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Are Expressive Suppression and Cognitive Reappraisal Associated with Stress-Related Symptoms?

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Abstract

Emotion dysregulation is thought to be critical to the development of negative psychological outcomes. Gross (1998b) conceptualized the timing of regulation strategies as key to this relationship, with response-focused strategies, such as expressive suppression, as less effective and more detrimental compared to antecedent-focused ones, such as cognitive reappraisal. In the current study, we examined the relationship between reappraisal and expressive suppression and measures of psychopathology, particularly for stress-related reactions, in both undergraduate and trauma-exposed community samples of women. Generally, expressive suppression was associated with higher, and reappraisal with lower, self-reported stress-related symptoms. In particular, expressive suppression was associated with PTSD, anxiety, and depression symptoms in the trauma-exposed community sample, with rumination partially mediating this association. Finally, based on factor analysis, expressive suppression and cognitive reappraisal appear to be independent constructs. Overall, expressive suppression, much more so than cognitive reappraisal, may play an important role in the experience of stress-related symptoms. Further, given their independence, there are potentially relevant clinical implications, as interventions that shift one of these emotion regulation strategies may not lead to changes in the other.

Keywords

Emotion regulation; expressive suppression; reappraisal; trauma; stress

1. Introduction

Emotion regulation, based on Gross (1998a, p. 275), refers to, “the processes by which individuals influence which emotions they have, when they have them, and how they experience or express these emotions.” Although this definition is inherently broad, there is functional utility in distinguishing emotion from emotion regulation. Specifically, strategies individuals use to alter their emotions affect not only their current emotional experience, but also broader emotional, cognitive, and interpersonal functioning (Barlow, Allen, & Choate, 2004;Gross, 2002;Gross & John, 2003;Kashdan, Barrios, Forsyth, & Steger, 2006). Furthermore, inappropriate or ineffective emotion regulation is emerging as a critical component in the development and maintenance of depression and anxiety disorders (Barlow et al., 2004;Campbell-Sills, Barlow, Brown, & Hoffman, 2006a;2006b;Mennin, 2006;Kashdan

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et al., 2006;Kashdan & Steger, 2006). Elucidating when and why emotion regulation can be adaptive or harmful is therefore crucial to the understanding of emotional processes and psychological dysfunction.

The empirical examination of emotion regulation grew out of the stress and coping literature, particularly conceptualizations of coping strategies put forth by Lazurus and colleagues (e.g., Lazurus, 1966; Lazurus & Folkman, 1984). Building on this long tradition to explain why some regulation strategies might be beneficial while others are detrimental, Gross (1998b) posited a process model of emotion regulation that emphasizes the timing of a regulation strategy as crucial to its impact and consequences. In this model, Gross (1998b; Gross & Thompson, 2006) differentiated between antecedent-focused regulation, in which intervention occurs early and is focused on altering the effect of emotion-generating cues, and response-focused regulation, which acts late in the process and is focused on altering emotional output (e.g., action, expression). Gross postulated that response-focused strategies are more detrimental and less effective in altering current emotional experience compared to antecedent-focused regulation. Specifically, Gross and colleagues primarily examined correlates and consequences of expressive suppression and cognitive reappraisal, two emotion regulation strategies representative of these points of intervention (e.g,. Butler et al., 2003; Gross, 1998b; Gross & Levenson, 1997; Gross & Thompson, 2006; Richards & Gross, 1999; 2000). Expressive suppression, a response-focused strategy, refers to the inhibition of external cues to one's internal emotional state (e.g., facial expression), while cognitive reappraisal, an antecedent-focused strategy, involves "construing a potentially emotion-eliciting situation in a way that changes its emotional impact" (Gross & John, 2003, p. 349). Based on Gross' (1998b) model, expressive suppression should be less effective in altering negative emotions compared to reappraisal and also associated with psychopathology, social dysfunction, and depressed mood.

As is predicted based on this process model of emotion regulation, factors associated with expressive suppression and cognitive reappraisal appear vastly divergent. Generally, expressive suppression is associated with reduced positive affect and life satisfaction and with greater depression and social anxiety, and greater negative emotion in response to negative affective stimuli (e.g., Kashdan et al., 2006; Sperberg & Stabb, 1998). In experimental studies, inducing expressive suppression can lead to impaired interpersonal communication (Butler et al., 2003; Gross & Muñoz, 1995), increased sympathetic nervous system arousal (Gross, 1998b; Gross & Levenson, 1997; Harris, 2001), and impaired memory (Richards & Gross, 1999; 2000; Richards, Butler, & Gross, 2003). Although an accumulating body of research indicates that expressive suppression may have negative short- and long-term consequences, expressive suppression can also be adaptive; for example, the ability to conceal one's emotions is important to maintaining relationships and employment (Gross, 2002; Gross & John, 2003; Gross & Muñoz, 1997). It may be that the habitual and inflexible use of expressive suppression across a variety of contexts contributes to psychopathology when other strategies that are *more* effective in altering negative emotion and *less* costly could be used instead of or in conjunction with expressive suppression (e.g., Gross, 2002; Gross & Levenson, 1997; Harris, 2001; Richards & Gross, 1999; 2000). However, in examining this literature, it is important to note that in the absence of prospective studies of expressive suppression and psychopathology, the direction of causality cannot be determined.

Furthermore, when applied inflexibly, habitual suppression of thoughts and emotion is thought to contribute to depression and anxiety disorders (Campbell-Sills et al., 2006a; 2006b; Kashdan et al., 2006; Lynch, Robins, Morse, & Krause, 2001; Mennin, 2006; Moses & Barlow, 2006; Roemer & Salters, 2004). Although expressive suppression may differ from direct suppression of emotional experiencing or thoughts, physiological responding to stress may be intensified or prolonged by expressive suppression (e.g., Gross, 1998b), and exposure to traumatic events, particularly interpersonal trauma, is thought to reduce emotion regulation capacity, leading to

difficulties in emotion regulation not entirely captured by the diagnosis of posttraumatic stress disorder (PTSD; Frewen & Lanius, 2006; Pelcovitz, van der Kolk, Roth, Mandel, Kaplan, & Resick, 1997; van der Kolk, Roth, Pelcovitz, Sunday, & Spinazzola, 2005). Furthermore, in stress-related reactions such as PTSD, it has been suggested that suppression of thoughts or emotions may potentially contribute to the maintenance of posttraumatic reactions, leading to chronic PTSD (e.g., Foa & Riggs, 1993; Purdon, 1999; Roemer, Litz, Orsillo, & Wagner, 2001; Shipherd & Beck, 1999). Indeed, initial work in this area by Roemer and colleagues (2001) suggests that individuals with PTSD report suppressing emotions more frequently and more intensely than those without PTSD. On the other hand, even less work has specifically examined *expressive suppression* and psychopathology nor has it examined it in trauma-exposed samples. As noted above, the correlational nature of much of this literature, however, leaves the direction of causality uncertain.

Unlike response-focused expressive suppression, habitual antecedent-focused reappraisal appears to lack the detrimental cognitive consequences associated with suppression and may actually be protective (for reviews, see Gross, 1998a; 2002). Reappraisal is associated with less depression, less negative affect, and increased life satisfaction (Garnefski, Teerds, Kraaij, Legerstee, & van den Kommer, 2004; Garnefski & Kraaij, 2006; Kashdan et al., 2006), and induced reappraisal decreases negative emotion and neither impairs memory nor increases arousal (Egloff, Schmukle, Burns, & Schwerdtfeger, 2006; Richards & Gross, 2000; Richards et al., 2003; Gross & Thompson, 2006) and may actually lessen physiological arousal (Dandoy & Goldstein, 1990). The use of reappraisal is also higher in healthy controls compared to individuals with clinical levels of anxiety and/or depression (Garnefski et al., 2002; Garnefski et al., 2004). In addition, like expressive suppression, reappraisal may be particularly relevant to the study of trauma reactions. Following trauma, initial negative cognitions and beliefs are prospectively associated with later post-trauma reactions including depression, anxiety, and PTSD (e.g., Dunmore, Clark, & Ehlers, 1999; Ehring, Ehlers, & Glucksman, 2006; Mayou, Ehlers, & Bryant, 2002); and accordingly, the use of cognitive reappraisal may prevent or relieve stress-related difficulties. Further, in trauma survivors with acute stress disorder, increased cognitive reappraisal is associated with reductions in trauma-related symptoms following therapy (Bryant, Moulds, & Guthrie, 2001).

In order to better understand the role of expressive suppression and cognitive reappraisal, new measures have begun to emerge. Probably most prominent in the personality literature is the Emotion Regulation Questionnaire (ERQ; Gross & John, 2003), measuring the habitual use expressive suppression and cognitive reappraisal. Initial studies of this questionnaire (Gross & John, 2003; Kashdan et al., 2006) have limited their sampling to undergraduates and examined few measures of psychopathology, instead including mostly broader personality and mood measures. Further, it is unclear whether relationships between the ERQ subscales of expressive suppression and cognitive reappraisal and psychopathology such as depression could be accounted for by known psychopathology vulnerability factors such as rumination (e.g., Nolen-Hoeksema, 2000; Holeva, Tarrier, & Wells, 2001) and anxiety sensitivity (e.g., Reiss, Peterson, Gursky, & McNally, 1986; Schmidt, Zvolensky, & Maner, 2006). Specifically, rumination describes a process where individuals focus on their symptoms of depression and the possible meaning of them without taking action to overcome them (e.g., Nolen-Hoeksema, 2000). Similarly, and more relevant to anxiety-based disorders, anxiety sensitivity describes a process where individuals focus on their arousal-related symptoms and interpret them as dangerous (e.g., Reiss & McNally, 1985). Thus, it is entirely possible that these vulnerability factors actually mediate the relationship between expressive suppression/cognitive reappraisal and psychopathology. That is, rumination and anxiety sensitivity emphasize *content or meaning* related to emotions being regulated, particularly focusing on symptoms and their meaning, and may be more important to psychopathology than *how* emotion is regulated (e.g., through expressive suppression or cognitive reappraisal).

In addition, researchers have begun to examine how emotion regulation strategies such as reappraisal and expressive suppression relate to each other. In the initial study examining psychometrics of the ERQ, Gross and John (2003) found that an independent two-factor model provided the best fit to their data when compared with a negatively correlated specialist model, a positively correlated hierarchical emotion regulation model, and a single factor general emotion regulation model, suggesting that an individual's tendency to use one strategy had little bearing on use of the other. However, this structural analysis has not yet been replicated, and the results are somewhat counterintuitive. Specifically, if reappraisal is truly a more effective strategy, one might expect that individuals who reappraise frequently would have less need for expressive suppression, a less effective strategy.

In the current study, we examined expressive suppression, reappraisal, and stress-related psychopathology symptoms in two samples. Using a similar undergraduate sample similar to Gross and John (2003), we sought replicate their work regarding individual differences in the use of suppression and reappraisal and extend it to stress-related psychopathology symptoms. Using a second trauma-exposed, community-based sample, we sought to further extend this work to trauma survivors. Specifically, we focused solely on women given potential gender differences in suppression, as non-clinical samples of women suppress at higher rates than men (Gross & John, 2003) and suppression may be increased in women with affective disorders, but not men, relative to healthy controls (Campbell-Sills et al., 2006a). First, in both the undergraduate and trauma-exposed women, we hypothesized that expressive suppression would be associated with higher scores on measures of posttraumatic stress, anxiety, depression, rumination, and anxiety sensitivity, and, conversely, and that reappraisal would be associated with lower scores on these measures. Second, we hypothesized that rumination and anxiety sensitivity mediate the relationship between emotion regulation and stress-related psychopathology symptoms. Third, we sought to further examine the factor structure of the ERQ, based on Gross and John (2003), comparing four potential models. Based on their previous findings, we hypothesized that an independent two-factor model would provide the best fit for the data across both the undergraduate and trauma-exposed community samples.

2. Method

2.1 Participants

2.1.1 Undergraduate sample (Sample 1)—Sample 1 consisted of 292 undergraduate women recruited from two urban universities, one located in the U.S. Pacific Northwest and the other in the Midwest. Thirty-nine percent (39.0%, $n = 114$) of the sample reported experiencing a DSM-IV Criterion A traumatic event (APA, 2000) based on the Posttraumatic Diagnostic Scale (PDS; Foa, Cashman, Jaycox, & Perry, 1997). Specifically, 25.22% indicated a sexual or non-sexual assault, 29.57% an accident or natural disaster, 15.65% witnessing or hearing about another person's death or serious injury, 18.26% a life-threatening illness, and 11.30% another type of event. Participants received course credit for participation.

2.1.2 Trauma-exposed community sample (Sample 2)—Sample 2 consisted of 67 women recruited through print advertisements and flyers from the same two, large metropolitan cities. All participants reported a DSM-IV Criterion A traumatic event (APA, 2000) based on the PDS (Foa et al., 1997) and interview assessment, with 79.10% indicating a sexual or non-sexual assault, 7.46% witnessing or hearing about another person's death or serious injury, 4.48% a serious accident, 2.99% a life-threatening illness and 5.97% another type of event. Participants received $20 per hour for participation.

Demographic information and mean scores on emotion regulation and stress-related psychopathology symptom measures are presented in Table 1.

2.2 Measures

2.2.1 Emotion Regulation Questionnaire (ERQ; Gross & John, 2003)—The ERQ is a 10-item self-report measure of an individual's tendency to use reappraisal and expressive suppression to regulate emotion. Each item consists of a 7-point Likert scale (1 = *strongly disagree*; 7 = *strongly agree*). The ERQ consists of reappraisal (6 items) and expressive suppression (4 items) subscales, with subscales scored as the mean of the items. Gross and John (2003) found test-retest reliability of .69 for both the reappraisal and suppression subscales, and internal consistency of each subscale was acceptable (reappraisal, $\alpha = .79$; suppression, $\alpha = .73$). The intercorrelations between subscales were low and nonsignificant ($rs < |.07|$). In the present study, internal consistency for both reappraisal (Sample 1: $\alpha = .82$; Sample 2: $\alpha = .86$) and expressive suppression subscales (Sample 1: $\alpha = .75$; Sample 2: $\alpha = .83$) was acceptable; and the intercorrelation between the subscales was also low (Sample 1: $r = |.10|$; Sample 2: $r = |.03|$).

2.2.2 Posttraumatic Stress Diagnostic Scale (PDS; Foa et al., 1997)—The PDS is a 49-item self-report measure used to assess trauma exposure and PTSD severity. Using an event checklist and specific criteria queries, the PDS assesses the experience a DSM-IV Criterion A traumatic event (APA, 2000) and then, for those reporting a traumatic event, assesses PTSD symptoms associated with the event, yielding subscale scores for reexperiencing, avoidance, and hyperarousal clusters and a total severity score. The PDS has good test-retest reliability and internal consistency and correlates well with other measures of PTSD symptoms (Foa et al., 1997).

2.2.3 Beck Depression Inventory (BDI; Beck, 1978)—The BDI is a 21-item self-report questionnaire assessing current symptoms of depression. The internal consistency, concurrent validity and discriminant validity of the BDI with clinician ratings and other depression scales are acceptable (Beck, Steer, & Garbin, 1988).

2.2.4 State-Trait Anxiety Inventory (STAI; Spielberger, 1988)—The STAI is a 40-item self-report measure of state and trait anxiety. Internal consistency of state (20 items) and trait (20 items) subscales is high. Test-retest reliability of the trait scale is also high; however, as expected, test-retest reliability for the state subscale is low (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983).

2.2.5 Anxiety Sensitivity Index (ASI; Reiss et al., 1986)—The ASI is a 16-item self-report measure assessing the construct of fear of fear, specifically fear or distress in response to anxiety-related physiological sensations (Reiss et al., 1986), with anxiety sensitivity being hypothesized to be an underlying vulnerability for certain anxiety disorders (e.g., Schmidt et al., 2006). Reiss et al. (1986) reported a single-factor structure of the ASI, high interrelatedness among items, and acceptable test-retest reliability ($r = .75$) and convergent validity.

2.2.6 Ruminative Response Scale (RRS; Nolen-Hoeksema & Morrow, 1991)—The RRS is a 22-item self-report measure assessing the tendency to ruminate or repetitively think about negative events after they occur and, with rumination hypothesized to be an underlying vulnerability factor for depression (e.g., Nolen-Hoeksema, 2000). The test-retest reliability ($r = .67$) and internal consistency ($\alpha = .90$) of the RRS are adequate (Nolen-Hoeksema, 2000), as are convergent and predictive validity (Nolen-Hoeksema, 2000; Nolen-Hoeksema & Morrow, 1991).

2.3 Data Analytic Strategy

Prior to data analyses, all main variables were examined for fit between their distributions and assumptions of univariate and multivariate analyses. Missing data was limited (0.9%), with no

imputation made for correlational analyses. Multivariate outliers were identified and removed from analyses, resulting in Sample 1 with $n = 289$ and Sample 2 with $n = 62$.

2.3.1 ERQ subscales and stress-related psychopathology symptoms—To examine the associations among expressive suppression and reappraisal and other measures, we conducted Pearson correlations separately in the undergraduate and the community-based, trauma-exposed samples. To correct for multiple analyses, we applied family-wise Bonferroni corrections ($p < .05$) to demographic factors (critical $p = .0125$), PTSD total and subscales (critical $p = .0125$), and other mood and anxiety measures (critical $p = .01$). For analyses including PTSD measures in the undergraduate sample, we only included those with prior Criterion A trauma exposure ($n = 111$) based on the PDS. Trauma-exposed undergraduate women ($M = 8.78$, $SD = 7.35$) endorsed slightly higher depressive symptoms than non-exposed undergraduates ($M = 6.99$, $SD = 6.01$; $t(276) = 2.24$, $p < .05$, Cohen's d = .27) but did not differ on any other measures.

2.3.2 Mediation analyses—The potential mediational role of rumination or anxiety sensitivity between emotion regulation and stress-related psychopathology symptoms was explored based on the recommendations of Baron and Kenny (1986). Bonferroni corrections were not applied given the more exploratory nature of these analyses.

2.3.3 ERQ factor structure—Replicating Gross and John (2003), four models of ERQ factor structure were tested and compared against a basic model in which the two factors were allowed to freely intercorrelate: 1) a single factor model in which all reappraisal and suppression items were used as indicators of the latent construct of emotion regulation; 2) a specialist two-factor model in which reappraisal and suppression factors were fixed to correlate at −.5, indicating that individuals who use one of the two forms of emotion regulation tend not to use the other; 3) a hierarchical two-factor model in which reappraisal and suppression were fixed to correlate at .5, indicating their subsumption under the larger construct of emotion regulation; and 4) an independent two-factor model, in which reappraisal and suppression factors were set to correlate at zero. For the two-factor models, four items were used as observable indicators of the latent construct of expressive suppression, and six items were used as indicators of cognitive reappraisal (Gross & John, 2003). Each model was analyzed using confirmatory factor analysis (CFA) with R version 2.4.1 (R Development Core Team, 2006). Based on recommendations from Hu and Bentler (1999), the following goodness of fit indices were used: chi square; standardized root mean square residual (SRMR < .09); Tucker-Lewis index (TLI > .95) and comparative fit index (CFI > .95). Due to the smaller sample size in Sample 2, the CFA statistics were run three times: undergraduate only; combined using both Sample 1 and Sample 2; and then finally for Criterion A trauma-exposed participants only from both samples ($n = 166$). Results were largely unchanged by exclusion of data from the trauma-exposed community sample and by exclusion of non-trauma-exposed participants; therefore, only the combined analyses are presented. We addressed the small amount of missing data (0.99% in the combined sample) using methods described by Little and Rubin (1987) and Schaffer (1997) to multiply impute each dataset five times. Because the pattern of results was unchanged across the five imputations, we report results only from the imputation yielding the most conservative goodness-of-fit indices.

3. Results

3.1 Relationships Between Emotion Regulation Strategies of Expressive Suppression and Reappraisal and Self-reported Stress-related Psychopathology Symptoms

Neither reappraisal nor expressive suppression was strongly associated with any of the demographic factors such as age, minority status, years of education, or history of trauma exposure (Criterion A status) in either Sample 1 or Sample 2.

As can be seen in Table 2, reappraisal was generally associated with lower self-reported psychopathology symptoms, and expressive suppression was associated with more severe self-reported psychopathology symptoms, particularly in the trauma-exposed community sample. Specifically, cognitive reappraisal was associated with lower depression in the undergraduate sample and lower state and trait anxiety in the trauma-exposed community sample. Interestingly, reappraisal was not strongly associated with PTSD. In contrast, expressive suppression was associated with higher anxiety sensitivity and depression in the undergraduate sample and higher PTSD severity, particularly avoidance and hyperarousal, and trait anxiety and depression in the trauma-exposed community sample.

3.2. Mediation Analyses

In Sample 1, conditions for a potential mediational role of anxiety sensitivity or rumination between reappraisal or expressive suppression and self-reported psychopathology symptoms were not met (Baron & Kenny, 1986). In Sample 2, neither was conditions for reappraisal or for the association between anxiety sensitivity and expressive suppression ($\beta = .13$, *ns*) met. However, as can be seen in Table 3, expressive suppression predicted rumination (Path A: independent variable predicting mediator); and rumination predicted, with the exception of reexperiencing, all of the psychopathology variables (Path B: mediator predicting dependent variable). Further, expressive suppression predicted all of the psychopathology symptom variables (Path C1: independent variable predicting dependent variable). As shown in Table 3, rumination partially mediated relationships between expressive suppression across most psychopathology variables (Path C2). Specifically, mediation approached significance for depression (Sobel $z = 1.90$, $p < .06$), trait anxiety (Sobel $z = 1.93$, $p = .05$), state anxiety (Sobel $z = 1.77$, $p < .10$), PTSD severity (Sobel $z = 1.67$, $p < .10$), and PTSD hyperarousal (Sobel $z = 1.65$, $p < .10$).

3.3 ERQ Factor Structure

Reliability coefficients for the combined dataset on reappraisal (Cronbach's $\alpha = .82$) and suppression (Cronbach's $\alpha = .76$) were similar to those found by Gross and John (2003). In addition, reappraisal and suppression subscales were not significantly correlated ($r = -.09$, *ns*).

Fit indices for the four models tested are presented in Table 4. Consistent with Gross and John (2003), the overall fit of the data was good, and the independent two-factor model provided the best fit to the data while the single factor model provided the worst fit. Factor loadings for the independent factor model are also shown in Table 5. Next, we compared each model with the freely correlated model, with a modest estimated intercorrelation of $r = -.16$, using chi-square difference tests to examine whether each model fit significantly worse than the least parsimonious, freely correlated model (Tabachnick & Fidell, 2001). The single factor model ($\chi^2\Delta = 419.28$; $p < .001$), the hierarchical model ($\chi^2\Delta = 123.64$; $p < .001$), the specialist model ($\chi^2\Delta = 38.51$; $p < .001$), and the independent factor model ($\chi^2\Delta = 6.45$; $p < .05$) all fit significantly worse than the basic model. However, consistent with Gross and John (2003), the independent factor model clearly outperformed the other models and approached non-significance in the chi-square difference test. In fact, in the analysis of only individuals meeting

Criterion A in Samples 1 and 2 combined, the independent model fit as well as the freely correlated model ($\chi^2\Delta = 2.70$; *ns*). Overall, the independent two-factor model provided a good fit to the data and clearly outperformed the other specified models when comparing their fit indices.

4. Discussion

Consistent with our hypotheses, expressive suppression was associated with higher, and reappraisal with lower, self-reported stress-related symptoms overall. Interestingly, expressive suppression was associated with PTSD, anxiety, and depression symptoms in the trauma-exposed community sample, although it was not as strongly associated in the undergraduate sample. Correlations with reappraisal were more limited across both samples, though again mirroring the hypothesized direction, particularly for depression and anxiety. Further, based on our factor analysis, expressive suppression and cognitive reappraisal appear to be independent constructs. Overall, this pattern of results is consistent with the notion that suppressing expression may underlie, or be a correlate of, anxiety and depressive symptomatology in vulnerable individuals such as those with trauma exposure. However, rumination partially mediated the relationship between expressive suppression and self-reported psychopathology symptoms, with mediation approaching significance for both depression and anxiety symptoms, suggesting that ruminative processes also are part of the picture.

The present findings extend the current suppression literature by suggesting that inhibiting one's emotional reactions so that others are not aware of them, that is, *expressive suppression*, may be a costly correlate or cause in trauma-related psychopathology. Non-clinical studies manipulating expressive suppression (Richards & Gross, 2000; for a review, see Gross, 2002), examining individual differences (e.g., Gross & John, 2003; Kashdan et al., 2006), and using more hybrid designs (Egloff et al., 2006) are surprisingly consistent with the current study; expressive suppression is emerging as a reliably costly strategy associated with negative psychological outcomes. In particular, inhibited emotional expression may be a maladaptive strategy when applied inflexibly (e.g., Kashdan et al., 2006; Kashdan & Steger, 2006). It may be that trauma-exposed individuals, particularly those with higher stress-related symptoms, rigidly over-utilize this strategy when other, more effective, strategies could be used instead. Consistent with this, expressive suppression may be a form of experiential or cognitive avoidance similar to thought suppression or emotional suppression, serving as a self-protective mechanism (Hayes et al., 2003). Indeed, preliminary work suggests that experiential avoidance may mediate the relationship between expressive suppression and negative psychological outcomes (Kashdan et al. 2006). However, if this is the case, anxiety sensitivity, which may be linked to experiential avoidance, should also be strongly associated with expressive suppression; it was not in the present study. Alternatively, expressive suppression may be fundamentally different from the broader construct of emotional suppression or experiential avoidance, or may function as a response to other maladaptive strategies, rather than a causal factor, in psychopathology.

It is noteworthy that rumination partially mediated the relationship between expressive suppression and stress-related symptoms, approaching significance for depression and anxiety in the trauma-exposed community sample. Anxiety sensitivity did not. This finding may help to further highlight the growing role of rumination as a potential vulnerability factor underlying trauma-related psychopathology (see Ehlers, Mayou, & Bryant, 1998; Mayou et al., 2002; Michael, Ehlers, Halligan, & Clark, 2005), akin to what is seen in depression (e.g., Nolen-Hoeksema, 2000; Nolen-Hoeksema & Morrow, 1991). Indeed, suppression of intrusive cognitions is commonly reported by depressed individuals and is similar to avoidance of intrusions seen in PTSD (Reynolds & Brewin, 1998; Williams & Moulds, 2007), and there is

significant qualitative overlap in the intrusive memories seen in both disorders (Reynolds & Brewin, 1998). Given this overlap, the role of rumination may be more critical than previously thought in trauma literature (e.g., Speckens, Ehlers, Hackmann, Ruths, & Clark, 2007). Expressive suppression, then, though preliminary, may be better conceptualized as a correlate of rumination and stress-related symptoms rather than a causal mechanism.

Also noteworthy, this partial mediational relationship was not observed in the undergraduate sample. Here, it may be simply that an undergraduate sample had a restricted range in which to detect an association; however, ranges and means were similar for expressive suppression and rumination across samples. Thus, it may instead reflect a fundamental difference between the samples in what is being experienced and regulated. Specifically, though rumination (e.g., "I think about how sad I feel.") and expressive suppression (e.g., "I keep my emotions to myself.") may reflect similar processes in undergraduate and trauma-exposed community samples, the actual content of the rumination and the experience of expressive suppression may be very different, for example, ruminating about a rape versus the end of a relationship. Quite simply, it may be the quality or intensity, and not the amount per se of rumination and expressive suppression that is crucial. Yet, this is impossible to determine in the current study since the content of rumination or expressive suppression was not measured.

In contrast to the association of expressive suppression with higher self-reported symptoms, cognitive reappraisal was associated with lower levels of depression in the undergraduate sample and lower levels of state and trait anxiety in the trauma-exposed community sample. Indeed, this is consistent with our hypotheses and with other studies (e.g., Garnefski et al., 2004; Garnefski & Kraaij, 2006; Gross & John, 2003; Kashdan et al., 2006) showing the potentially adaptive nature of reappraisal. Yet, given the literature on the role of appraisals in development and treatment of chronic PTSD (e.g., Bryant et al., 2001, Dunmore et al., 1999; Ehring et al., 2006; Mayou et al., 2002), it was surprising that higher cognitive reappraisal was only modestly associated with lower reexperiencing symptoms ($r = -.18$, *ns*) and not associated with avoidance ($r = .04$, *ns*) in the trauma-exposed community sample. It may be that expressive suppression and reappraisal are independent constructs, as discussed further below, with reappraisal playing a less important role than expressive suppression in trauma-related difficulties. Alternatively, since reappraisal necessitates approach toward trauma-related thoughts, it may initially lead to an increase in symptoms and only decrease symptoms after prolonged use of the strategy, leading to weaker relationships between these constructs. Finally, cognitive reappraisal, as measured by the ERQ, may not tap into the same construct as other measures that highlight the importance of specific negative beliefs about self, others, and the world in the development of chronic PTSD (e.g., Foa, Ehlers, Clark, Tolin, & Orsillo, 1999). Thus, similar to expressive suppression, it may not be how frequently an individual reappraises but what and how they reappraise. Regardless, given its potentially adaptive role seen for both depression and anxiety symptoms, cognitive reappraisal, in general, may be a resilience factor (e.g., Westphal & Bonanno, 2007) or help contribute to post-traumatic growth (e.g., Johnson et al., 2007) after trauma exposure.

Finally, our study replicates the independent relationship between reappraisal and expressive suppression seen in Gross and John (2003) and further extends this relationship to trauma-exposed individuals. Specifically, the pattern of results in the trauma-exposed individuals did not differ from that of the full combined sample, demonstrating that the independent structure is indeed generalizable to individuals with prior trauma exposure. Thus, trauma-exposed individuals who used expressive suppression were no more or less likely to use cognitive reappraisal or vice versa. Further, this lack of strong association is also consistent with a recent study using a stress-inducing evaluative speech paradigm (Egloff et al., 2006). Given that repeated and prolonged exposure to interpersonal trauma may lead to emotion regulation difficulties beyond or in the absence of diagnosable PTSD (e.g., Frewen & Lanius, 2006;

Pelcovitz et al., 1997; van der Kolk et al., 2005), our finding of independence of these emotional regulation strategies needs to be further replicated with samples such as those experiencing childhood sexual abuse.

Several limitations to the current study are noteworthy. Although we examined measures of stress-related symptoms, the samples employed here were not explicitly treatment seeking nor did we conduct a formal diagnostic assessment, although the vast majority of the trauma-exposed community sample had sought mental health care. The present findings may also not extend to males, who utilize suppression less (Gross & John, 2003) and show less variability in the use of suppression between clinical and non-clinical samples (Campbell-Sills et al., 2006a). Further, although nearly 80% of our trauma-exposed community sample experienced either a sexual or non-sexual assault, we were not able to examine the role of repeated trauma exposure, where emotion regulation difficulties may be especially pronounced (e.g., Frewen & Lanius, 2006; Pelcovitz et al., 1997; van der Kolk et al., 2005). Of note, the correlational nature of the present design limits examination of underlying mechanism. Clearly, both the manipulation of expressive suppression and the prospective examination of this strategy, as well as its relationship to rumination, in response to traumatic events are needed. Further, to some extent, the association of PTSD with experiential avoidance or suppression of thoughts and feelings may be tautological. However, no current PTSD criterion currently indicates a specific method of emotion regulation, and individuals may avoid thoughts or feelings via suppression, reappraisal, distraction, or other means. Finally, other divergent emotion regulation strategies, such as distraction and suppression of thoughts and subjective emotional experience, may also be relevant.

In summary, in trauma-exposed individuals, the habitual use of expressive suppression was associated with greater PTSD, depression, and anxiety, perhaps because these individuals apply this strategy frequently and inflexibly and adopt a generally emotion-avoidant way of interacting with the world (e.g., Campbell-Sills et al., 2006a; Hayes et al., 2003; Kashdan et al., 2006; Moses & Barlow, 2006). Alternatively, rumination partially mediated this relationship, suggesting that responding to a depressed mood with an increased focus on oneself, symptoms, and causes may also explain some of the relationship between expressive suppression and stress-related symptoms. Further, expressive suppression was independent of cognitive reappraisal, suggesting that the two constructs are not linked. Extending this beyond our data, the current findings point to the possibility that rigid use of expressive suppression may promote stress-related symptoms in trauma-exposed women, while reappraisal may have a protective role in regard to these symptoms, although perhaps a more limited one. Furthermore, although many cognitive-behavioral therapies seek to increase cognitive reappraisal, interventions explicitly targeting expressive suppression and seeking to expand a client's available repertoire of emotion regulation strategies may also be helpful for trauma survivors. Given that expressive suppression and cognitive reappraisal appear to be independent constructs, increasing reappraisal may not decrease the potentially more maladaptive use of expressive suppression. Considering that exposure to memories of a stressful or traumatic event encourages expression of emotions (Foa, Huppert, & Cahill, 2006) and may discourage rumination (Purdon, 2004), written or imaginal exposure for stress-related symptoms may be particularly well-suited to targeting expressive suppression and rumination. In addition, specifically targeting rumination via metacognitive therapy (Wells & Papageorgiou, 2004) and both rumination and suppression via mindfulness-based interventions (e.g., Segal, Williams, & Teasdale, 2002) may help address this independence of key constructs.

Clearly, future work needs to examine both expressive suppression and emotional suppression, refining terminology and examining the convergent and divergent properties within clinical samples. In addition, given the strong overlap between PTSD and depression, the role of

ruminative cognitions in the development and persistence of the trauma-associated reactions and symptoms, particularly its relationship with emotion regulatory strategies, needs further exploration. Thus, we are left with the question of whether expressive suppression is a vulnerability or causal factor of stress-related symptoms or merely a correlate that results from the presence of other factors or the use of other ineffective emotion regulation strategies.

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Table 1

Sample Characteristics

	Undergraduate Female (*n* = 289)		Trauma-exposed Community (*n* = 62)	
	M (*SD*)	**Range**	**M (*SD*)**	**Range**
Demographic Information				
Age	19.09 (*3.60*)	18 – 50	29.48 (*13.42*)	18 – 69
Education (years)	13.06 (*1.21*)	12 – 21	14.69 (*2.34*)	12 – 22
Asian American (%)	24.6		11.3	
African American (%)	4.2		4.8	
Caucasian (%)	64.4		79.0	
Other (%)	6.8		4.8	
Measures				
Reappraisal (ERQ)	4.57 (*1.03*)	1.50 – 7.00	4.76 (*1.02*)	2.67 – 6.67
Suppression (ERQ)	3.33 (*1.27*)	1.00 – 6.75	3.48 (*1.39*)	1.25 – 6.00
PTSD Severity (PDS)	7.23 (*8.32*)[a]	0 – 35	18.89 (*11.47*)	0 – 44
Depression (BDI)	7.60 (*6.56*)	0 – 32	12.10 (*8.19*)	0 – 32
Trait Anxiety (STAI-T)	46.82 (*4.88*)	33 – 61	47.14 (*12.50*)	25 – 73
State Anxiety (STAI-S)	45.79 (*5.21*)	30 – 60	42.89 (*12.04*)	22 – 73
Anxiety Sensitivity (ASI)	35.37 (*9.44*)	16 – 69	38.65 (*10.08*)	21 – 63
Rumination (RRS)	51.78 (*7.42*)	34 – 74	50.63 (*7.04*)	30 – 63

[a] PDS scores of individuals reporting a DSM-IV Criterion A (APA, 2000) traumatic event (*n* = 111).

Table 2

Correlations among ERQ subscales and self-reported psychopathology symptoms.

	Undergraduate Female (n = 289)		Trauma-exposed Community (n = 62)	
	Reappraisal (ERQ)	**Suppression (ERQ)**	**Reappraisal (ERQ)**	**Suppression (ERQ)**
PTSD Severity (PDS)	−.11 [a]	.17 [a]	−.03	.34*
Reexperiencing	−.07 [a]	.08 [a]	−.15	.25
Avoidance	−.10 [a]	.21 [a]	.04	.33*
Hyperarousal	−.13 [a]	.15 [a]	.01	.35*
Depression (BDI)	−.27*	.21*	−.18	.50*
Trait Anxiety (STAI-T)	−.07	.03	−.36*	.38*
State Anxiety (STAI-S)	.18*	−.04	−.37*	.29
Anxiety Sensitivity (ASI)	−.05	.22*	−.07	−.13
Rumination (RRS)	.08	.14	−.08	.28

* $p < .05$, using Family-wise Bonferroni correction.

[a] PDS scores of individuals reporting a DSM-IV Criterion A (APA, 2000) traumatic event (n = 111).

Table 3

Summary of Path Coefficients Rumination Mediating the Relationship Between Expressive Suppression and Self-reported Psychopathology in Trauma-exposed Community Sample (Sample 2)

Dependent Variable	Path A	Path B	Path C1	Path C2
Potential Mediator: Rumination (RRS)				
Depression (BDI)	.28*	.49**	.50**	.39**
PTSD total (PDS)	.28*	.37**	.34**	.26*
PTSD re-experiencing (PDS)	.28*	.24	.25*	.20
PTSD avoidance (PDS)	.28*	.35**	.33*	.25*
PTSD hyperarousal (PDS)	.28*	.37**	.35**	.27*
State anxiety (STAI-S)	.28*	.40**	.29*	.20
Trait anxiety (STAI-T)	.28*	.50**	.38**	.26*

* $p < .05$

** $p < .01$.

Note. Given the more exploratory nature of these analyses, no correction for multiple analyses was made. Path A = independent variable predicting the mediator. Path B = mediator predicting the dependent variable. Path C1 = independent variable predicting dependent variable. Path C2 = independent variable predicting dependent variable with Paths A and B controlled.

Table 4

Confirmatory Factor Analysis fit indices combining undergraduate and community samples.

Model	χ^2	df	CFI	TLI	SRMR
Single factor	499.51*	35	.63	.52	.15
Hierarchical two-factor	203.87*	35	.86	.83	.28
Two-factor specialist	118.74*	35	.93	.91	.16
Independent two-factor	86.68*	35	.96	.95	.06

* $p < .05$

Note. CFI = comparative fit index; TLI = Tucker-Lewis index; SRMR = standardized root mean square.

Table 5

Independent two-factor model: Factor loadings for reappraisal and suppression items.

Item Content (Gross & John, 2003)	Reappraisal factor	Suppression factor
Change what I'm thinking about to increase positive emotion (Item 1)	.54	
Change what I'm thinking about to decrease negative emotion (Item 3)	.61	
Alter thinking to stay calm under stress (Item 5)	.42	
Change thinking about a situation to increase positive emotion (Item 7)	.82	
Control emotions by changing thinking (Item 8)	.80	
Change thinking about a situation to decrease negative emotion (Item 10)	.83	
Keep emotions to self (Item 2)		.84
Do not express positive emotion (Item 4)		.34
Control emotions by not expressing (Item 6)		.86
Do not express negative emotion (Item 9)		.62