

Effects of Writing about Emotions versus Goals on Hostility, Depressive Symptoms,
and Physical Health Parameters: The Moderating Role of
Emotional Approach Coping

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Abstract

A randomized, controlled trial compared emotionally disclosive writing (EMO; Pennebaker & Beall, 1986; $n = 24$), writing about long-term goals as the “best possible self” (BPS; after King, 2001; $n = 17$), and a control writing condition (CTL; $n = 22$); the trial evaluated emotional approach coping, i.e., efforts to cope through emotional processing (EP) and emotional expression (EE), as a moderator of writing effects on hostility, depressive symptoms, and physical health parameters in 63 undergraduate students. Emotional processing and emotional expression moderated the effects of writing condition on hostility at 1-month follow-up. Low EP participants reported less hostility in the BPS condition relative to the EMO condition, whereas high EP participants reported less hostility in EMO relative to BPS. Low EE participants reported less hostility in BPS, and high EE participants reported more hostility in BPS, relative to the EMO and CTL conditions. A moderating effect of EP on cynicism at 1 month also was identified, such that low EP participants reported more cynicism in EMO, and those high in EP reported less cynicism in EMO, compared to the other two conditions. Emotional processing moderated the effects of condition on the number of health care visits at 1-month follow-up. Low EP participants had fewer visits in BPS whereas high EP participants had more visits in BPS relative to the other two conditions. No main or moderated effects of condition were identified at 1-month follow-up on depressive symptoms, self-reported physical symptoms, or blood pressure.

Experimental studies using a paradigm developed by Pennebaker and Beall (1986) have demonstrated that emotional disclosure through writing produces physical and psychological health benefits across differing populations and stressors (e.g., Smyth, 1998; Frisina, Borod, & Lepore, 2004; Frattaroli, 2006). Findings, however, are not uniform, and extensions of the original paradigm have raised new questions regarding both mechanisms and moderators of writing benefits. As writing is developed as an intervention strategy, it is critically important to establish what individual difference variables and environmental contexts moderate physical and psychological health outcomes. Austenfeld, Paolo, and Stanton (2006) compared emotional writing about current stress to optimistic writing about future goals and accomplishments as the “best possible self” (King, 2001) in a group of third-year medical students. This study yielded several novel findings. Students with high baseline hostility evidenced reduced hostility at 3-month follow-up in the emotional disclosure writing condition, but hostility increased in students high in hostility at baseline who were assigned to write about goals or a control topic. Effects of writing condition on depressive symptoms were moderated by emotional approach coping (EAC; see Austenfeld & Stanton, 2004, for a review), a construct encompassing efforts to cope through emotional processing (EP), i.e., acknowledging and understanding emotion, and emotional expression (EE). In the medical student study, participants high in EP or EE reported lower levels of depressive symptoms when writing about emotion relative to the goal-writing and control conditions. For students low in EP or EE, writing about goals resulted in lower levels of depressive

symptoms compared to the other two conditions. Emotional processing also moderated the effects of writing condition on number of health care visits at 3-month follow-up; low EP participants had fewer visits in the goals condition compared to the emotional disclosure and control conditions (the number of visits did not appear to be affected by condition for high EP participants). The effects of writing on hostility are of particular interest, considering recent long-term prospective studies suggesting that hostility is a major risk factor for development of cardiovascular disease. The current study compared emotional versus goal-oriented writing in a sample of undergraduates, in an attempt to replicate the moderator effects of EAC and to further evaluate effects of writing on hostility, using a hostility measure that is employed in studies of cardiovascular disease.

Effects of Writing on Psychological and Physical Health in Third-Year Medical Students

The experimental writing paradigm developed by Pennebaker and Beall (1986) was designed to evaluate the positive correlation between non-disclosure of traumatic life events and physical illness, independent of social support, which had been identified in survey studies (e.g., Pennebaker & O’Heeron, 1984). In this experiment, college undergraduates were randomly assigned to write about a traumatic event in one of 3 forms: facts about the trauma only, emotions associated with the trauma only, or both facts and emotions related to the trauma. Control participants wrote about a trivial topic (e.g., a description of their living room). All participants wrote anonymously for 15 minutes on four consecutive nights and did

not receive feedback from the experimenters regarding their essays. Increased blood pressure and negative mood immediately after writing were found in participants who wrote about both the facts and the emotions associated with the trauma, but this group also had a significant decrease in health care visits for illness at 6-month follow-up. Similar results, although to a lesser degree, were obtained for the trauma-emotions only group, whereas the trauma-facts only group resembled the control group.

The next generation of studies explored the remarkable finding that a relatively brief period of emotionally expressive written disclosure about trauma produces health benefits several months after writing. A meta-analysis (Smyth, 1998) including the first decade of randomized studies using this experimental paradigm identified significant improvements in physical health, psychological well-being, physiologic parameters, and general functioning associated with emotionally expressive writing compared to non-emotional control writing. The mean weighted effect size for all outcomes was $d = .47$, representing a 23% improvement in the experimental groups; this effect size is similar to that associated with other psychological, educational, and behavioral interventions (Lipsey & Wilson, 1993).

Later studies extended these findings to reveal that improved health occurs not only after emotionally expressive writing about trauma, but also after writing about only the positive aspects or benefits of a traumatic event (King & Miner, 2000; Stanton et al., 2002). In an attempt to identify whether writing benefits accrue without specific attention to past or current negative life events, King (2001)

developed a writing task based on the work of Markus and colleagues (Markus & Nurius, 1986; Ruvolo & Markus, 1992), who described how individuals construct future self-concepts and demonstrated that construction of a competent, successful future self is associated with greater effort and persistence. King compared the effects of writing about future goals in an idealized, narrative form as one's "best possible self" (BPS) to emotionally expressive writing about trauma. Relative to control participants who wrote about their plans for the day, both the BPS and trauma participants rated their writing as important, emotional, and difficult and had fewer medical visits for illness at 5-month follow-up. The BPS participants, however, had a significant increase in positive mood and higher subjective well-being at 3-week follow-up compared to those writing about trauma, for whom many studies have shown a transient post-writing increase in negative affect (Smyth, 1998). This study showed that the benefits of writing are not solely attributable to disclosing emotional distress and/or creating a meaningful narrative about negative life events, as was initially hypothesized (Smyth & Pennebaker, 1999). King (2002) has suggested enhancement of self-regulation, i.e., the process of pursuing goals, attending to environmental feedback, and making appropriate changes in behavior based on that feedback, as a general mechanism for writing benefits. A recent meta-analysis of the writing paradigm and other forms of experimental disclosure validated the beneficial effects of disclosure, and noted that self-regulation theory as a mechanism has some degree of empirical support, although findings are limited by

the small number of studies including a positive disclosure condition (Frattaroli, 2006).

In an effort to replicate and extend King's (2001) findings, Austenfeld et al. (2006) compared writing about traumatic events to writing about goals in a group of third-year medical students. This population was deemed a particularly relevant group for comparison of emotionally expressive versus goal-oriented writing because third-year medical students work in an environment that both generates emotional stress and challenges their long-term professional and personal goals. The third year in most medical school programs is the first year of clinical clerkship, or full-time clinical training. Students rotate through the major medical specialties, participating in patient care while under the supervision of interns, resident physicians, and attending physicians. The clerkship experience often is stressful because of long hours worked, sleep deprivation, less personal time with friends and family, and being at the bottom of the physician hierarchy (Angoff, 2001). Students are often required to do mundane tasks and may be publicly humiliated by those above them in the hierarchy. Lubitz and Nguyen (1996) found that 68.5% of third-year medical students reported being verbally abused and that 64.3% of women students reported being sexually harassed. With regard to their long-term goals and ideals, students may experience disillusionment and erosion of their ethical standards during clerkships. In one study, 98% heard physicians refer derogatorily to patients, 58% reported having done something they thought was unethical, 61% observed unethical

behavior by others, and 62% reported that some of their ethical principles had been eroded or lost (Feudtner, Christakis, & Christakis, 1994).

The primary hypothesis of this study was that both emotionally disclosive writing and narrative goal-oriented writing as the best possible self would enhance physical health and psychological adjustment relative to a control condition. Another goal was to evaluate emotional approach coping (EAC), a construct including coping through acknowledging, understanding, and expressing emotion, as a previously untested moderator of writing benefits. Two prior experiments had suggested the importance of matching emotional expression as a preferred coping strategy to environmental demands. Undergraduates high in emotionally expressive coping evidenced less negative affect and physiologic arousal when randomly assigned to talk to an interviewer about their emotions rather than the facts regarding a parent's chronic illness, compared to those low in emotional expression (Stanton, Kirk, Cameron, & Danoff-Burg, 2000b, Study 4). In a group of breast cancer patients, women reporting high emotional expression as a coping strategy for dealing with breast cancer had fewer medical visits and less distress compared to those low in emotional expression, and also had enhanced quality of life if they rated their social context as receptive to their emotional expression (Stanton et al., 2000a). Based on these studies, it was predicted that medical students high in EAC would benefit more from writing when randomized to the emotional expression condition, whereas students low in EAC might benefit more from writing about goals in the BPS condition.

The 64 third-year medical students participating in this study, 35 men and 29 women, with a mean age of 26.4 years, completed a set of baseline questionnaires and were randomized to 1 of 3 writing conditions: 1) describing their deepest thoughts and feelings about their most “upsetting, traumatic, frustrating, or challenging” experiences during their clinical clerkships (EMO); 2) describing their future as if all their professional and personal goals had been accomplished, including a description of how they overcame at least one major obstacle (BPS); 3) describing everything they had done for the past 24 hours, without mentioning emotions or opinions (control condition, CTL). Participants wrote about the assigned topic for 25 minutes during 3 sessions that were spaced approximately 1 week apart and completed questionnaires at 3-month follow-up.

Emotional approach coping was evaluated at baseline using the EAC scale (Stanton, Danoff-Burg, Cameron, & Ellis, 1994; Stanton et al., 2000b) containing 2 separate subscales of emotional processing (EP), i.e., acknowledgement of and attempts to understand emotion, and emotional expression (EE). Psychological adjustment dependent variables included depressive symptoms and the specific negative affects of fear, hostility, guilt, and sadness. Physical health outcomes consisted of self-reported physical symptoms and the number of visits to health care providers for illness over the 3-month follow-up period. Primary analyses were analyses of covariance, controlling for baseline values on self-report measures and for the 3-month period prior to the study for the number of health care visits. Moderating effects of EP and EE were evaluated using 2-way ANCOVAs

controlling for baseline levels on dependent variables, with EP or EE (in their continuous form), writing condition, and their interaction as independent variables.

This study yielded two previously unreported effects of writing on psychological adjustment. First, a specific effect of emotionally expressive writing on hostility was identified, but only for participants relatively high in baseline hostility, with significantly lower hostility at 3 months in participants randomized to the EMO condition compared to the BPS and control groups. The level of hostility reported by the medical students overall in this study at 3-month follow-up was not elevated ($M = 10.80$) compared to normative data in a large population of college students, in whom the mean hostility level was 11.2, $SD = 4.6$ (Watson & Clark, 1991). The intriguing finding is the change in hostility according to writing condition; for students with baseline hostility at least one standard deviation above the mean, hostility decreased after writing about emotions, but increased after writing about goals or the control topic.

Results suggested that for individuals entering difficult situations such as medical clerkships with higher hostility, even brief expressive writing may have a lasting beneficial effect. Several participant essays illustrated how the EMO condition provides a vehicle for open expression of anger, hostility, and frustration. For example, the following excerpt was written by a student whose level of hostility decreased from 15 at baseline to 10 at 3-month follow-up (identifying details deleted):

One of the most maddening moments so far was during my ... rotation... My awful night started when my beeper went off and I was asked to do some scut work... This I didn't even mind very much. You have to understand a little of how it feels to try to fall asleep when you're a student on call. It's impossible. When residents and attendings get called they know they are going to a situation that they feel comfortable with (most likely). For a student you know you are going to a situation about which you will know little and be poorly prepared. You don't know what to expect, and nobody else cares. I'm clenching my teeth right now.

Now I will recount my night on call. Around 5 am I get paged to ... [a phone number with too many digits]. I tried calling different combinations of the numbers, but there was no response. Being the diligent student I decided to go figure out what was going on anyway. I went up to the floor only to find that the ... intern was gone taking a shower. So I decided to go back to the ... to check there next. Turned out that there was nothing happening there either. So I went back to the ... floor and lo and behold there was the intern. It was now close to 5:30. All he could say was, "Where have you been! I have been paging you! We have 4 new admissions!" Then he told me to put the new patient's info in the computer. Pause. I don't know what computer, which file, there is no patient information available! So I stumble through the process of finding and putting info on the computer, when I realize that it's 6 am. I need to be starting to work on my own patients downstairs now if I hope to be done by 7 am for class. Of course the intern came and chewed me out some more and probably gave me a horrible evaluation. Well, I gave him a bad evaluation too. It's just so frustrating to work so hard, have so much stress, do all you can and still get graded down because of instances like this. What am I supposed to do? It's a no win situation! We have these pins that say "humanism in medicine" that we wear on our white coats. Still, true humanism is sometimes a rare thing in the life of a third-year medical student....

The second novel finding in this study was the moderation of writing condition effects on depressive symptoms and number of health care visits by the emotional approach coping components of emotional processing and emotional expression. Participants high in EP or EE assigned to the EMO condition had lower levels of depressive symptoms compared to those in the BPS and control conditions. It was noted that the predicted CES-D level in high EP participants randomly

assigned to write about goals approached 16, a commonly used cutoff value for this screening instrument, with scores at or above 16 suggesting clinical depression (Roberts & Vernon, 1983; Hsu & Marshall, 1987). For participants low in EP or EE, the goals condition produced lower levels of depressive symptoms compared to the emotional disclosure and control conditions. Although condition effects were not identified for other psychological adjustment variables, means for these variables were in the direction of enhanced adjustment for high EP and high EE individuals in the EMO group compared to the other 2 conditions. With regard to physical health outcomes, EP moderated writing condition effects on number of health care visits. Participants low in EP in the BPS group had fewer visits relative to the emotional disclosure and the control groups, but condition did not appear to affect number of visits for high EP participants.

This study was limited by insufficient power to detect some medium-sized effects, although the sample size of approximately 20 participants per condition yielding significant differences on health outcomes in other experiments was met (Smyth, 1998). Given recent data pointing to hostility as major risk factor for cardiovascular disease, reduction of hostility through writing merits further investigation. The consistent pattern of means indicating enhanced adjustment in high EP and EE participants in the EMO condition across all psychological outcomes also requires further study, because it strongly suggests that individuals who cope through processing and expressing emotion represent a group for whom emotionally expressive writing is particularly helpful.

Hostility and Health

A now classic body of early research in health psychology examined the link between the Type A behavior pattern (TABP) and the development of coronary artery disease (see Smith & Gallo, 2001, for a review). TABP, including hostility, achievement striving, competitiveness, job over-involvement, and time urgency, is measured using the Structured Interview (SI) developed by Rosenman (1978), as well as several less widely used instruments (e.g., Jenkins Activity Survey, Jenkins, Rosenman, & Zyzanski, 1974; Framingham Type A Scale, Haynes, Feinleib, & Kannel, 1980). Large-scale clinical studies of TABP yielded conflicting results, but a review of this literature suggested that TABP measured with the SI is a reliable risk factor for development of CHD (Miller, Turner, Tindale, Posavac, & Dugoni, 1991). A closer analysis of the elements of the TABP, however, has suggested that hostility is the trait most closely associated with CHD (see Smith & Ruiz, 2002 for a review). Hostility in this body of research includes a cognitive construct referring to an attitude towards others characterized by ill will, denigration, and cynical mistrust (Smith, 1994). Hostility is related to the emotional state of anger, which may be transient or trait-like, and aggressive behavior, which may be verbal or physical. The assessment of hostility has been dominated by two types of measures: structured interviews such as the Interpersonal Hostility Assessment Technique (IHAT), based on the Structured Interview for TABP (Barefoot & Lipkus, 1994) and self-report instruments, such as the widely used Cook and Medley Hostility (Ho) scale, a subscale of the MMPI (Cook & Medley, 1954). The IHAT scores the subject's

interactions with the interviewer for confrontations or direct challenges, uncooperative or hostile evasiveness, indirect challenges, and irritability. The Ho scale was empirically derived and possesses some difficulties with internal structure, but has established convergent validity, large data sets for study, and convenience of the self-report format. A meta-analytic review (Miller, Smith, Turner, Guijarro, & Hallet, 1996) concluded that measures based on the Structured Interview were most strongly and consistently associated with CHD. The Ho scale had a smaller association with CHD and was a stronger predictor of all-cause mortality than CHD.

More recent prospective studies have demonstrated strong predictive utility of the Ho scale for CHD and related disorders, over and above other traditional behavioral, psychological, sociodemographic and physiological risk factors. A study of 774 older men without CHD at baseline demonstrated that hostility measured by the Ho scale is an independent risk factor for the development of CHD (Niaura et al., 2002). The study included evaluations of the metabolic syndrome, a group of risk factors consisting of visceral obesity, insulin resistance, hyperglycemia, hypertension, and dyslipidemia, behavioral factors (calorie intake, tobacco use, and alcohol use) and sociodemographic factors as predictors of CHD. Only hostility measured with the Ho scale positively predicted, and high-density lipoprotein cholesterol level negatively predicted development of CHD at 3-year follow-up. No other variables, including other elements of the metabolic syndrome, were significant predictors and there was no definitive evidence that the effects of hostility were mediated or moderated by any of the other factors.

The predictive value of the Ho scale has been extended to young adults, adolescents, and children. In a subset of participants from the CARDIA study, a large, prospective, multicenter population-based study of CHD risk factors in young adults, including approximately equal numbers of participants across gender, race, age (ranging from 18 to 30 years), and education, hostility based on the Ho scale was positively associated in a graded fashion with the presence of coronary artery calcifications at 10-year follow-up (Iribarren et al., 2000). These calcifications are measured using electron-beam computed tomographic scans and are a marker of subclinical coronary artery atherosclerosis. Controlling for other behavioral, physiological, and demographic factors, participants with Ho scores above the median were twice as likely to have calcifications as those with Ho scores below the median. The CARDIA study also revealed graded, or “dose-response” positive associations between both hostility measured with the Ho scale and time urgency/impatience (TUI), a subscale of the Framingham Type A Questionnaire, with the development of hypertension at 15-year follow-up, controlling for other hypertension risk factors (Yan et al., 2003). No significant associations with hypertension were found for achievement striving, the other component of type A behavior, depression, or anxiety. In a study of African American and white children (ages 8 to 10 years) and adolescents (ages 15 to 17 years), hostility measured with both the Ho scale and Type A Adolescent Structured Interview positively predicted development of the metabolic syndrome, particularly obesity and insulin resistance, at 3-year follow-up (Raikkonen, Matthews, & Salomon, 2003).

Strong empirical evidence thus supports the independent role of hostility in the development of CHD as well as its contribution to other medical disorders that predispose to CHD. In prospective studies, hostility has also been associated with interpersonal difficulties, i.e., marital conflict (Miller, Markides, Chiriboga, & Ray, 1995). Intervention programs designed to reduce hostility/anger have demonstrated efficacy for various populations (e.g., Beck & Fernandez, 1998) including CHD patients (Gidron, Davidson, & Bata, 1999), but these interventions consist of several weeks of group or individual treatment. Considering the reduction in self-reported hostility, although it was not measured using the Ho scale, found in the medical student study, does expressive writing hold promise as a simple, cost-effective intervention for hostility, or at least as an adjunct to other hostility/anger interventions? Pre-existing data are limited, because most writing studies report psychological outcomes in terms of general negative affect and well-being, without specific mention of hostility.

In the medical student study, hostility was measured with a subscale from the PANAS-X (Watson & Clark, 1991), a measure that may be used with different temporal instructions ranging from state to trait. Across all instruction sets, the measure has established internal consistency reliability, convergent validity, and discriminant validity. The hostility subscale item set appears to tap both the emotion of anger and the cognitive dimension of hostility. The medical students were instructed to describe how they had felt for the past few weeks, providing a rating of recent mood rather than current affect or a trait characteristic. The EMO writing

instructions in this experiment added the word “frustrating” to the types of experiences participants could write about, along with “traumatic” experiences, which is the standard instruction for emotionally disclosive writing (Smyth, 1998). The specific mention of frustration, along with the clinical clerkship context, may have contributed to the observed effects of emotional writing on hostility. The current study sought to evaluate whether this finding generalizes to a more diverse sample of young adults and added the Cook–Medley Ho scale as a measure of hostility, in order to allow comparison with the studies of hostility and health described above.

Emotional Approach Coping as a Moderator of Writing Benefits

A second major focus of the current study was to further explore the role of emotional approach coping as a moderator of writing effects. In the medical student sample, there was evidence for enhanced adjustment for students high in EAC who were randomly assigned to the emotional expression condition compared to the BPS or control conditions and for students low in EAC randomly assigned to the BPS condition versus the emotional expression or control conditions. With increasing interest in the use of expressive writing as a therapeutic intervention (Smyth & Catley, 2002) and self-help strategy (Pennebaker, 2004), it is important to investigate what type of writing is most effective for whom.

The construct of emotional approach coping was developed in response to a discrepancy between the stress and coping literature and modern emotion research. In their highly influential transactional theory, Lazarus and Folkman (1984)

suggested that coping occurs in 2 basic forms: problem-focused coping, consisting of direct efforts to alter the demands on the person, and emotion-focused coping, representing efforts to regulate the emotions associated with the stressful event. Problem-focused coping strategies include defining the problem, generating and weighing alternative solutions, and following a plan of action. Emotion-focused coping consists of a wider variety of strategies such as avoidance, denial, seeking emotional support, and positive reappraisal. Lazarus and Folkman (1984) repeatedly emphasized that both strategies have adaptive potential and that consideration of the context in which the strategies are used is essential when evaluating outcomes of coping efforts. Many researchers, however, compared problem-focused coping with emotion-focused coping and concluded that emotion-focused coping is a maladaptive strategy. In fact, as Coyne and Racioppo (2000) commented, the positive relationship of emotion-focused coping with psychological distress may be the most consistently reported finding in the empirical coping literature. An illustrative review of the PsycInfo database from 1995 through 1998 located empirical studies describing findings regarding emotion-focused coping in a sample adults or adolescents (Stanton, Parsa, & Austenfeld, 2002). The three most commonly used coping measures were the Ways of Coping Questionnaire (WOC; Lazarus & Folkman, 1985), the COPE (Carver, Scheier, & Weintraub, 1989) and the Coping Inventory for Stressful Situations (CISS; Endler & Parker, 1990, 1994). In studies using these measures, there was wide variation in the operationalization of emotion-focused coping. Many studies did not employ the originally derived emotion-focused

subscales of the WOC and the COPE, for example, but instead used composites of subscales or selected items as measures of emotion-focused coping. These modifications were usually not described in abstracts or conclusions; researchers often referenced outcomes related to “emotion-focused coping” rather than the more circumscribed constructs that were actually assessed, (e.g., avoidance). In addition, studies that examined the subscales most relevant to coping through processing and expressing emotions (i.e., CISS emotion-oriented coping scale and COPE Focus on and Venting of Emotion scale) consistently found positive associations between those scales and indicators of maladjustment, such as symptoms of anxiety or depression, neuroticism, low life satisfaction, or eating disturbance. All 19 studies using the CISS and 7 of 8 studies using the COPE reported correlations of emotion-focused strategies with maladjustment.

The association of emotion-focused coping with negative outcomes conflicts with research in diverse fields based on the functionalist view that emotions produce cognitive, physiologic, and behavioral effects allowing efficient adaptation to varying demands from the environment (Levenson, 1994). Theoretical, empirical, and applied work based on this functionalist perspective includes the developmental construct of emotional competence (e.g., Saarni, 1990), the personality construct of emotional intelligence (e.g., Salovey, Bedell, Detweiler, & Mayer, 1999), and clinical approaches such as process-experiential therapy (e.g., Greenberg & Pavio, 1997) and the developmental constructivist approach (Mahoney, 1991). As demonstrated by Stanton and colleagues, the discrepancy between this new research

on emotion and the “bad reputation” of emotion-focused coping (Stanton & Franz, 1999, p. 96) is related to the way emotion-focused coping has been operationalized in coping measures (Stanton et al., 1994). In several of the most widely used coping instruments, a majority of items designed to tap emotion-focused coping also contain expressions of emotional distress or self-deprecation. It is not surprising that measures containing these items produce positive correlations of emotion-focused coping with dysfunction, particularly in cross-sectional studies.

To address the problems in existing measures, Stanton and colleagues developed a new set of items designed to measure coping through acknowledging, understanding and expressing emotions, without any mention of distress or self-deprecation (Stanton et al., 2000b). Exploratory and confirmatory factor analyses of these items yielded two distinct emotional approach coping factors: emotional processing (EP) and emotional expression (EE). Items measuring emotional processing, which encompasses both the identification of and attempts to understand emotion, include: “I acknowledge my emotions,” “I realize that my feelings are valid and important,” “I take time to figure out what I’m really feeling,” and “I delve into my feelings to get a thorough understanding of them.” Items measuring emotional expression include: “I feel free to express my emotions,” “I take time to express my emotions,” “I allow myself to express my emotions,” and “I let my feelings come out freely.”

In both dispositional and situational versions, these item sets have high internal consistency and test-retest reliability, are uncorrelated with social

desirability, and have established convergent and discriminant validity (Stanton et al., 2000b). They are distinct from other forms of coping and are uncorrelated with the personality variable of neuroticism, except for the finding that neuroticism is negatively correlated with emotional processing in women. The EAC dimensions of EP and EE are moderately to highly intercorrelated, but have different associations with outcome measures, depending on context, and should be measured separately. With regard to predictive utility, longitudinal studies have demonstrated associations between EAC and enhanced adjustment to stressors including chronic pain, infertility, and breast cancer (Smith, Lumley, & Longo, 2002; Berghius & Stanton, 2002; Stanton et al., 2000a). It should be noted that in studies of undergraduates, EP has been associated with improved psychological outcomes in women, but diminished adjustment in men. Studies of somewhat older men, however, have linked EAC to enhanced adjustment (i.e., to chronic pain and infertility). As noted earlier, the finding that medical students high in EAC tended to benefit from emotionally expressive writing rather than goal-oriented writing was expected based on studies indicating that emotional expression as a preferred coping strategy is particularly effective when matched to a receptive environment (Stanton et al., 2000b, Study 4; Stanton et al., 2000a).

The goal of the current study was to replicate and extend the study of medical students described above by comparing the effects of emotionally expressive writing about current stress to writing about long-range goals as the best possible self in a larger sample of undergraduates. To allow comparison with research on hostility and

cardiovascular disease, the self-report hostility measure most often used in this research was added as a dependent variable. Additional dependent variables measured at 1-month follow-up included depressive symptoms and physical health indicators. Because pre-existing data are limited, this study also included an exploratory measurement of blood pressure at baseline and 1-month follow-up. Although writing studies have demonstrated acute changes in cardiovascular reactivity, including increased blood pressure, immediately following emotionally disclosive writing (e.g., Pennebaker & Beall, 1986), measurement of blood pressure at follow-up has been reported rarely, and only in community-based adult samples. In a study of normotensive adults, emotionally expressive writing was associated with decreased blood pressure at 6 weeks (Crow, Pennebaker, & King, submitted), and in a sample of hypertensive adults, emotionally expressive writing was associated with decreased blood pressure at 4 months only in participants with higher initial levels of suppressed anger, relative to participants low in initial levels of suppressed anger (McGuire, Greenberg, & Gervirtz, 2005), demonstrating a moderating effect of unexpressed anger on writing effects.

Based on the medical student study and other previous research, the hypotheses evaluated at 1-month follow-up in this study were:

1. A condition x baseline hostility interaction will emerge such that emotionally expressive writing will produce decreased hostility in participants with high levels of hostility at baseline, relative to a control condition.

2. A condition x emotional approach coping interaction will emerge such that individuals high in EAC will experience greater psychological and physical health benefits in the emotional expression condition than the BPS condition, whereas individuals low in EAC may accrue more benefits from the BPS condition than the emotional expression condition.
3. Both experimental conditions will produce improved psychological adjustment and improvement in physical health indicators relative to the control condition.
4. The effects of writing on blood pressure also will be explored.

Method

Participants

Participants were 63 undergraduate students at the University of Kansas, 44 women (69.8%) and 19 men (30.2%), selected from the General Psychology participant pool based two inclusion criteria: rating their stress level at 3 or higher on a 7-point scale with respect to their current most stressful situation (1 = not at all stressful; 7 = extremely stressful) and rating that situation as 5 or lower in terms of how much control the participant perceived over the situation's outcome (1 = no control at all; 7 = complete control). The screening questions are included in Appendix C. Students responded to these items on the online General Psychology participant pool pre-screening questionnaire. The inclusion criteria were intended to select for stressors at least somewhat similar to the medical student clerkship, in which students are often frustrated by their lack of control. There were no exclusion criteria. Participants had a mean age of 19.3 years ($SD = 1.19$, range = 18 to 24) and

were predominantly white (87.3%), with 1.6% African American, 6.3% Latino, 3.2% Asian, and 1.6% other ethnicities. Most were single (95.2% of the 62 who responded were single; one participant did not report marital status) and did not have children (98.4%).

Twenty-four additional participants were not included in analyses as follows: 1 read the consent form and chose not to continue, stating that she could not write well in English, 1 completed the first session assessments and left before writing, 15 completed Session 1 only, 3 completed Sessions 1 and 2 only, and 4 completed Sessions 1, 2, and 3 only. Thus, of the 87 participants initially recruited, 72.4 % completed all four sessions. Chi-square analysis did not reveal a significant difference in gender or condition assignment for students who completed the study (EMO = 24, BPS = 17, CTL = 22) versus those who began but did not complete it (EMO = 4, BPS = 11, CTL = 8). Analysis of variance did not reveal a significant difference in age or baseline values on dependent variables between completers and noncompleters, with the exception of diastolic blood pressure, $F(1, 81) = 5.64, p = .020$; noncompleters had higher baseline diastolic blood pressure ($M = 71.25, SD = 6.58$) relative to completers ($M = 67.68, SD = 5.84$).

Procedure

Following approval of the study by the University of Kansas Human Subjects Committee, students meeting the inclusion criteria above signed up online for the first session. All sessions were conducted by the investigator. Participants reported to a private room where the investigator introduced the study. They signed an informed

consent form (see Appendix A) after being given the opportunity to have any questions about the study answered. Participants were left alone to rest or read quietly for five minutes. The investigator then took participants' blood pressure using an automated blood pressure cuff three times at 1-minute intervals.

Participants were escorted to an adjacent semi-private room where they sat alone at a desk in a cubicle and completed a set of baseline questionnaires. They were then randomized to one of 3 writing conditions (see below), with randomization stratified by gender. Participants listened to a CD with instructions (Appendix B) using a CD player with headphones at their cubicle and began writing. Cubicles were arranged such that students could not view anyone else while completing questionnaires or writing. The number of participants writing in the room varied from 1 to 5, and there was minimal contact between participants and minimal noise (a private room for each participant was not available due to classroom space limitations.) The writing instructions were previously recorded on CDs by the investigator. An independent person then labeled the CDs and corresponding conditions only by number, such that the investigator was blind to condition assignment. There were two exceptions to this procedure: a hearing-impaired participant was randomly assigned to a condition by the investigator, who then read the writing instructions aloud in a private room, and another participant completed 1 of the 3 writing sessions in a private room due to lack of an available cubicle in the semi-private room.

The three writing conditions to which participants were assigned included: 1) describing their deepest thoughts and feelings about their most “stressful, upsetting, frustrating, traumatic, or challenging” current experience (EMO); 2) writing about their future as if all of their life goals had been achieved, with a description of how they overcame at least one obstacle (BPS); 3) objectively describing what they had done for the past 24 hours in detail, without opinions or expression of emotions (CTL). Participants wrote about the assigned topic during three 20-minute sessions, scheduled approximately one week apart. After writing, participants placed their essay in an envelope identified only with a study number, and gave the envelope to the investigator. At the end of the third writing session, participants were given a form to record any visits to health care providers over the next 4 weeks. Participants returned for a fourth session approximately 4 weeks later, during which their blood pressure was taken by the investigator in a private room, using the same procedure as in Session 1, and they completed a packet of follow-up questionnaires. All sessions were completed within 9 weeks. Students received course credit after completing each session.

Measures

Emotional approach coping. The proposed moderator variable, emotional approach coping, was measured at baseline with the Emotional Approach Coping (EAC) scale (Stanton et al., 2000b), consisting of the Emotional Processing (EP) and Emotional Expression (EE) subscales. In this study, the 4-item versions of these subscales were used, and participants were instructed to complete the items with

respect to what they had done to cope with their current most stressful situation (Appendix C). The Emotional Approach Coping scales have established internal consistency and predictive utility (Stanton et al., 2000a, Stanton et al., 2000b). The 4 EP and 4 EE items were embedded in the COPE (Carver, Scheier, & Weintraub, 1989), a measure of 15 coping strategies.

Hostility. The Cook-Medley Hostility (Ho) scale (1954), an empirically derived measure consisting of 50 true-false items from the MMPI (Hathaway & McKinley, 1943), has established convergent validity with other measures of hostility. This study used the MMPI-2 version of the Ho scale at baseline and 1-month follow-up. It contains essentially the same items as the original scale, with some items slightly edited to improve readability (Han, Weed, Calhoun, & Butcher, 1995). The PANAS-X Hostility subscale (Watson & Clark, 1991) also was completed at baseline and 1-month follow-up, and was given with the PANAS-X, an affect measure with established internal consistency reliability and convergent and discriminant validity. The instruction set used in this study asked participants to rate items according to how they had been feeling for the past few weeks.

Depressive symptoms. The Center for Epidemiologic Studies Depression scale (CES-D; Radloff, 1977) provided a measure of depressive symptoms at baseline and 1-month follow-up. The CES-D has established reliability and validity as a measure of depressive symptoms in the general population (Roberts & Vernon, 1983).

Physical symptoms. A modified 9-item version of a measure developed by Pennebaker (1982), the Pennebaker Inventory of Limbic Languidness (PILL), was used to evaluate physical symptoms at baseline and at 1-month follow-up. This measure asked participants to indicate on how many of the past 30 days they experienced a variety of physical symptoms that were unrelated to exercise.

Medical care utilization. With a signed release giving the experimenter permission to request this information, the number of visits for illness (not injury) participants made to the university student health center and, for a subset of 20 participants for whom these data were available, to private health care providers, for the 1-month period prior to the study and for the 1-month follow-up period was counted by student health center or physician's office personnel and reported to the experimenter.

Blood pressure. Using a method similar to that of Yan et al. (2003), blood pressure was obtained at baseline and at 1-month follow-up. Participants first sat at rest for 5 minutes, and arm blood pressure was then measured at three 1-minute intervals using an automated blood pressure monitor (Omron Model HEM-780). Averages of the second and third measurements were calculated.

Manipulation check and essay ratings. An independent rater unaware of participants' condition assignment read the essays in random order and recorded which condition instructions they most reflected. At 1-month follow-up, participants rated on a 7-point scale (1 = not at all; 7 = a great deal) how valuable or meaningful the project was to them, how interesting it was, how much it increased their

understanding of their experience, and how much they expected their participation to have lasting positive and negative effects.

Statistical Analysis

To establish that randomization was successful, preliminary analyses of variance for continuous variables and χ^2 analyses for categorical variables, with condition as the independent variable, were performed on all demographic variables and baseline dependent variables. Preliminary analyses of covariance, with baseline values on the dependent variables as covariates, also were conducted to examine effects of gender and gender x condition interactions. Primary analyses were multiple regression models including dummy-coded experimental condition as a categorical independent variable, emotional processing (EP) or emotional expression (EE) as a centered continuous independent variable, and their interaction, to test their effects on each dependent variable. Models included baseline values of the relevant dependent variable as a covariate.

Results

Analyses on Baseline Data

Analyses of variance revealed that experimental groups did not differ significantly on baseline values of dependent variables including hostility, depressive symptoms, self-reported physical symptoms, number of health care visits and blood pressure. Experimental groups contained approximately equal numbers of males and females, $\chi^2(2, N = 63) = 1.57, p = .457$, with 7 males and 17 females in the EMO condition, 7 males and 10 females in the BPS group, and 5 males and 17 females in

the CTL group. Significant gender differences were identified for emotional processing, $F(1,61) = 4.68, p = .034$ (males, $M = 2.45, SD = .61$; females, $M = 2.82, SD = .64$) and emotional expression, $F(1, 61) = 4.43, p = .039$ (males, $M = 2.38, SD = .76$; females, $M = 2.85, SD = .84$) Experimental groups did not differ in age of participants. Numbers were not sufficient for reliable χ^2 analysis of ethnicity, but white versus non-white participants were fairly evenly distributed across groups. Overall, the findings indicate successful randomization.

Manipulation Check and Essay Ratings

An independent rater classified 187 of the 189 essays (98.9%), ordered randomly, into the correct condition, indicating excellent adherence to writing instructions for participants who completed the study. As shown in Table 1, univariate ANOVA on participant ratings of their writing experience, with experimental condition as the independent variable, revealed a significant difference on how valuable or meaningful the experience was, $F(2, 59) = 5.37, p = .007$, with EMO participants rating it as more valuable or meaningful ($M = 4.08, SD = 1.64$) than did controls ($M = 2.76, SD = 1.30$). The ANOVAs for the ratings of how interesting the project was and of long-lasting positive effects from the project did not reach significance, but did show trends for EMO participants to rate their participation as more interesting than controls ($p = .081$) and for BPS participants to report more positive effects than controls ($p = .086$). Ratings of how much the project increased participants' understanding were not significant, but means were in the direction of the EMO group reporting increased understanding relative to the

other groups. No significant difference on the rating of long-lasting negative effects from the project was found, with all groups rating negative effects as low.

Descriptive statistics for participant ratings are provided in Table 1.

Table 1

Descriptive Statistics on Participation Ratings at 1-month Follow-up

Dependent variable	EMO	BPS	CTL
Project valuable/meaningful	4.08 (1.64)	3.82 (1.13)	2.76 (1.30)
Project interesting	4.71 (1.73)	4.53 (1.12)	3.76 (1.30)
Project increased understanding	3.38 (1.74)	2.82 (1.55)	2.62 (1.66)
Positive effects	2.96 (1.55)	3.24 (1.75)	2.19 (1.12)
Negative effects	1.29 (.62)	1.12 (.33)	1.29 (.78)

Note: Standard deviations are in parentheses below the means.

Analyses on 1-Month Follow-up Data

Preliminary ANCOVAs did not reveal significant main effects of gender or gender x condition interactions on dependent variables at 1-month follow-up, and gender was not included as an independent variable in subsequent analyses.

Descriptive statistics for all dependent variables by condition are displayed in Table

2. In primary analyses, emotional processing (EP) or emotional expression (EE) was entered as a centered continuous independent variable and dummy-coded experimental condition as a categorical independent variable, along with their interaction, to test their effects on each dependent variable. The dependent variables were two hostility scales (i.e., PANAS-X hostility and the Ho scale including its four subscales, Cynicism, Hypersensitivity, Aggressive Responding, and Social Avoidance), depressive symptoms, self-reported physical symptoms, number of health care visits, and blood pressure. All models included the baseline level of the dependent variable as a covariate. Significant interactions were plotted and interpreted according to the recommendations of Aiken and West (1991). Sample size varied in some analyses due to missing data for some participants.

Table 2

Descriptive Statistics on Dependent Variables at Baseline and 1-month Follow-up

Dependent Variable		EMO	BPS	CTL
PANAS-X Hostility	Time 1	10.42	10.63	10.32
		(3.78)	(3.81)	(3.40)
	Time 2	10.42	11.50	10.18
		(3.48)	(3.65)	(3.26)
Ho Scale	Time 1	18.82	18.43	15.38
		(5.92)	(6.74)	(5.69)
	Time 2	18.71	18.77	16.69
		(5.98)	(6.83)	(8.32)

Dependent Variable		EMO	BPS	CTL
Ho Cynicism	Time 1	8.83	9.13	8.11
		(3.24)	(3.85)	(3.63)
	Time 2	8.83	8.40	7.56
		(3.22)	(3.83)	(3.84)
Ho Hypersensitivity	Time 1	4.89	4.43	3.83
		(2.74)	(2.90)	(2.57)
	Time 2	4.39	5.21	4.72
		(2.50)	(2.55)	(3.01)
Ho Aggressive Responding	Time 1	4.26	4.18	3.67
		(1.94)	(1.98)	(1.98)
	Time 2	4.55	4.25	4.05
		(1.95)	(1.73)	(2.42)
Ho Social Avoidance	Time 1	1.20	1.13	.85
		(1.28)	(1.13)	(.81)
	Time 2	1.05	1.13	1.20
		(1.23)	(1.30)	(1.01)
CES-D	Time 1	12.42	11.82	13.95
		(11.76)	(6.64)	(10.01)
	Time 2	13.29	12.12	13.68
		(8.99)	(5.71)	(9.64)
Self-reported physical symptoms	Time 1	35.25	29.65	37.32
		(30.62)	(23.01)	(30.31)
	Time 2	28.18	23.29	29.32
		(34.59)	(21.23)	(20.71)

Dependent Variable		EMO	BPS	CTL
Health care visits	Time 1	.29	.12	.18
		(.75)	(.33)	(.50)
	Time 2	.13	.18	.18
		(.34)	(.39)	(.50)
Systolic blood pressure	Time 1	106.11	109.47	107.16
		(10.72)	(10.50)	(10.80)
	Time 2	105.52	106.50	107.00
		(10.59)	(10.08)	(9.28)
Diastolic blood pressure	Time 1	68.80	65.97	67.75
		(5.74)	(5.14)	(6.36)
	Time 2	68.09	65.47	67.95
		(7.32)	(6.29)	(7.46)

Note: Standard deviations are in parentheses below the means.

Analyses on psychological variables. No significant main effects for condition emerged on any psychological dependent variable. However, significant interactions between EP and EE and condition, identified by significant changes in R^2 when adding the interaction terms to the regression model, were found for the prediction of PANAS-X hostility at 1-month follow-up. The form of the interaction between EP and condition (R^2 change = .085, $F(2, 55) = 3.85$, $p = .027$) is illustrated in Figure 1. For participants low in EP, the BPS condition resulted in lower hostility relative to the EMO condition at 1-month follow-up. For those high in EP, the EMO

condition resulted in lower hostility relative to the BPS condition. Predicted levels of hostility for the CTL group varied minimally with level of EP. In the significant interaction between EE and condition on PANAS-X hostility (R^2 change = .071, $F(2, 55) = 3.16, p = .050$), as seen in Figure 2, the BPS condition produced low hostility for low EE participants and higher hostility for high EE participants with a pattern similar to that seen for BPS moderated by EP. In contrast to the findings for EP, however, hostility did not vary substantially with EE level in the EMO condition, and in CTL, there was slightly higher predicted hostility in low EE versus high EE participants.

Emotional processing and condition interacted in the prediction of another hostility variable, the Cynicism subscale of the Ho measure (R^2 change = .095, $F(2, 44) = 4.39, p = .018$). As illustrated in Figure 3, for low EP participants, writing about emotion produced higher cynicism at follow-up relative to BPS and CTL, which differed only slightly, whereas for those high in EP, the emotion task produced lower cynicism relative to BPS and CTL. No significant interactions emerged on the Ho subscales of Hypersensitivity, Aggressive Responding, or Social Avoidance or on depressive symptoms.

Analyses on physical health indicators. A significant interaction between EP and condition was identified for the prediction of the number of health care visits¹ at 1-month follow-up (R^2 change = .097, $F(2, 56) = 3.31, p = .044$). For participants low in EP, the BPS condition resulted in fewer health care visits, whereas for those high in EP, the BPS condition resulted in more visits, relative to EMO and BPS.

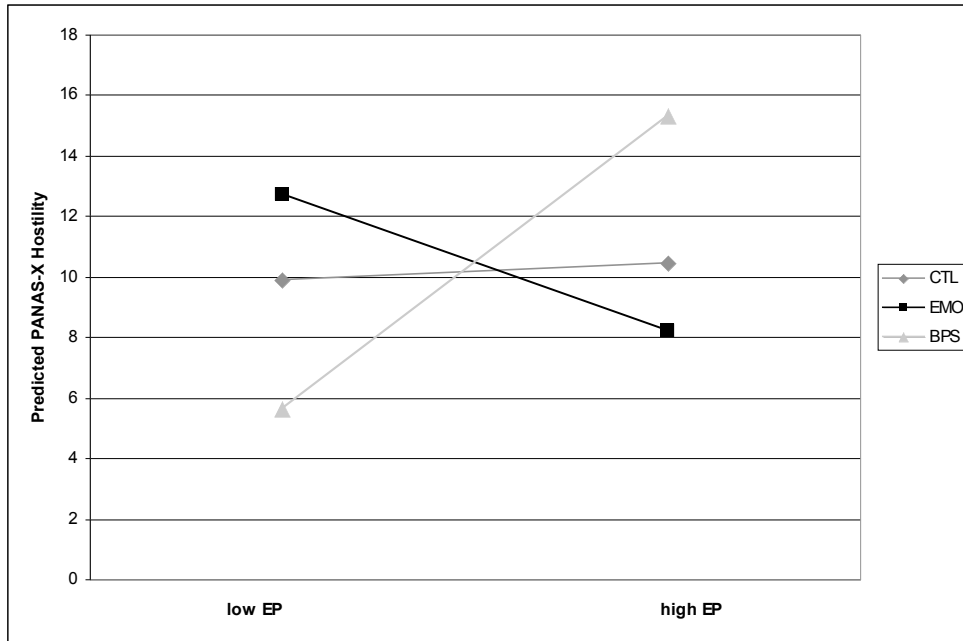


Figure 1. Emotional processing x condition interaction on prediction of hostility at 1-month follow-up.

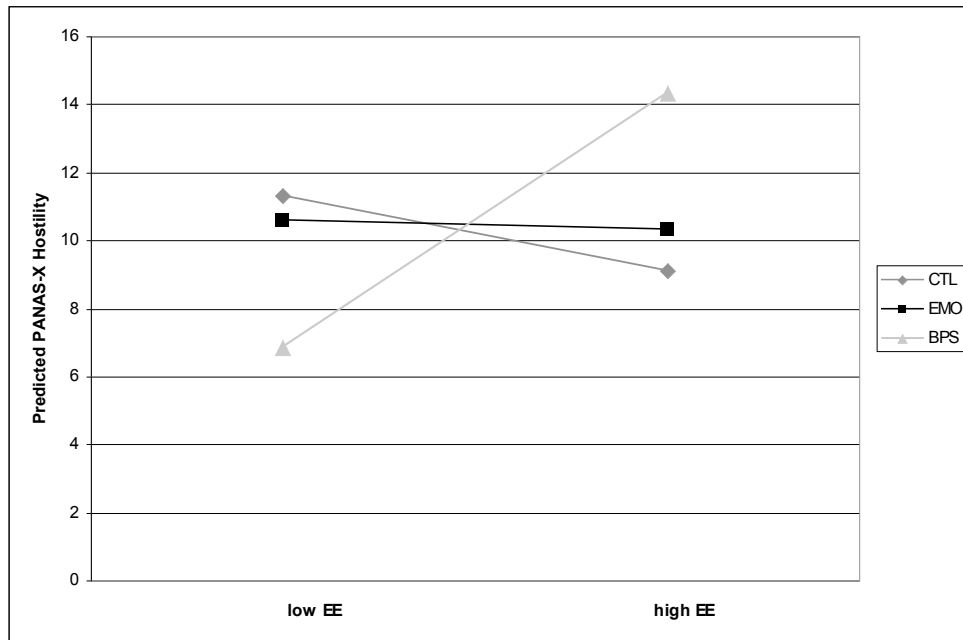


Figure 2. Emotional expression x condition interaction on prediction of hostility at 1-month follow-up.

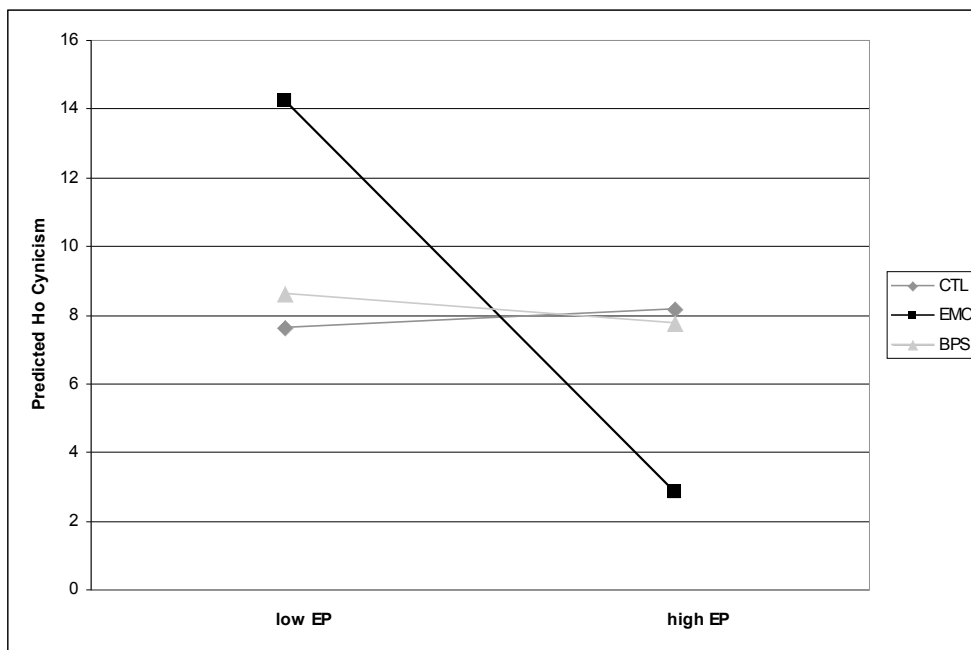


Figure 3. Emotional processing x condition interaction on prediction of cynicism at 1-month follow-up.

Low EP participants in the CTL condition had the greatest number of visits, with an intermediate number in EMO. For high EP participants, the number of visits was similar for EMO and CTL. Emotional expression did not moderate effects of condition, and there were no significant main effects of condition for health care visits. No significant interactions or main effects of condition were found for self-reported physical symptoms or blood pressure. Physical symptoms declined and blood pressure remained stable for all conditions across the two assessments.

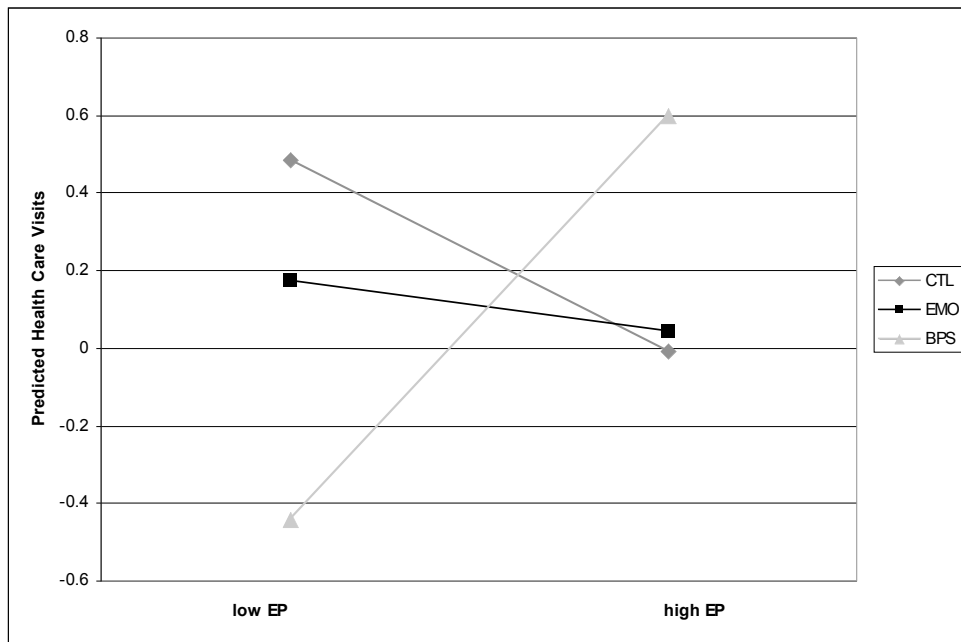


Figure 4. Emotional processing x condition interaction on prediction of number of health care visits at 1-month follow-up.

Discussion

In this study of undergraduate students, the hypothesized moderation of writing condition effects on PANAS-X hostility at 1-month follow-up by baseline levels of hostility found in this researcher's medical student sample (Austenfeld et al., 2006) was not replicated, but condition effects on hostility were moderated by the emotional approach components of emotional processing (EP) and emotional expression (EE). Participants low in EP had relatively low levels of hostility in BPS and higher levels of hostility in the EMO condition. These findings were reversed for high EP participants, with lower hostility in EMO and higher hostility in BPS. The relationship between the BPS condition and level of hostility at follow-up was moderated in a similar pattern by EE, such that low EE participants had low hostility

in BPS and high EE participants had higher hostility in BPS. In this interaction, the EMO and CTL conditions did not differ substantially. Condition effects on another hostility variable, the Cynicism subscale of the Ho scale, were moderated by EP, such that low EP participants in the EMO condition reported higher cynicism relative to BPS and CTL, and high EP participants in EMO reported lower cynicism relative to the other conditions. Emotional processing also moderated effects of condition on health care visits, with fewer predicted visits for low EP participants in BPS, replicating findings in the medical student study (Austenfeld et al., 2006). In the current study, high EP participants in BPS had a higher number of predicted visits, whereas visits did not vary substantially by condition for high EP medical students.

The findings suggest that benefit accrues when the imposed coping strategy (e.g., writing instruction) is matched to the individual's pre-existing preferred coping strategy. Individuals who do not tend to explore or express emotions when dealing with ongoing stressors may benefit more from looking ahead to the future in an optimistic manner rather than focusing on their negative feelings. Those who do prefer to process emotion in stressful contexts may need to explore and express negative feelings as part of moving on from the stressor. Supporting evidence for benefits of matching writing instructions to preferred coping strategy comes from the medical student study (Austenfeld et al., 2006), from studies indicating that emotionally expressive individuals benefit when their social context is receptive to their emotional expression (Stanton et al., 2000a; Stanton et al., 2000b, Study 4), and from an experiment showing that men using their preferred manner of anger

expression had reduced cardiovascular reactivity (Engebretson, Matthews, & Scheier 1989). The finding that pessimists had reduced health care visits after expressive writing when coping instructions were added to the task, whereas optimists had reduced visits with or without coping instructions, also indicates that the focus of the writing process may need to be tailored to individual differences (Cameron & Nicholls, 1998). More research is required to evaluate whether individual differences moderate the effectiveness of other brief interventions, such as stress-management interventions.

The decrease in hostility for participants in this study who were randomly matched to a congruent writing condition relative to controls is an important finding given the cardiovascular health risks ascribed to hostility (see Smith & MacKenzie, 2006, for a review). The lack of previous research on the effects of expressive writing and hostility is striking, given the rapidly increasing number of expressive writing studies. In the most recent meta-analysis of writing effects, only 73 of 8,533 (0.86%) participants were specifically evaluated for changes in anger, versus 2,098 of 8,533 (24.59%) for depressive symptoms (Frattaroli, 2006). It should be noted that levels of hostility at follow-up were not elevated in this study for the overall sample ($M = 10.61$, $SD = 3.43$) or within groups (EMO $M = 10.42$, $SD = 3.48$, BPS $M = 11.50$, $SD = 3.65$, CTL $M = 10.18$, $SD = 3.26$), relative to a large college student sample ($M = 11.2$, $SD = 4.6$; Watson & Clark, 1991). However, examination of the predicted means for the emotional approach coping by condition interactions demonstrates the potential importance of matching writing condition to coping

predisposition. The predicted hostility mean for low EP participants in the BPS condition, for example, was 5.61, more than one standard deviation below the overall sample mean, whereas the predicted mean for high EP participants in BPS was 15.30, more than one standard deviation above the overall sample mean. Future research on expressive techniques in samples with high hostility is warranted.

Although the number of writing studies has increased rapidly in recent years, the mechanisms for writing benefits remain unclear. Exposure theory is gaining empirical support (Frattaroli, 2006), but self-regulation theory provides a parsimonious explanation for effects of both emotionally expressive and positively focused writing tasks, including the best possible self task, which do not induce exposure to negative emotions. How might self-regulation theory explain the differential effects of writing task according to level of emotional approach coping? One possibility, alluded to above, is that individuals low in EAC are better able to gain a sense of control over their experience when they look forward to future goals with a positive attitude. In this experiment, the BPS condition did include an instruction to describe how participants would overcome an obstacle to reach their life goals. This task may allow consideration of challenges in a positive light, without prolonged exploration of negative emotions, which for these individuals may be disruptive or aversive. For those high in EAC, dealing with emotional experience may be an essential part of gaining the same sense of control, with review of negative experiences and emotions representing a constructive process (Lepore, Greenberg, Bruno, & Smyth, 2002).

The findings in this study are limited by reliance on self-report measures of hostility and depressive symptoms. In particular, the Ho Cynicism subscale results should be considered as less reliable than the PANAS-X hostility results because of missing data for 12 participants, decreasing the n for this variable from 63 to 51. Data are missing for 8 participants due to an error in questionnaire format, but the remaining 4 participants left items blank, and items were occasionally left blank in other Ho subscales. The scale instructions suggest leaving items blank if they are not applicable or unclear, and particular items were left unanswered more often than others, likely because they were irrelevant or ambiguous for participants. In addition, limitations in the Ho scale related to lack of sound internal structure have been identified (Martin, Watson, & Wan, 2000). The CES-D, a self-report measure with established reliability, did not reveal moderated effects of writing condition on depressive symptoms as was identified for the medical student sample. The baseline mean CES-D score in the medical student sample was in fact lower than that for the undergraduate sample, thus the difference in results cannot be explained by a floor effect for undergraduate depressive symptoms.

Although the undergraduate study replicated the moderated effects of condition on health care visits found for low EP medical students and also demonstrated moderated effects of condition for high EP undergraduates, the health care visit data should be interpreted with caution, due to challenges in compiling complete visit counts for the undergraduate sample. An attempt was made to include visits to private health care providers, but these data were not available for all

students who indicated they had private providers. The limitations of health care visits as a dependent variable in writing studies have been acknowledged (Pennebaker, 2002). The absence of writing effects on blood pressure may in part be related to the young, presumably healthy undergraduate sample, although it is important to note that noncompleters had higher baseline diastolic blood pressure than completers. The two previous studies reporting decreases in blood pressure after writing sampled working adults (Crow et al., submitted) and hypertensive adults (McGuire et al., 2005). In the hypertensive sample, average baseline systolic and diastolic blood pressures were considerably higher than those for both completers and noncompleters in the present study.

An additional limitation of the current study is sample size. Based on the previous medical student study and preliminary power analyses, the sample size of 63 participants likely did not have sufficient power to detect small to moderate interactions or main effects. One of the challenges in recruiting undergraduates was that they were asked to participate in a 6-week long experiment; some openly commented that they preferred to complete only the first session for credit and then participate in other studies to obtain credits more quickly.

Given these limitations, the observed moderation of condition effects on hostility and health care visits by emotional approach coping suggests that matching the writing task to individual differences may be important in order to optimize writing benefits. Additional studies with larger sample sizes are needed to extend these findings and explore other potential moderators of writing effects. Further

empirical study of the potential of writing to reduce hostility in stressful contexts is essential, in light of the risk that elevated hostility may pose to cardiovascular health.

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Appendix A

Informed Consent Form (attached)

A Study of the Effects of Writing on the Health of Undergraduate Students

INFORMED CONSENT

INTRODUCTION

The Department of Psychology at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You may refuse to sign this form and not participate in this study. You should be aware that even if you agree to participate, you are free to withdraw at any time. If you do withdraw from this study, it will not affect your relationship with the Department of Psychology, the services it may provide to you, or the University of Kansas.

PURPOSE OF THE STUDY

The purpose of this study is to determine the effects of writing about experiences, thoughts, feelings, and goals on the psychological and physical health of undergraduate students.

PROCEDURES

Your participation in this study may involve writing 3 times for 20 minutes each time and having your blood pressure taken before the first writing session and 4 to 8 weeks after the last writing session. The writing sessions will be spaced approximately 1 week apart. You may be randomly assigned to write about 1 of 3 possible topics. These topics may include writing about your experiences, your thoughts, your feelings, and your goals. If assigned to write, you will go to a semi-private room at the University of Kansas, where you will listen to brief audio taped writing instructions, and then begin your 20 minute writing session. You will also complete a brief questionnaire. You will place your writing and this questionnaire in an envelope identified only with a study number, not your name.

Before the first writing session a researcher will take your blood pressure 3 times at 1-minute intervals to get an average blood pressure. You will then complete a set of questionnaires, which may ask you about your thoughts, feelings, experiences and physical symptoms. This set of questionnaires will take approximately 40 to 50 minutes to complete. Four to 8 weeks after the third writing session you will return to a room at the University of Kansas where a researcher will take your blood pressure 3 times at 1-minute intervals to get an average blood pressure. You will then complete a set of questionnaires, similar to the first set. These questionnaires will take approximately 40 to 50 minutes to complete. The total amount of time you will spend writing and filling out questionnaires will be approximately 4 to 5 hours.

Some participants may be randomly assigned to complete all aspects of the study except for the writing sessions.

To study the effect of writing on physical health, you are being asked to give permission for the researchers to inquire at the student health center and/or at the office of your private physician as to the number of visits you have made to the student health center and/or physician's office for the treatment of illness, for the period of time beginning 4 to 8 weeks prior to the first writing session and ending 4 to 8 weeks after the last writing session. The researchers will not obtain any specific information about the nature of the illnesses, but will only confirm that the visits were for illness and not injury.

RISKS

You may be writing about topics that are emotionally upsetting for you. In previous studies of writing, some participants have reported becoming emotionally upset, but these effects are most often temporary. To date, no long-term negative effects of this type of writing study have been identified in undergraduate student participants. Having your blood pressure taken may cause mild discomfort to your arm while the blood pressure cuff is inflated. You may refuse to have your blood pressure taken and still participate in other aspects of the study if you wish.

BENEFITS

There will likely not be any direct benefits to you from participating in the study. The potential benefits of this project are to increase our scientific understanding of how writing about experiences, thoughts, feelings, and goals can improve psychological well-being and physical health.

PAYMENT TO SUBJECTS

You will not receive any monetary payment for participating in this study. You will receive a specified amount of extra credit in your Psychology 104 class for participating.

COSTS

There will be no direct financial cost to you for participating in this study.

INFORMATION TO BE COLLECTED AND CONFIDENTIALITY

To perform this study, researchers will collect information about you. This information will be obtained from the questionnaires you complete, the measurement

of your blood pressure, your writing, and from the student health center or your private physician. Also, information will be collected from the study activities that are listed in the Procedures section of this consent form.

Your name will not be associated in any way with the information collected about you or with the research findings from this study. The researchers will use a study number instead of your name. Only if your writing indicates that you intend to harm yourself or other people will the researchers match the study number on your writing with your name to identify you. The researchers will then contact you and will provide resources to help ensure your safety and/or the safety of other involved persons. The researchers will not reveal your identity if they publish the results of this study.

The information collected about you will be used by Jennifer Austenfeld, Dr. Ray Higgins, Dr. Annette Stanton, members of the research team, the University of Kansas Center for Research, and officials at the University of Kansas that oversee research, including committees and offices that review and monitor research studies. Some persons or groups that receive your health information as described above may not be required to comply with the Health Insurance Portability and Accountability Act's privacy regulations, and your health information may lose this federal protection if those persons or groups disclose it.

The researchers will not share information about you with anyone not specified above unless required by law or unless you give written permission.

Permission granted on this date to use and disclose your information remains in effect indefinitely. By signing this form you give permission for the use and disclosure of your information for purposes of this study at any time in the future.

INSTITUTIONAL DISCLAIMER STATEMENT

"In the event of injury, the Kansas Tort Claims Act provides for compensation if it can be demonstrated that the injury was caused by the negligent or wrongful act or omission of a state employee acting within the scope of his/her employment."

REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, you cannot participate in this study.

CANCELLING THIS CONSENT AND AUTHORIZATION

You may withdraw your consent to participate in this study at any time. You also have the right to cancel your permission to use and disclose information collected about you, in writing, at any time, by sending your written request to: Jennifer Austenfeld, Psychological Clinic, Fraser Hall, Room 315, 1415 Jayhawk Boulevard, Lawrence, KS, 66045. If you cancel permission to use your information, the researchers will stop collecting additional information about you. However, the research team may use and disclose information that was gathered before they received your cancellation, as described above.

QUESTIONS ABOUT PARTICIPATION

Questions about procedures should be directed to the researchers listed at the end of this consent form.

COUNSELING SERVICES

If you need professional psychological counseling to help you cope with upsetting thoughts and/or feelings during this study, these services are available to you for a small fee through the KU Psychological Clinic, Fraser Hall, Room 315, 1415 Jayhawk Boulevard, Lawrence, KS, 66045, telephone number (785) 864-4121 or KU Counseling and Psychological Services (CAPS), Watkins Health Center, 2nd Floor, Lawrence, KS, 66045, telephone number (785) 864-2277.

PARTICIPANT CERTIFICATION

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study and the use and disclosure of information about me for the study. I understand that if I have any additional questions about my rights as a research participant, I may call (785) 864-7429 or write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas, 66045-7563, email dhann@ku.edu.

With my signature, I acknowledge that I give my permission for the researchers to inquire at the student health center and/or at the office of my private physician as to the number of visits I have made to the student health center or physician's office for the treatment of illness, for the period of time beginning 4 to 8 weeks prior to the first research session and ending 4 to 8 weeks after the last research session.

I agree to take part in this study as a research participant. I further agree to the uses and disclosures of my information as described above. By my signature I affirm that I am at least 18 years old and that I have received a copy of this Consent and Authorization form.

Type/Print Participant's Name

Date

Participant's Signature

Researcher Contact Information:

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If you would like to obtain a summary of the results of this study, please send an email request to Jennifer Austenfeld, jausten@ku.edu

Appendix B

Writing Instructions (attached)

Emotional expression condition

Session 1

“What I would like you to write about for these three sessions are your very deepest thoughts and feelings about the current most stressful, upsetting, frustrating, traumatic or challenging experience you described earlier today. Write about the stressful experience in as much detail as you can. Really get into it and freely express any and all emotions or thoughts that you have about the experience. The only rule we have about your writing is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don’t worry about grammar, spelling or sentence structure. Don’t worry about erasing or crossing things out. Just write continuously for 20 minutes.”

Session 2

“Today, during your second writing session, I want you to continue to write about your very deepest thoughts and feelings about your current most stressful, upsetting, frustrating, traumatic or challenging experience. You may write about the same experience you described in your first writing session, or about a new or different experience. Write about each stressful experience in as much detail as you can. Really get into it and freely express any and all emotions or thoughts that you have about the experience. Remember, the only rule we have about your writing is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don’t worry about grammar, spelling or sentence structure. Don’t worry about erasing or crossing things out. Just write continuously for 20 minutes.”

Session 3

“Today, during your third and last writing session, I want you to continue to write about your very deepest thoughts and feelings about your current most stressful, upsetting, frustrating, traumatic or challenging experience. You may write about the same experience you described in your first two writing sessions, or about a new or different experience. Write about each stressful experience in as much detail as you can. Really get into it and freely express any and all emotions or thoughts that you have about the experience. Remember, the only rule we have about your writing is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don’t worry about grammar, spelling or sentence structure. Don’t worry about erasing or crossing things out. Just write continuously for 20 minutes.”

Best possible self condition

Session 1

“Think about your life in the future. Imagine that everything has gone as well as it possibly could. You have worked hard, overcome obstacles, and succeeded at accomplishing all of your life goals. Think of this as the realization of all your life dreams. Now, describe in writing this realization of your dreams. Be sure to include a description of how you overcame at least one major obstacle or challenge to achieve these goals. The only other rule we have about your writing is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don’t worry about grammar, spelling, or sentence structure. Don’t worry about erasing or crossing things out. Just write continuously for 20 minutes.”

Session 2

“Today, during your second writing session, I want you to think again about your life in the future and imagine that everything has gone as well as it possibly could. You have worked hard, overcome obstacles, and succeeded at accomplishing all of your life goals. You may continue to write about the same goals you described in the first session, or add new goals. Again, think of this as the realization of all your life dreams. Now, describe in writing this realization of your dreams. Be sure to include a description of how you overcame at least one major obstacle or challenge to achieve these goals. Remember, the only other rule we have about your writing is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don’t worry about grammar, spelling, or sentence structure. Don’t worry about erasing or crossing things out. Just write continuously for 20 minutes.”

Session 3

“Today, during your third and last writing session, I want you to think again about your life in the future and imagine that everything has gone as well as it possibly could. You have worked hard, overcome obstacles, and succeeded at accomplishing all of your life goals. You may continue to write about the same goals you described in the first two sessions, or add new goals. Again, think of this as the realization of all your life dreams. Now, describe in writing this realization of your dreams. Be sure to include a description of how you overcame at least one major obstacle or challenge to achieve these goals. Remember, the only other rule we have about your writing is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don’t worry about grammar, spelling, or sentence structure. Don’t worry about erasing or crossing things out. Just write continuously for 20 minutes.”

Control condition

Session 1

“I am interested in the daily experiences of undergraduate students. During this writing session, I would like you to describe in detail what you have done for the past 24 hours. It is important that you describe things exactly as they occurred. Do not mention your emotions, feelings, or opinions. Your description should be as objective as possible. You may include details such as what time you got up and what you have eaten. The most important part of this writing is that you focus on the facts and try to reconstruct what happened in as much objective factual detail as possible. No fact is too big or too small. The only other rule we have about your writing is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don’t worry about grammar, spelling, or sentence structure. Don’t worry about erasing or crossing things out. Just write continuously for 20 minutes.”

Session 2

“As you did in the first writing session, I would like you to describe in detail what you have done for the past 24 hours. It is important that you describe things exactly as they occurred. Do not mention your emotions, feelings, or opinions. Your description should be as objective as possible. You may include details such as what time you got up and what you have eaten. The most important part of this writing is that you focus on the facts and try to reconstruct what happened in as much objective factual detail as possible. No fact is too big or too small. The only other rule we have about your writing is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don’t worry about grammar, spelling, or sentence structure. Don’t worry about erasing or crossing things out. Just write continuously for 20 minutes.”

Session 3

“As you did in the first two writing sessions, I would like you to describe in detail what you have done for the past 24 hours. It is important that you describe things exactly as they occurred. Do not mention your emotions, feelings, or opinions. Your description should be as objective as possible. You may include details such as what time you got up and what you have eaten. The most important part of this writing is that you focus on the facts and try to reconstruct what happened in as much objective factual detail as possible. No fact is too big or too small. The only other rule we have about your writing is that you write continuously for the entire time. If you run out of things to say, just repeat what you have already written. Don’t worry about grammar, spelling, or sentence structure. Don’t worry about erasing or crossing things out. Just write continuously for 20 minutes.”

Appendix C

Measures (attached)

Screening questions

Take a few moments to think about a current situation that is the most stressful, upsetting, frustrating, traumatic, or challenging for you. It may be a problem with someone close to you, a problem at school, a medical problem, a separation from someone you care about, etc. With this situation in mind, please answer the following questions.

_____ How stressful has this situation been for you on a scale from **1 = not at all stressful, to 7 = extremely stressful?**

_____ How much control do you think you have over this situation on a scale from **1 = no control at all, to 7 = complete control?**

Emotional Approach Coping Scales

Emotional Processing

I take time to figure out what I'm really feeling.
I delve into my feelings to get a thorough understanding of them.
I realize that my feelings are valid and important.
I acknowledge my emotions.

Emotional Expression

I take time to express my emotions.
I let my feelings come out freely.
I allow myself to express my emotions.
I feel free to express my emotions.

Footnote

¹Health care visit data were obtained from the university student health center for all participants ($N = 63$). Thirty-four participants also listed private health care providers at Session 1, and letters requesting visit counts were sent to a subset of 22 of these providers for whom adequate identifying information was available. Responses were received from 20 providers. Thus, private provider information was obtained for 20 of 34 participants (58.8%) who indicated they had private providers at Session 1. The number of visits used for analyses for each participant was the number of visits to the student health care center plus, if available, the number of visits to private providers. Analyses also were conducted using the number of visits to the student health care center, excluding private provider data. A significant interaction between emotional processing and condition on prediction of visits was identified in this analysis (R^2 change = .121, $F(2, 56) = 4.04$, $p = .023$), with the form of the interaction similar to that in Figure 4.