

# The Role of Thought Suppression in Posttraumatic Stress Disorder

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Thirty motor vehicle accident (MVA) survivors with PTSD and 25 without PTSD completed a trauma-related thought-suppression task. Both groups successfully suppressed trauma-related thoughts, followed by a rebound effect for the PTSD group, and no rebound effect for the no-PTSD group, in a replication of previous work (Shipherd & Beck, 1999). Additionally, a personally relevant, neutral thought-suppression task was included to examine the generalizability of thought suppression in PTSD participants. The PTSD group was able to suppress neutral thoughts without a rebound effect, suggesting that increases in suppressed thoughts are specific to trauma-relevant cognitions in individuals with PTSD. The potential role of thought suppression as a maintaining factor for reexperiencing symptoms of PTSD is discussed.

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FOLLOWING A TRAUMATIC EVENT, it can be predicted that some individuals will experience distress and symptoms of posttraumatic stress disorder (PTSD; American Psychiatric Association [APA], 1994). It has been documented that these symptoms tend to decrease naturally during the 3 months immediately following a trauma (Ehlers, Mayou, & Bryant, 1998; Rothbaum, Foa, Riggs, Murdock, & Walsh, 1992). Unfortunately, some trauma survivors continue to experience symptoms and distress beyond the first 3 months, leading to a diag-

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nosis of chronic PTSD. Prevalence rates for chronic PTSD vary between studies and trauma type. In a review of the literature following one type of trauma, it was estimated that between 9% and 40% of survivors of motor vehicle accidents develop chronic PTSD (Blanchard & Hickling, 1997). Clearly, an understanding of individual differences that influence progression into a more entrenched pathological state would be beneficial. The current study was designed to examine one such factor, specifically thought suppression.

The theoretical literature provides a conceptual framework for understanding the potentially important role of thought suppression in the maintenance of PTSD. Information processing theory hypothesizes that traumatic experiences remain in active memory, accompanied by a drive to incorporate this information into existing mental representations (Horowitz, 1976; Lang, 1977). The theory predicts that intrusive thoughts will result until the material is fully assimilated into the individual's conceptual memory. Thus, it is possible that allowing intrusive thoughts to occur without censure may facilitate recovery, according to this theory, whereas thought suppression may prevent re-experiencing symptoms from remitting (Horowitz, 1976; Lang, 1977). Support for this hypothesis can be found in the empirical literature. For example, the use of suppression as a coping strategy following trauma was found to predict psychological distress in survey studies involving both adults and children (Aaron, Zagul, & Emery, 1999; Amir et al., 1997; Ehlers et al., 1998; Morgan, Mathews, & Winton, 1995). These studies found that survivors who attempted to avoid aversive memories by suppressing intrusive thoughts endured more reexperiencing symptoms. These findings support the hypothesis that deliberate thought suppression facilitates the maintenance of these symptoms, a supposition that has been discussed by several authors (Amir et al., 1997; Gold & Wegner, 1995; Purdon, 1999; Purdon & Clark, 2000; Steil & Ehlers, 2000; Trinder & Salkovskis, 1994).

The paradigm developed by Wegner and colleagues (Wegner, Schneider, Carter, & White, 1987) has become a popular tool for examining the effects of deliberate thought suppression. In studies using

this paradigm, half of the participants suppressed target thoughts (e.g., thoughts about a white bear) and the remaining participants simply monitored their thoughts. Following this initial period, all participants monitored their thoughts without suppressing any specific thoughts. In this way, the immediate and delayed effects of suppressing thoughts were examined. Wegner's theory (Wegner, 1989) of the ironic effects of thought suppression is the predominant theoretical model for explaining the process of suppression. This theory posits that thought suppression can occur by shifting attention to an irrelevant stimulus through a two-level system (Wegner, 1994). One part of this system is an intentional and effort-intensive "operating process," whereby the participant is seeking distracting stimuli. Simultaneously, there also is an unconscious and automatic "monitoring process" that is vigilant for the suppressed material. Through the use of this two-part system, distracters can become powerful cues for the return of suppressed material and thought suppression inevitably leads to an increase in the frequency of suppressed material. Thus, the thought suppression theory is consistent with information processing theories for understanding PTSD, as the role of powerful cues for intrusive thoughts is well-known in this disorder. In support of this theory, two paradoxical effects have been documented when measuring target thoughts in college samples (e.g., Clark, Ball, & Pape, 1991; Lavy & van den Hout, 1990; Merckelbach, Muris, van den Hout, & de Jong, 1991; Wegner & Erber, 1992; Wegner, Schneider, Knutson, McMahon, 1991): (a) an *immediate enhancement effect*, defined by increased occurrences of the thought when trying to suppress it, and (b) a *rebound effect*, defined by increased occurrences of the thought after suppression instructions are removed.

Within the thought suppression literature, the paradigm's applicability for understanding different types of psychopathology, including depression, obsessive-compulsive disorder, and PTSD, has been explored. Several reviews of this literature have summarized findings to date (Beavers, Wenzlaff, Hayes, & Scott, 1999; Purdon, 1999; Purdon & Clark, 2000; Rassin, Merckelbach, & Muris, 2000; Wenzlaff & Wegner, 2000). These reviews have detailed some of the mixed findings, along with the conceptual and methodological differences within this literature. Even in a meta-analysis of the thought suppression literature (Abramowitz, Tolin, & Street, 2001), the role of thought suppression in psychopathology was unclear, due to the small number of studies conducted with clinical samples. The only clear finding from this literature has been that additional studies with consistent methodology are

needed to understand the role of thought suppression in various disorders.

With regard to studying trauma recovery, several studies have used analogue populations exposed to stressful films to examine thought suppression. In these studies, a rebound effect has been demonstrated (Davies & Clark, 1998; Harvey & Bryant 1998b; McNally & Riccardi, 1996). These studies provided the first evidence for the importance of the rebound effect in trauma recovery. Further exploration of thought suppression has been undertaken with samples of trauma survivors (Harvey & Bryant, 1998a; Shipherd & Beck, 1999). For example, Harvey and Bryant's (1998a) study of thought suppression in newly traumatized individuals revealed that participants demonstrated a rebound effect. Specifically, in the immediate aftermath of a traumatic motor vehicle accident, suppression of traumatic material led to a resurgence of these thoughts in individuals with and without Acute Stress Disorder (ASD). However, the results did not argue for specificity of thought rebound in ASD, a finding that may have been attributable to the recency of the trauma. In order to explore the role of thought suppression in chronic PTSD, Shipherd and Beck (1999) compared women with and without PTSD following sexual assault (average 6 years post-assault). Sexual assault survivors with chronic PTSD demonstrated a rebound effect with trauma-related thoughts following suppression whereas the survivors without PTSD did not. This study demonstrated for the first time differences in the performance of trauma survivors with and without PTSD when engaged in deliberate thought suppression. Overall, the presence of a rebound effect in the PTSD group and its absence in the no-PTSD group suggested that thought suppression might be relevant in the maintenance of intrusive symptomatology. However, it was unclear if these effects were specific to recovery from sexual assault or were a psychopathological feature of PTSD irrespective of the type of trauma. Further, it was unclear if the rebound effect was specific to trauma-related information or if the effect was reflective of general cognitive functioning.

One area yet to be explored with trauma survivors is the generalizability of the rebound effect to thoughts that are not trauma-related. If the rebound effect were specific to trauma-related thoughts in PTSD participants, this would provide stronger evidence for the possibility that thought suppression might be a relevant process in maintaining one of the key symptoms of PTSD, specifically, intrusive trauma-related thoughts. Thus, it is possible that intrusive thoughts are analogous to rebound effects that occur naturally following attempts to suppress

trauma-related thoughts. In contrast, if the rebound effect were present with thoughts that are not trauma-related among individuals with PTSD, it would be suggestive of a general cognitive style that may occur in individuals who develop PTSD. To date, examinations of this question with analogue populations have yielded conflicting results (Harvey & Bryant, 1998a; Roemer & Borkovec, 1994; Wegner & Gold, 1995). One study found that the rebound effect generalizes to humorous and neutral stimuli (Harvey & Bryant, 1998a). In contrast, other studies did not find a rebound effect for trauma-irrelevant but personally relevant emotional thoughts (Roemer & Borkovec, 1994; Wegner & Gold, 1995). Notably, these studies have not examined generalizability of the rebound effect in clinical samples. This omission is important given the potential implications of the rebound effect in explaining the reexperiencing symptoms of PTSD.

The aim of the current study was to examine two aspects of deliberate thought suppression that were not addressed previously: (a) to examine if the rebound effect would occur with thoughts that are not trauma-related, among individuals with and without PTSD; (b) to examine if the effects noted among rape survivors (Shipherd & Beck, 1999) would be observed among survivors of a different type of trauma, specifically a motor vehicle accident (MVA). Fifty-five MVA survivors, diagnosed with PTSD or free from PTSD, were asked to complete two thought suppression tasks. In one task, they were asked to suppress MVA-related thoughts, and in the other, they were asked to suppress personally relevant, neutral thoughts. At each phase, subjective ratings of mood, distress, and degree of thought suppression were collected.

Based on previous work in this area (Shipherd & Beck, 1999), it was hypothesized that the rebound effect would be replicated for trauma-related thoughts in the PTSD participants. In contrast, it was hypothesized that the no-PTSD survivors would not show a rebound of trauma-related thoughts following thought suppression. It also was hypothesized that the PTSD group would demonstrate stronger reactions than the no-PTSD participants to the trauma-related thought suppression task as measured by ratings of emotion. Further, it was hypothesized that the PTSD group would report more thought suppression overall during the trauma suppression task due to their diagnostic status. Given that the generalizability of the rebound effect had never been examined in PTSD, it was unclear what to anticipate with the personally relevant neutral thought suppression task. However, the presence of a rebound effect following suppression of neutral thoughts in PTSD participants could

suggest a generalization of cognitive responding to thought suppression. In contrast, the absence of a rebound effect would indicate that the effects of thought suppression were specific to trauma-related information in participants with PTSD.

## Method

### PARTICIPANTS

Seventy-four MVA survivors were recruited from the pretreatment phase of a larger study examining treatment for PTSD. Participants were recruited from the community using advertisements, physician referrals, and friendship networks. Inclusion criteria required that participants were at least 18 years of age at the time of the accident, were a minimum of 3 months postaccident, were English speaking, did not meet criteria for any current psychotic or substance abuse/dependence disorders, did not report any neurological damage or extensive head injury, and could be clearly classified as having PTSD or no PTSD.<sup>1</sup> Further, the participant's subjective experience during the traumatic event was required to meet diagnostic criteria for a traumatic experience (Criterion A; APA, 1994).

Participants were diagnosed by trained graduate students using the Clinician-Administered PTSD Scale for *DSM-IV* (CAPS; Blake et al., 1997) and Anxiety Disorders Interview Schedule (ADIS-IV; DiNardo, Moras, Barlow, Rapee, & Brown, 1993; DiNardo, Brown, & Barlow, 1994). These measures have solid psychometric properties and are widely used as diagnostic tools (Blake et al., 1997; Brown, DiNardo, Lehman, & Campbell, 2001). Reliability checks were performed on 25% of the assessments by an independent diagnostician who watched randomly selected videotaped interviews. Perfect agreement was reached for diagnoses of PTSD, generalized anxiety disorder, obsessive-compulsive disorder, social phobia, and major depression. The kappa coefficient for diagnoses of panic disorder and bipolar disorder I was .95, and .94 for specific phobia.<sup>2</sup> In cases where diagnosticians disagreed, the diagnoses of record were based upon a team consensus.

The final sample is described in Table 1 and included 55 participants, 30 with chronic PTSD and 25 no-PTSD participants. As mentioned previously, in order to determine if the effects of thought suppression were a result of diagnostic status or a more general effect of trauma recovery, all study partici-

<sup>1</sup>Nineteen subsyndromal individuals were excluded from the study because they were presenting for treatment of PTSD with clinical levels of distress and subclinical symptoms.

<sup>2</sup>Diagnoses of hypochondriasis and driving phobia did not occur with sufficient frequency to generate reliable interrater agreement coefficients.

TABLE 1 Sample Characteristics

|  | PTSD<br>( <i>n</i> = 30) |           | No PTSD<br>( <i>n</i> = 25) |           | <i>p</i>  |
|--|--------------------------|-----------|-----------------------------|-----------|-----------|
|  | <i>M</i>                 | <i>SD</i> | <i>M</i>                    | <i>SD</i> |           |
| Age (years)  | 40.47                    | 11.5      | 33.6                        | 9.3       | .02       |
| CAPS score   | 72.96                    | 19.6      | 19.24                       | 17.2      | .0001     |
| Months elapsed since MVA                           | 32.23                    | 28.7      | 27.08                       | 27.7      | <i>ns</i> |
| Average number of prior traumas                    | 3.8                      | 2.7       | 2.5                         | 2.1       | .05       |
| Average number of additional psychiatric diagnoses | 2.3                      | 1.4       | 0.6                         | 0.7       | .05       |
| Number with generalized anxiety                    | 17                       |           | 6                           |           |           |
| Number with major depression                       | 13                       |           | 2                           |           |           |
| Number with specific phobias                       | 12                       |           | 1                           |           |           |
| Gender (% female)                                  | 60                       |           | 68                          |           | <i>ns</i> |
| Race (% Caucasian)                                 | 83                       |           | 84                          |           | <i>ns</i> |
| Marital status (% married)                         | 40                       |           | 36                          |           | <i>ns</i> |
| Employed (% yes)                                   | 50                       |           | 84                          |           | .008      |
| College education (% yes)                          | 16.7                     |           | 50                          |           | .0008     |
| Percent reporting pain                             | 70                       |           | 32                          |           | .003      |
| Psychotropic medications (% yes)                   | 83                       |           | 56                          |           | .03       |

pants were survivors of an MVA. All participants who completed the project were paid \$20 for their participation. Individuals in both groups were presenting an average of 2 years and 5 months post-accident, primarily were female ( $n = 35$ , 63.3%), Caucasian ( $n = 46$ , 83.6%), and not partnered ( $n = 29$ , 53%), with an income below \$40,000 per year ( $n = 31$ , 58.5%). There were no significant differences between the groups in the degree of physical injury sustained during the MVA or whether a lawsuit was pending.

As expected, the groups differed on employment status, education, medication status, number of previous traumas, the number who reported pain, and the number of comorbid psychiatric conditions (see Table 1). The most common comorbid diagnoses were generalized anxiety disorder ( $n = 23$ ), major depression ( $n = 15$ ) and specific phobias ( $n = 13$ ). Participants also reported expected differences on self-report measures designed to assess posttrauma functioning (see Table 2), with PTSD participants reporting more symptoms of depression, anxiety and trauma-related distress than no-PTSD participants. An unexpected group difference emerged in the age of participants, with the PTSD group reporting an average age of 40.5 ( $SD = 11.5$ ) and no-PTSD survivors reporting an average age of 33.6 ( $SD = 9.3$ ). Given that a group difference in age was not predicted, age was controlled for in analyses.<sup>3</sup>

<sup>3</sup>Due to an unanticipated age difference between the groups, analysis of dependent variables was conducted with age as a covariate. However, there was no change in the pattern of results as compared to the analysis without using age as a covariate. Thus, for ease of presentation the dependent variables are presented without age covaried from the MANOVAs.

TABLE 2 Self-Report Measures

|  | PTSD<br><i>n</i> = 30 |           | No PTSD<br><i>n</i> = 25 |           | <i>t</i> value |
|--|-----------------------|-----------|--------------------------|-----------|----------------|
|  | <i>M</i>              | <i>SD</i> | <i>M</i>                 | <i>SD</i> |                |
| Impact of Event Questionnaire <sup>a</sup>             |                       |           |                          |           |                |
| Avoidance  | 24.5                  | (7.7)     | 4.4                      | (6.4)     | -10.44*        |
| Intrusion  | 20.6                  | (6.7)     | 4.3                      | (6.3)     | -9.2*          |
| Posttraumatic Stress Symptoms <sup>b</sup>             |                       |           |                          |           |                |
| Glover Numbing Scale <sup>c</sup>                      | 138.4                 | (30.2)    | 93.6                     | (24)      | -6.00*         |
| Spielberger Trait Anxiety Inventory-State <sup>d</sup> | 53.2                  | (13.8)    | 36.5                     | (14)      | -4.42*         |
| Spielberger Trait Anxiety Inventory-Trait <sup>d</sup> | 54.2                  | (9.7)     | 41.6                     | (10.3)    | -4.60*         |
| Beck Depression Inventory <sup>e</sup>                 | 23.7                  | (8.6)     | 10.4                     | (8.2)     | -5.83*         |

Note. Means reported with standard deviations in parentheses.

<sup>a</sup>Horowitz, Wilner, & Alvarez, 1979; <sup>b</sup>Foa, Riggs, Dancu, & Rothbaum, 1993; <sup>c</sup>Glover, et al., 1994; <sup>d</sup>Spielberger, Gorsuch, & Lushene, 1970;

<sup>e</sup>Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961.

\* $p < .006$  (Bonferroni corrected).

## PROCEDURE

Participants were allowed a practice phase designed to familiarize them with the thought listing procedure.<sup>4</sup> Instructions for the practice phase were as follows:

I would like you to spend the next 5 minutes writing on this blank page whatever information is present in your awareness from moment to moment. Your report might include, but is not limited to, descriptions of images, memories, feelings, fantasies, plans, sensations, observations, daydreams, objects that catch your attention, or efforts to solve a problem. Do not worry about spelling or grammar. You may write on both sides of this paper. Do you have any questions?

Following the practice phase, participants were asked to complete two thought suppression tasks (MVA, neutral) in a randomized counterbalanced fashion. A cognitive distraction task (the picture completion task from the Wechsler Adult Intelligence Scale-Revised; Wechsler, 1981) was administered between thought suppression tasks to minimize carryover effects. Each task consisted of three phases (Monitor 1, Suppression, Monitor 2) of 9 minutes each. During each phase, participants were

<sup>4</sup>The presence of a 5-minute practice phase and the 9-minute length of the experimental phases are consistent with the methods employed in the study being replicated (Shipherd & Beck, 1999).

asked to write their thoughts, with the following instructions for the Monitor 1 and Monitor 2 phases:

I would like you to write down what you are thinking about again. This time, it is OK to think about absolutely anything, including your [car accident (MVA task) or daily activities (neutral task)]. Just go ahead and write down whatever comes into your mind. Do you have any questions?

Between the two Monitor phases, the Suppression phase took place with the following instructions:

I would like you to write down what you are thinking about again, exactly like you did before. Except this time, please *try not* to think about your [car accident (MVA task) or daily activities (neutral task)] that we reviewed together earlier.<sup>5</sup> But if you do, please continue to write these thoughts down as they come into your mind. Do you have any questions?

In order to be consistent with the methodology used by Shipherd and Beck (1999), writing was chosen as the strategy for thought monitoring. Measures of the degree of suppression, subjective distress, and mood were taken immediately following each phase.

#### PROCEDURAL MEASURES

*Motor Vehicle Accident Interview (MVA-I).* This interview was based on a similar measure developed by Blanchard and Hickling (1997) and was used to gather information about each participant's accident. Data from this interview were used to provide descriptive information, including time elapsed since the MVA, severity of injury, and the presence of litigation.

*Daily Activities Questionnaire (DAQ).* This open-ended questionnaire asked participants to write a description of their activities during a typical day. As an example, participants chronicled their activities on an average day, including errands, meals, and standard activities (e.g., work). Participants were asked to rate the entirety of this description on two 0–100 Likert scales indicating the degree of positive and negative emotion associated with the listed description of a typical day.

<sup>5</sup>Prior to the tasks, the MVA description and Daily Activities Questionnaire (DAQ) were reviewed with the participant to ensure that the content was accurate. In addition, it was clarified that the experimenter would be referring to the content on the DAQ when stating "daily activities." The instructions further reminded participants of the content when the experimenter states "that we reviewed together earlier" during the suppression instructions.

These ratings were used to verify the valence of the neutral thought suppression target, with a rating of 50 indicating a neutral response on both dimensions. In this way, the emotional valence of the personally relevant neutral task was controlled across participants. Ratings indicated that the no-PTSD group's daily activities were more positive ( $t = 2.0$ ,  $p < .05$ ; mean = 57.2,  $SD = 19.3$ ) than the PTSD group (mean = 46.5,  $SD = 20.4$ ). However, the groups were similar on the negative emotion associated with daily activities ( $t = -1.49$ ,  $p > .05$ ) with an average rating of 47.9 ( $SD = 21.9$ ).

#### VALIDITY MEASURES

*Degree of suppression.* The degree to which participants were working to suppress target thoughts was assessed using a 0 to 100 rating scale (0 = *not trying to suppress target thoughts*, 100 = *completely trying to compress target thoughts*). Ratings of suppression were collected immediately following each phase of the thought suppression tasks.

#### DEPENDENT MEASURES (SEE TABLE 3)

*Percent target thoughts.* The thought listing procedure was used in order to determine the presence of target thoughts (Cacioppo, von Hippel, & Ernst, 1997). The first author divided all thought listings into "thought units" using the same strategy across subjects, primarily using sentences as individual thoughts. Two trained independent raters who were unaware of the participants' diagnostic status then coded thought listing data. Raters were provided with a list of each participant's daily activities and a description of his or her MVA in order to make accurate codings. Raters met training criteria by reaching agreement on 80% of five consecutive practice thought listings (Clark, Ball, & Pape, 1991). Overall, raters were in agreement on 87% of thoughts listed, with the remaining discrepancies resolved by a third trained rater.

Thoughts were coded as *MVA*, *neutral*, or *other* for each phase of all tasks. Narrow definitions were used for "MVA-related" and "neutral-related," where only thoughts that directly included elements from the MVA-I and DAQ were considered. Thus, only items that were expressly listed on the DAQ were coded as neutral thoughts. For example, if a participant wrote about going to a doctor's appointment, but going to the doctor was not listed on the DAQ, these thoughts were coded as "other." Other thoughts included any thoughts not directly mentioned in the MVA-I or DAQ, including current mood states, reactions to the task, etc. Following coding, the percent target thoughts were calculated for each phase. In this way, individual variability in the

TABLE 3 Dependent Variables

|                     | Percent Target Thoughts |                | SUDS           |                | Mood—Anxiety   |                | Mood—Positive Affect |                |
|---------------------|-------------------------|----------------|----------------|----------------|----------------|----------------|----------------------|----------------|
|                     | PTSD                    | No PTSD        | PTSD           | No PTSD        | PTSD           | No PTSD        | PTSD                 | No PTSD        |
| MVA Monitor 1       | 37.7<br>(36.7)          | 28.2<br>(30.5) | 58.8<br>(28.5) | 23.0<br>(24.8) | 62.7<br>(25.5) | 53.4<br>(10.5) | 33.5<br>(14.5)       | 47.9<br>(12.8) |
| MVA Suppression     | 28.1<br>(31.0)          | 12.3<br>(18.3) | 48.5<br>(33.8) | 23.4<br>(28.1) | 59.0<br>(24.6) | 51.9<br>(11.3) | 34.3<br>(14.3)       | 47.1<br>(12.7) |
| MVA Monitor 2       | 43.8<br>(33.0)          | 12.3<br>(21.6) | 48.2<br>(33.2) | 26.2<br>(29.3) | 57.2<br>(24.5) | 51.6<br>(9.0)  | 33.4<br>(13.6)       | 47.4<br>(16.0) |
| Neutral Monitor 1   | 12.1<br>(17.7)          | 8.8<br>(12.3)  | 44.7<br>(31.3) | 30.9<br>(29.2) | 55.8<br>(21.1) | 53.9<br>(11.0) | 36.6<br>(14.0)       | 47.3<br>(14.4) |
| Neutral Suppression | 7.1<br>(11.4)           | 8.2<br>(11.0)  | 42.5<br>(32.3) | 28.4<br>(31.4) | 52.3<br>(21.5) | 49.9<br>(9.5)  | 34.2<br>(12.9)       | 46.2<br>(12.5) |
| Neutral Monitor 2   | 4.5<br>(7.2)            | 5.5<br>(8.4)   | 36.5<br>(29.7) | 23.8<br>(25.5) | 53.8<br>(19.6) | 50.9<br>(9.0)  | 35.0<br>(13.9)       | 47.2<br>(12.4) |

Note. Means reported with standard deviations in parentheses.

number of thoughts produced in each of the phases was controlled.<sup>6</sup>

*Subjective Units of Distress (SUDS).* A measure of subjective distress was used to assess the participants' distress level during each phase of the study. SUDS ratings were on a 0 to 100 scale (0 = *no distress at all*, 100 = *as much distress as you can imagine*).

*Mood.* The Multiple-Affect Adjective Check List—Revised (MAACL; Zuckerman & Lubin, 1985) was used to evaluate mood during each phase. This widely used measure included 132 affective adjectives used to describe current state. Four subscales were used, including anxiety, depression, hostility, and positive affect, with standardized *T* scores calculated to control for response bias. Reliability ratings for the subscales of this measure range from .49 to .90 (Zuckerman & Lubin, 1985).

#### ANALYTIC STRATEGY

*Order effects.* All participants were randomly assigned to task presentation order. Twenty-six participants completed the MVA thought suppression task first and 29 participants completed the neutral thought suppression task first. Prior to conducting the primary analyses, the effect of task order was assessed via two ANOVAs, one for MVA-related thoughts and the second for neutral thoughts. The design of these ANOVAs was 2 Order (MVA first, neutral first)  $\times$  3 Phase (Monitor 1, Suppression, Monitor 2).

<sup>6</sup>In order to ensure that the results obtained using percent target thoughts were not influenced by statistical concerns inherent with proportional data, the principal analyses were repeated using arcsine transformation of the proportion of target thoughts. No differences were noted between transformed and untransformed data. Thus, for ease of presentation, only untransformed data are presented.

*Degree of suppression.* In order to examine the degree of suppression, ratings were submitted to a 2 Group (PTSD, No PTSD)  $\times$  2 Task (MVA, Neutral)  $\times$  3 Phase (Monitor 1, Suppression, Monitor 2) MANOVA with repeated measures on Task and Phase.

*Dependent variables.* Dependent variables were assessed through a series of ANOVAs. The design for these analyses was 2 Group (PTSD, No PTSD)  $\times$  2 Task (MVA, Neutral)  $\times$  3 Phase (Monitor 1, Suppression, Monitor 2) with repeated measures on Task and Phase. Pillai's criterion for determining significance was employed because it is robust in the presence of unequal sample sizes (Tabachnick & Fidell, 1996). Significant effects were followed with Tukey's procedure ( $p < .05$ ), using comparison specific error terms to test effects involving repeated measures (Task and Phase). Effect sizes (ES) were computed using partial  $\eta^2$ , reflecting the percent of variance accounted for with each effect (Rosenthal, 1995). Effect sizes were interpreted using Cohen's (1988) system where 2% to 12% is a small effect, 13% to 44% is a medium effect, and over 44% is a large effect. The level of power (PR) for each effect also was computed (Tabachnick & Fidell, 1996).

## Results

### VALIDITY CHECKS

*Order effects.* No order effects were noted, suggesting that the procedure was effective in controlling carryover effects: for MVA thoughts,  $F(1, 53) = 2.93$ ,  $ES = 5.2\%$ ,  $PR = .39$ , and for neutral thoughts,  $F(1, 53) = 0.46$ ,  $ES = .9\%$ ,  $PR = 0.10$ .

*Degree of suppression.* Analysis of the degree of suppression ratings revealed the predicted signifi-

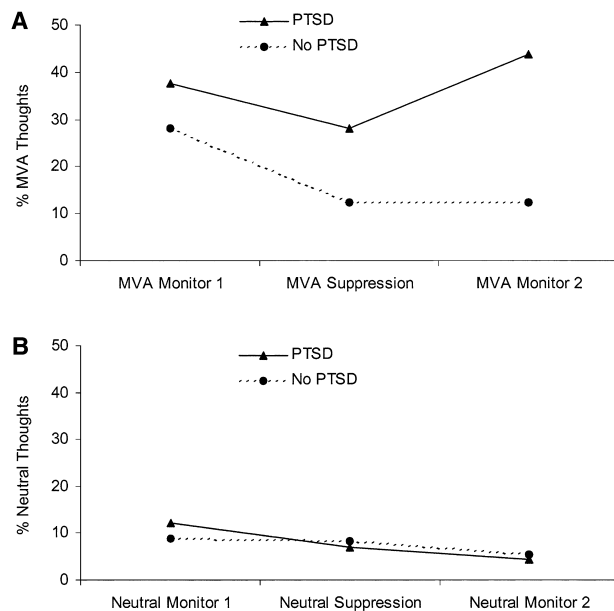
icant main effect for phase,  $F(2, 52) = 41.16, p < .001, ES = 61\%, PR = 1.0$ , and no interaction effect,  $F(1, 53) = 1.73, p = ns, ES = 9\%, PR = .63$ . During the Monitor 1 phase, participants reported an average suppression rating of 18.27 ( $SD = 30.8$ ). During the Suppression phase, there was a significant increase in suppression to 64.13 ( $SD = 33.1$ ). There was a significant decrease in reported suppression to 22.51 ( $SD = 31.7$ ) during Monitor 2. There also was a significant main effect of task,  $F(1, 53) = 5.46, p < .05, ES = 9\%, PR = .63$ , with more suppression reported overall during the MVA task (mean = 38.55,  $SD = 34.8$ ) as compared with the neutral task (mean = 31.39,  $SD = 29.0$ ). Thus, the PTSD and no-PTSD groups complied with the experimental instructions on both tasks and there were no main effects or interactions with the group variable (PTSD, no-PTSD).

#### DEPENDENT VARIABLES

**Percent target thoughts.** Analysis of percent target thoughts revealed a significant Group  $\times$  Task  $\times$  Phase interaction,  $F(2, 52) = 3.11, p < .05, ES = 11\%, PR = .57$ . Comparisons of the MVA and neutral tasks revealed significantly more target thoughts during each phase of the MVA task as compared with the neutral task (see Figure 1A and B). This pattern was present in both the PTSD and no-PTSD groups. Comparisons of the PTSD and no-PTSD groups demonstrated that, as predicted, the PTSD group reported significantly more trauma-related thoughts

than the no-PTSD group during each phase of the MVA task. In contrast, there were no differences between the groups in target thoughts during the neutral task. Follow-up testing examining the Phase factor revealed a significant decrease in the frequency of target thoughts from Monitor 1 to Suppression phase for the PTSD group on both tasks. Following successful suppression, the PTSD group reported significantly more MVA-related thoughts during Monitor 2 as compared with both the Suppression and the Monitor 1 phases. In contrast, the PTSD group reported a significant decrease in thoughts of daily activities from Suppression to Monitor 2 on the neutral task. These results demonstrate that the PTSD participants responded differently to the suppression of trauma-related thoughts and neutral thoughts. Specifically, the PTSD participants were able to suppress both types of thoughts (MVA and neutral) followed by a rebound effect for trauma-related thoughts, but no rebound for neutral thoughts. The no-PTSD group reported a significant decrease in the frequency of MVA thoughts from Monitor 1 to Suppression phase. In the Monitor 2 phase, the no-PTSD group continued to report low levels of MVA-related thoughts, equivalent to those reported in the Suppression phase. The no-PTSD group did not demonstrate significant fluctuations in the frequency of thoughts during the phases of the neutral task. However, these findings were marked by a low frequency of thoughts about daily activities throughout the task for both groups, perhaps due to the stringent definition of Neutral thoughts. It should be noted that both groups reported the anticipated profile of suppression ratings for both tasks, indicating that they had complied with the experimental instructions, but simply had too few of these thoughts to notice fluctuations in their frequency.

**Secondary analyses of thoughts during the neutral task.** In order to gain insight into what participants were thinking during the neutral task, several post-hoc analyses were conducted to examine what topics participants were thinking about during this task. First, a 2 Group (PTSD, No PTSD)  $\times$  3 Phase (Monitor 1, Suppression, Monitor 2) ANOVA with repeated measures on Phase was conducted with MVA thoughts to determine if participants were preoccupied with trauma-related thoughts during the task. A significant main effect for group emerged,  $F(1, 53) = 20.05, p < .0001, ES = 28\%, PR = .99$ . The PTSD group reported an average of 30.43% ( $SD = 27.3$ ) MVA-related thoughts during this task, whereas the no-PTSD group reported an average of 7.79% ( $SD = 20.93$ ) trauma-related thoughts. Thus, PTSD participants reported significantly more



**FIGURE 1** Percentage of thoughts about (A) the MVA during each phase of the MVA task and percent thoughts about (B) daily activities during each phase of the neutral task.

trauma-related thoughts during the neutral task than no PTSD participants. However, it should be noted that the PTSD group's average number of MVA thoughts throughout the neutral task was lower than the percent of MVA thoughts from the Monitor 1 phase of the MVA task (neutral task  $\chi = 30.4\%$ ,  $SD = 27.3$ ; MVA Monitor 1  $\chi = 37.7\%$ ,  $SD = 36.7$ ).

Second, a 2 Group (PTSD, No PTSD)  $\times$  3 Phase (Monitor 1, Suppression, Monitor 2) ANOVA with repeated measures on Phase was conducted with "other" thoughts to determine if participants were preoccupied with thoughts unrelated to the neutral thoughts during this part of the procedure. A significant main effect for group also emerged with this analysis,  $F(1, 53) = 21.15$ ,  $p < .0001$ ,  $ES = 29\%$ ,  $PR = 1.0$ . PTSD participants reported an average of 61.76% ( $SD = 26.9$ ) other thoughts during the neutral task, whereas the no-PTSD participants reported an average of 84.75% ( $SD = 22.7$ ) other thoughts. These results indicate that all participants were primarily thinking other thoughts (nontrauma, nonneutral) during the neutral task, with no-PTSD participants thinking significantly more other thoughts.

**SUDS.** Analysis of subjective units of distress during the MVA suppression task revealed a significant Group  $\times$  Task interaction,  $F(1, 53) = 4.09$ ,  $p < .05$ ,  $ES = 7\%$ ,  $PR = .51$  (see Figure 2A and B). This effect indicated that the PTSD group reported more distress during the MVA task (mean = 51.86,  $SD = 31.8$ ) as compared with the neutral task (mean = 41.23,  $SD = 31.08$ ), whereas the no-PTSD group reported equal levels of distress for both tasks (MVA = 24.17, neutral = 27.69).

**Mood.** No interactions were noted with measures of mood. However, a significant group effect for the Positive Affect subscale,  $F(1, 53) = 13.83$ ,  $p < .001$ ,  $ES = 21\%$ ,  $PR = .95$ , indicated that the PTSD group was significantly lower in positive affect (mean = 34.48,  $SD = 13.9$ ) than the no-PTSD group (mean = 47.19,  $SD = 13.5$ ). On the Anxiety subscale, there was a main effect for task,  $F(1, 53) = 4.78$ ,  $p < .05$ ,  $ES = 8\%$ ,  $PR = .57$ , with higher anxiety noted during the MVA task (mean = 56.28,  $SD = 19.8$ ) when compared with the neutral task (mean = 52.87,  $SD = 16.6$ ). In addition, there also was a main effect for phase on the Anxiety subscale,  $F(2, 52) = 4.60$ ,  $p < .05$ ,  $ES = 15\%$ ,  $PR = .75$ . Overall, Monitor 1 anxiety (mean = 56.7,  $SD = 18.8$ ) was higher than the levels of anxiety reported during the Suppression (mean = 53.47,  $SD = 18.4$ ) and Monitor 2 phases (mean = 53.55,  $SD = 17.4$ ). There were no significant effects on the remaining mood subscales.

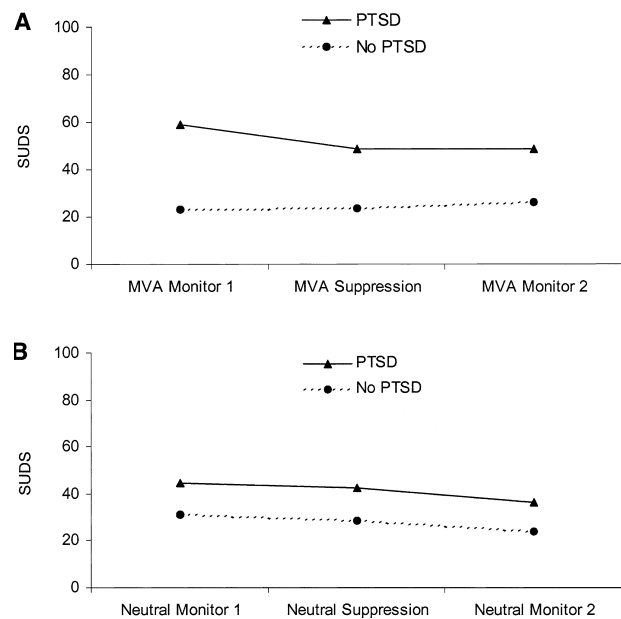


FIGURE 2 Subjective distress (SUDS) during each phase of (A) the MVA task (0–100) and (B) the neutral task (0–100).

## Discussion

In a replication of a previous work, this study demonstrated a rebound effect for trauma-related thoughts in PTSD participants, whereas no-PTSD participants did not have this effect. Further, this study extended the current literature by evaluating the effects of thought suppression in trauma survivors with personally relevant neutral thoughts. Results from the neutral thought suppression task indicated that the PTSD group was able to suppress neutral thoughts without a rebound afterward. The no-PTSD group appeared to demonstrate a floor effect, with very few thoughts of daily activities in any of the phases. Overall, the PTSD group reported less positive affect and more subjective distress than the no-PTSD participants. In addition, the PTSD group reported more subjective distress during the MVA task as compared with the neutral task. Regardless of diagnostic status, ratings of anxiety were higher for participants during the MVA task as compared with the neutral task.

The thought listing data from the MVA suppression task replicated a previous study examining thought suppression in sexual assault survivors with chronic PTSD (Shipherd & Beck, 1999). In both studies, trauma survivors with PTSD demonstrated a rebound effect with trauma-related thoughts, whereas no-PTSD participants did not. The performance of the no-PTSD trauma survivors in these studies suggests that the rebound effect is specific to PTSD pathology and cannot be accounted for by the presence of a traumatic event in an individual's

history. Moreover, this replication suggests that the rebound effect is not specific to recovery from one type of traumatic event (e.g., sexual assault), but appears to be more broadly related to the pathology of PTSD. Given the early stage of the literature examining thought suppression in PTSD, the importance of this construct remains uncertain. However, these initial studies indicate that there is promise in examining this area further. In particular, it would be useful to examine thought suppression in field studies in order to evaluate the convergent validity of the construct of suppression in laboratory and naturalistic evaluations. In this way, a stronger case could be made for the interpretability of basic experimental examinations of thought suppression. Longitudinal studies of newly traumatized individuals also may provide useful data about the role of thought suppression in the maintenance of PTSD symptoms. In particular, it would be beneficial to examine the relationship between thought suppression and naturally occurring rebound effects. Individual differences in the use of thought suppression as a coping strategy could be examined as an independent variable in future studies of the effects of naturalistic thought suppression. In essence, there are many aspects related to the construct of thought suppression that are unstudied.

In order to test if the rebound effect was specific to trauma-related information, participants in this study were asked to perform a thought suppression task with a personally relevant neutral target. Findings indicated that, in general, participants had a low frequency of thoughts about their daily activities, which made it difficult to evaluate the effect of suppressing these thoughts. In fact, post-hoc analyses revealed that most participants' thoughts wandered to "other" thoughts that were not targeted for assessment. However, despite the constricted range of neutral thoughts, the PTSD participants were able to successfully suppress thoughts of their daily activities without a rebound effect. The absence of a rebound effect in the neutral task occurred even in the presence of a high baseline level of trauma-related thoughts. This may be similar to the experience of many trauma survivors outside the laboratory setting, where it becomes necessary to suppress nonrelevant daily thoughts, even in the presence of trauma-related thoughts. This finding suggests that the rebound effect may be specific to trauma-related thoughts and thus may play a critical role in maintaining reexperiencing symptoms of PTSD. Specifically, these participants were able to suppress nontraumatic thoughts without adverse effects, although suppression of trauma-related thoughts resulted in an increase in trauma cognitions. At a minimum, these results suggest that the

cognitive functioning of PTSD patients is important to explore further. In particular, there may be a PTSD-related deficit in the ability to remove trauma-related thoughts that is critical to understanding PTSD psychopathology. This would be consistent with information processing theory's conceptualization of PTSD and could be a potential maintaining factor in the disorder. However, when interpreting these results, it is important to note that the no-PTSD group did not report any changes in the frequency of neutral thoughts. Given the low frequency of these thoughts within this group, it is possible that this is attributable to a floor effect. Clearly, examination of other thoughts occurring with a higher frequency would be a more appropriate control task as compared with trauma-related thoughts.

In considering the application of these findings to naturally occurring PTSD symptoms, it is possible that individuals with chronic PTSD attempt thought suppression with trauma-related thoughts in their daily lives and experience naturally occurring rebound effects. This hypothesis is consistent with other prospective studies of posttrauma symptoms as well as retrospective reports of the use of suppression in PTSD (Aaron et al., 1999; Amir et al., 1997; Ehlers et al., 1998; Morgan et al., 1995). Thus, in an attempt to eliminate symptoms, individuals with chronic PTSD may paradoxically exacerbate the reexperiencing symptoms of the disorder. Based on these results, it is possible that thought suppression might play an important role in maintaining PTSD symptoms, particularly intrusive thoughts about the trauma. In addition, it appears that this process is specific to trauma-related information and does not generalize to the more neutral thoughts of daily activities. Future studies also may explore the parameters of these effects by examining other types of thoughts (e.g., negative thoughts) and/or examining the role of current mood state on the ability and effect of suppressing thoughts. In this way, we can begin to explore the hypothesized parameters of intrusive traumatic recollections and the trauma's association with other memories.

The lack of self-reported emotional reactivity to the task also is consistent with previous findings (Shipperd & Beck, 1999). In the previous study, PTSD participants reported more overall distress, but did not report fluctuations in affect or levels of distress in response to the rebound of trauma-related thoughts (Shipperd & Beck, 1999). The lack of subjective distress associated with the rebound in MVA thoughts runs counter to the ironic processing theory (Wegner, 1989), which predicts that suppressed thoughts should be accompanied by associated emotions when they return. One possible inter-

pretation of these findings is that intrusive thoughts occur naturally following attempts at thought suppression in the daily lives of participants with PTSD. Given the participants' potential familiarity with this phenomenon, they may view the rebound effect as a predictable consequence that does not cause distress. This interpretation is consistent with the information processing theory, which proposes that individuals with PTSD encode traumatic events in fear networks, which are characterized by disjointed storage of elements of the event (Foa & Kozak, 1986). The fear network is likely to give rise to reexperiencing, arousal and avoidance symptoms until the memory of the trauma is integrated into existing memory networks. Thus, trauma survivors with PTSD may be familiar with the experience of returning intrusive thoughts about the trauma, and thus may be less distressed by their presence than predicted by the ironic theory.

There are several limitations to the current study, including the absence of psychophysiological measures of arousal, the lack of an anxiety disordered control group, and the absence of other suppression tasks involving personally relevant, emotionally laden thoughts (e.g., negative nontrauma-related thoughts). The current study attempted to utilize personally relevant-emotionally neutral target thoughts as a sole comparison group. Future studies might consider including other comparison tasks, such as negative nontrauma-related thoughts, as a more appropriate comparison. Further, despite suppression ratings indicating that subjects were complying with the experimental instructions, it is clear that thoughts about daily activities did not provide enough variability in the frequency of thoughts to be as stringent a comparison as desired. In addition, no measure of social desirability was included in this study, making it impossible to determine if performance was influenced by the participants' desires to be viewed positively or by their views of what was expected of them during the tasks. Other limitations to the current study include a relatively small sample size of MVA survivors. Future studies examining the role of thought suppression in PTSD may benefit from including survivors of multiple types of trauma, thus extending the generalizability of the findings.

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