

A PRELIMINARY STUDY OF THE EFFECTS OF DIRECTED SUPPRESSION OF RAPE-RELATED MATERIAL AMONG RAPE SURVIVORS USING UNOBTRUSIVE MEASURES

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Abstract. The current study explored whether, consistent with Wegner's (1994) theory of ironic process of mental control, instructions to suppress rape-related thoughts would lead to paradoxical increases in the accessibility and distress associated with these thoughts. In order to minimize experimental artifacts, instructions and assessments were designed to be unobtrusive. Although no effects of suppression instructions on rape-related distress emerged, directed suppression was associated with a concurrent increase in heart rate. In addition, directed suppression led to a medium-sized effect of increased accessibility, although this effect was nonsignificant due to small sample size. Finally, individual differences in the tendency to suppress thoughts were associated with increased accessibility in the suppression condition, suggesting that thought control strategies may be particularly problematic when they are chronically employed.

Keywords: Thought suppression, avoidance, trauma, ironic process, mental control.

Introduction

Post-traumatic stress disorder (PTSD) is characterized by both intrusive and avoidant symptomatology (American Psychiatric Association, 1994). In addition to the hallmark symptoms of intrusive recollections of traumatic events, hyperaccessibility of these thoughts and memories, and distress when reminded of events, individuals with PTSD attempt to avoid thoughts, memories and feelings associated with these events. Extant theories of PTSD have focused on the role that avoidance may play in interfering with successful processing of the traumatic event, causing the emotionality and accessibility of the memory to remain unaltered (cf. Horowitz, 1986; Foa & Riggs, 1994). However, theory and research on the effects of mental control suggest that cognitive avoidance may increase, rather than simply maintain, the intrusive symptoms of PTSD.

Wegner's (1994) theory of ironic processes in mental control posits that attempts to suppress or avoid internal thoughts may paradoxically increase accessibility and intrusiveness of these thoughts. In particular, he proposes that when attentional resources are depleted (for instance during psychological distress), the intentional operating process that searches for non target thoughts will be compromised, leaving the automatic monitoring process (which searches for

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instances of the target material) unchecked, thus resulting in increased accessibility of the target.

A number of experimental studies have demonstrated paradoxical increases in intrusions due to instructed suppression, although some studies have failed to replicate these findings (see Abramowitz, Tolin, & Street, 2001; Purdon, 1999; Rassin, Merckelbach, & Muris, 2000; for critical reviews of this literature). This inconsistency is likely due both to variability in types of target material and variability in design and methods of measuring intrusions (see Abramowitz, et al., 2001, for a comprehensive discussion of this issue). Several researchers have noted that methodologies such as bell rings and event markers may artificially draw attention to the target thought, resulting in findings that may be experimental artifacts (e.g. Lavy & van den Hout, 1990; Rassin et al., 2000). Further, these methodologies may be particularly sensitive to reporting bias (Abramowitz et al., 2001) and may not adequately detect the increased accessibility (as opposed to conscious presence) of target material predicted by Wegner's theory. However, several studies have demonstrated suppression-induced concurrent paradoxical increases in latencies to color naming target-relevant words in the modified Stroop task (Lavy & van den Hout, 1994; Wegner & Erber, 1992; Wegner, Erber & Zanakos, 1993), suggesting that suppression does increase accessibility of (neutral) target-related thoughts. To date, no such studies have been conducted with emotional target material.

In addition to evidence of an apparent link between avoidance/suppression and increased accessibility of target material, research on the effects of attempted suppression has revealed a second consequence of avoidance relevant to the study of traumatic stress: increased negative emotionality associated with the forbidden thought. Research demonstrates that instructions to suppress lead to target-related autonomic arousal (Wegner, Shortt, Blake, & Page, 1990; Merckelbach, Muris, van den Hout, & de Jong, 1991), as well as increased target-related anxiety (Roemer & Borkovec, 1994) and discomfort (Purdon & Clark, 2001). The effects of directed suppression on general (versus target-specific) distress and arousal have not been studied as extensively and findings are more varied. Purdon and Clark (2001) found that failures in instructed suppression of obsession-like thoughts were associated with more negative mood states than suppression of positive or neutral thoughts, whereas other studies have failed to reveal suppression effects on self-reported general distress (e.g. Roemer & Borkovec, 1994).

The studies reviewed above document effects of directed suppression that correspond to many post-traumatic symptoms: intrusive thoughts, distress and arousal associated with trauma cues, generalized arousal symptoms (APA, 1994), and increased accessibility of traumatic material as measured by Stroop interference (e.g. McNally, English, & Lipke, 1993; Cassidy, McNally, & Zeitlin, 1992). Increased accessibility of traumatic material has also been demonstrated among rape survivors who do not meet criteria for PTSD, with intrusive symptoms predicting the magnitude of the effect (Cassiday et al., 1992).

Consistent with the proposed relationship between thought suppression and symptoms of PTSD, correlational studies have found self-reported tendency to suppress thoughts to be associated with hyperaccessibility of distressing material (Rassin, Merckelbach, & Muris, 2001), PTSD diagnosis (Ehlers, Mayou, & Bryant, 1998) and symptom severity (Steil & Ehlers, 2000). However, these correlational designs do not permit conclusions regarding causality; thought suppression may be a response to the kinds of thoughts experienced in PTSD, rather than a causal factor in the intrusive, distressing nature of these thoughts (Abramowitz et al., 2001).

Experimental studies examining the effects of directed thought suppression of trauma-relevant material both in clinical Acute Stress Disorder (ASD) and PTSD samples and in

analogue studies have generally supported the proposed relationship between suppression and intrusions, with some inconsistencies (see Purdon, 1999, for a more extensive review). Rassin and colleagues found a delayed increase in target-related thoughts after suppression of distressing material in normal participants (Rassin, Merckelbach, & Muris, 1997). Davies and Clark (1998) found a rebound effect for analogue traumatic intrusions but not for neutral material in normal participants (as measured by verbalized thoughts; other measures of target thought intrusion failed to demonstrate a rebound effect for either stimulus), while Harvey and Bryant (1998b) found delayed increases in intrusions across distressing and neutral film clips.

Studies using clinical samples also provide some support for the proposed relationship. In one study, female rape survivors with PTSD reported a rebound of traumatic intrusions following suppression instructions whereas non-PTSD rape survivors did not (Shipherd & Beck, 1999). In another study, both ASD and non-ASD participants demonstrated a delayed increase of target related material following instructed suppression, although the majority of the effect seemed to be due to rebound in the ASD group who suppressed (Harvey & Bryant, 1998a),¹ whereas a final study failed to demonstrate the predicted paradoxical effect in this population (Guthrie & Bryant, 2000). Interestingly, although several studies examined the impact of suppression on self-reported general emotional state, none revealed suppression effects on mood (Shipherd & Beck, 1999; Davies & Clark, 1998), anxiety (Harvey & Bryant, 1998a; Guthrie & Bryant, 2000) or distress (Harvey & Bryant, 1998b). Further, Davies and Clark (1998) did not find suppression effects on either target-related discomfort or unpleasantness associated with the stimulus. Several methodological considerations should be noted in interpreting these studies: Shipherd and Beck did not include a control (nonsuppression) condition, Guthrie and Bryant assessed longer-term effects of suppression, and all studies had small sample sizes and failed to report effect sizes, which may have precluded the ability to detect interaction effects.

While these studies suggest that thought suppression may play a causal or maintaining role in intrusive symptoms following traumatic exposure, it would be premature to rule out alternative explanations for observed effects (e.g. they may be an experimental artifact of both conspicuous experimental instructions that make the purpose of the study apparent and obtrusive measures of intrusive thoughts). In addition, the emotional impact of suppression of trauma-related material, which may be particularly important clinically, has not been sufficiently explored. While investigators have failed to find effects of suppression on general mood or target related distress, all have relied on self-report data rather than on multimodal assessment of emotional responding.

In order to investigate the causal role of suppression attempts in PTSD-like symptomatology, the current study explored the effects of directed suppression of trauma-related material on accessibility of trauma-related thoughts, arousal concurrent with suppression attempts, and self-reported distress and arousal when subsequently presented with a trauma-related cue. We used an analogue design, but to heighten external validity and increase cognitive load included only participants who had a history of sexual assault and used a rape-related story as the target of suppression. In order to minimize the potential experimental confounds associated with conspicuous experimental instructions and measures discussed above, unobtrusive measures

¹ Interestingly, these results emerged even though ASD participants in the control condition reported efforts to suppress that fell nonsignificantly between those of ASD or nonASD participants in the suppress condition, suggesting the *instruction* of suppression, rather than reported suppression attempts, had a paradoxical effect.

were used throughout and efforts were made to mask the purpose of the study. We predicted that suppression instructions would be associated with increased accessibility of rape-related thoughts, increased arousal during suppression, and increased distress and arousal when reexposed to the rape-related target. Given the recent emphasis on the potential importance of individual difference variables in thought suppression (e.g. Purdon, 1999; Rassin et al., 2000), exploratory correlational analyses of potentially relevant individual difference variables and hyperaccessibility were also conducted.

Method

Participants

A large sample of female participants at an urban northeastern university completed a prescreening questionnaire packet in return for \$3. The questionnaire packet included a demographic questionnaire, the Life Events Checklist (adapted from the CAPS; Blake et al., 1995), a consent form for future research opportunities, and several psychological measures (relevant measures are described below). Participants who reported English as a first language (in order to insure validity of the modified Stroop), consented to future research, and endorsed experiencing a “sexual assault (forced oral, anal, or vaginal penetration)” (which was confirmed by interview), were contacted for participation in the experimental portion of the study.

Twenty-three participants completed the experimental portion of the study (described below). Participants had a mean age of 27.70 ($SD = 8.84$, range 19 to 47). Nineteen participants self-identified as White, two as Black/African-American and two as mixed race/ethnicity. Experimental groups did not differ in ethnicity or age, p 's $> .80$.

Dependent measures

Accessibility of rape related thoughts. The participants completed a modified emotional Stroop task with rape-related or neutral words. A series of colored words appeared on a computer screen and response latencies were measured as participants named the color of each word. Five rape-related words (VICTIM, AIDS, RAPE, INTERCOURSE, PENIS; used in Cassidy et al., 1992) and 5 neutral words (MODERATE, TYPICAL, FAIR, POLITE, CLEVER; used in McNally, Kaspi, Riemann, & Zeitlin, 1990; McNally, Riemann, & Kim, 1990; and Cassidy et al., 1992) were presented in blocked format for 50 total trials (the five neutral words appeared in five different colors in the first block, while the five rape-related words appeared in five different colors in the second block). The mean word length was 6.0 letters for rape-related words and 6.2 for neutral words. Words were not matched for frequency-of-usage in standard language because both high and low frequency words have been shown to produce Stroop interference (Mogg & Marden, 1990). Additionally, it is likely that the women in the current sample, who had all experienced a sexual assault, had higher frequency of thoughts about rape-related words, rendering frequency-of-usage norms irrelevant (also see Cassidy et al., 1992). Words were presented on a 17-inch color monitor. A voice-activated relay was used; a standard microphone received responses. This procedure was adapted from a study of sexual-assault survivors that demonstrated an association between delays in color naming rape-related words and severity of post-traumatic stress disorder symptomatology (Cassidy et al., 1992). This methodology has been proposed to capture the intrusive phenomena associated with PTSD more effectively than traditional self-report measures, as

intrusions are more closely linked to accessibility than to conscious thought (McNally et al., 1993).

Self-reported distress. Subjective experience of emotion was measured using two self-report measures, the negative affect scale of the Positive and Negative Affect Scale (PANAS-NA; Watson, Clark, & Tellegen, 1988) and the Subjective Units of Distress Scale (SUDS; Wolpe, 1990). These measures were administered at baseline, directly following the first reading of the rape article, and directly following the second reading of the rape article.

The PANAS is a 20-item self-report measure specifically designed to assess the distinct dimensions of *positive* and *negative* affect (PA and NA, respectively). Only the NA scale was used in the present study. The correlation between the NA and PA scales is low [ranging from $-.12$ to $-.23$ (Watson et al., 1988)], indicating that the two scales measure independent constructs and can appropriately be used separately. When used with short-time frame instructions (i.e. "rate how you are feeling right now"), the subscale is sensitive to fluctuations in mood states. Internal consistency estimates for the NA scale using all time instructions are good to excellent (α s from $.84$ to $.87$).

General subjective distress was measured by the Subjective Unit of Distress Scale (SUDS; Wolpe, 1990). Participants rated, on a scale from 0–100, their current level of distress. A study of the validity of the SUDS found that there are significant positive correlations between SUDS ratings and other measures of concurrent distress, such as heart rate, peripheral vasoconstriction, and digit temperature (Thayer, Papsdorf, Davis, & Vallecorsa, 1984).

Heart rate. Participants' physiological arousal was measured via heart rate (HR) using standard electrodes. Information was relayed through a Biopac encoder unit. Data were recorded on-line using Acknowledge 3.5 software. Physiological data were recorded during a baseline period, during the first and second reading of the rape article, and during the period in which participants were given the experimental instructions. The baseline and experimental periods were 5 minutes long, while the narrative periods were approximately 2.5 minutes long. HR was measured at 10-second intervals, and these intervals were averaged within each period to obtain the average HR for that period.

Individual difference variables

For exploratory purposes, psychological constructs of interest (general distress, PTSD symptom severity, tendency to suppress unwanted thoughts) were assessed in the initial screening packet or through clinical interview following the experimental portion of the study.

The *Brief Symptom Inventory 18* (BSI-18; Derogatis, 2001) is a brief self-report inventory designed to serve as a screening device for psychological distress and disorders. Participants are asked to rate the extent to which they are distressed or bothered by each of 18 psychological symptoms on a 5-point Likert scale (1 = not at all, 5 = extremely). Ratings across all 18 items are summed to provide the global severity index (GSI). The GSI has been found to have good internal consistency and reliability and to demonstrate a strong relationship with the Symptom Checklist-90-Revised ($r = 0.93$), which has shown convergent and discriminant validity with other measures of psychological distress (Derogatis, 2001).

The *PTSD Symptom Scale – Interview version* (PSS-I; Foa, Riggs, Dancu, & Rothbaum, 1993) is a semi-structured interview that assesses severity of PTSD symptoms, linked to a specific event. The interview has good internal consistency, test-retest reliability, and convergent

validity, as well as excellent inter-rater reliability (Foa et al., 1993). The authors provide criteria for assessing probable PTSD diagnosis; this method yields good convergent validity with the SCID (sensitivity 88%, specificity 96%; Foa et al., 1993). PTSD symptoms were assessed with specific reference to the adult incidence of sexual assault that the participant appraised as most distressing (if more than one event was reported) and severity of symptoms as well as probable PTSD diagnostic status were calculated.

The *White Bear Suppression Inventory* (WBSI; Wegner & Zanakos, 1994) is a 15-item self-report measure of the tendency to suppress one's thoughts. The scale has good internal consistency, test-retest reliability, and convergent validity (Muris, Merckelbach, & Horselenberg, 1996). In addition, scores on the WBSI predicted unwanted intrusive thoughts in a laboratory study (Muris et al., 1996).

Procedure

Participants who consented to future research were contacted by phone, given details about the study (including that it involved reading a potentially distressing narrative, to insure informed consent) and scheduled for a time if they consented to participation. They were randomly assigned to either the suppression or control condition. Four female experimenters (balanced across condition) conducted the experimental sessions; three female clinicians conducted the clinical interviews. All instructions were given both verbally and in writing; each task was completed alone in an adjacent side room. Participants were told that the purpose of the study was to investigate how people process stories and words. After a complete description of the study, participants provided informed consent. After sensors were attached for heart rate assessment, participants were given instructions for the modified Stroop task (to be administered later) and completed 10 practice trials to be sure they understood the task. Because the Stroop task requires significant attentional resources, this pre-Stroop practice period was included to ensure that participants were able to sufficiently engage in the experimental instructions during the Stroop. Then participants were asked to rest quietly for 5 minutes to obtain a measure of baseline physiological arousal. Next, they completed a baseline SUDS and PANAS in order to assess initial affective state. Next, participants read a copy of a rape news article while listening to an audiotape of the article being read aloud. To maximize encoding of the article, participants were told that they would answer questions about the content when they were finished. The article resembled a news item describing the separate rapes of four local women, including the surroundings prior to and during their assaults. The article suggested that the assailant may have been the same man in each case, and described the assailant as using a weapon (a knife) to threaten each woman. Heart rate data were collected while the article was read, and SUDS and PANAS were collected immediately following, in order to assess rape-cued affect prior to the experimental manipulation. Participants then engaged in the experimental condition for 5 minutes prior to the modified Stroop. Instructions were constructed for each condition that attempted to mask the manipulation, so that participants would not be aware of the purpose of the study. Thus, although participants were told not to think of the article, it was not made clear that this was the purpose of the study. Participants in the suppression condition were told: *“Now we would like you to clear your mind of the article for the next several minutes before we go on to the next task. It is very important that you try not to think of the article you just read. If you have any thoughts or images of the article,*

just push them away. Please rest quietly for several minutes with your eyes open, focusing on anything at all except the article."

Participants in the control condition were told: "Now that you have read the article, we would like to take another baseline measure. Please just rest quietly with your eyes open for the next several minutes, thinking of anything that comes to mind, including the article. It is possible that you'll have some thoughts or images of the article, that's fine. Just allow your mind to focus on anything at all, including the article, for the next several minutes."

Heart rate data were collected during this period, providing an assessment of suppression-induced arousal. Next, the experimenter re-entered the room, reminded the participant of the instructions for the Stroop task, and reiterated the experimental instructions in the context of the Stroop task. Participants in the suppression condition were told: "While you are doing this task it is very important that you try not to think about the article you read earlier. Just focus on the task. We'll ask you later on how much you were thinking about the article." Participants in the control condition were told: "While you are doing this task, you might have thoughts about the article you read earlier. That's OK. Just do your best to focus on the task. We'll ask you later on how much you were thinking about the article."

The experimenter then left the room and reminded participants of the instructions one last time over the intercom. Participants in the suppression condition were told: "Remember, while you're doing this task, it's very important that you stay focused on the task and try not to think about the article you read earlier. If any thoughts or images come to you, do your best to push them away." Those in the control condition were told: "While you're doing this task, it's very important that you just let whatever comes to mind come to mind, including thoughts or images of the article you just read. For any thoughts that come to you, just allow them." After participants completed the modified Stroop, they completed a self-report measure that assessed perceived effort in suppressing thoughts of the article on a 4-point Likert scale as well as perceived effort in suppressing thoughts of their own assault and extent of intrusive thoughts of their own rape, also on 4-point Likert scales. Participants then read and listened to the article again while heart rate was measured, followed by completion of a final SUDS and PANAS, providing measures of target-related reactivity following suppression. The clinician then conducted the PSS-I (described above), and participants were debriefed.

Results

Data cleaning and transformations

Stroop data. One participant (control condition) had no Stroop data due to technical problems. In order to remove values due to errors in the voice-activated relay, reaction times less than 350 or greater than 2000 msec were replaced with missing values. Fewer than 2% of the data were replaced with missing values. Mean reaction times were calculated for neutral and rape related words, and these scores were normally distributed.

Heart rate. HR data were checked for artifacts and cleaned manually prior to analysis; data points that indicated missed or doubled counted heart beats and other apparent artifacts (e.g. those corresponding with experimenters' documentation of idiosyncrasies, i.e. coughing, movement, etc) were smoothed using running mean replacement. Mean HR was calculated for each period (baseline, first article, experimental period, second article). HR was slightly negatively skewed during the reading of the second article; square root transformation of the

Table 1. Means and standard deviations by condition

Measure	Control		Suppress		<i>t</i>	<i>p</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
	<i>n</i> = 11		<i>n</i> = 12			
GSI	14.55	13.13	18.42	14.75	-.02	>.50
PSS	11.55	11.65	11.67	10.75	-.67	>.50
WBSI	48.45	14.26	50.83	13.37	-.41	>.50

reflected values (Tabachnick & Fidell, 1996) resulted in normal distributions across all time periods, so these values were used in all subsequent analyses.²

Self-reported distress. Baseline PANAS-NA ratings were positively skewed; log transformations resulted in normal distributions across all time periods so these values were used in all subsequent analyses. SUDS ratings were normally distributed so no transformations were made.

Predictors

The BSI scales and PSS-I total score were positively skewed; square root transformations resulted in normally distributed values used in the exploratory analyses. The WBSI was normally distributed so no transformations were made. Means and standard deviations of these measures, separately by condition, as well as *t* and *p* values demonstrating no significant differences between conditions, are presented in Table 1. A chi-square test revealed no significant differences between the control and suppression conditions for PTSD diagnostic status (36.4% and 41.7%, respectively, met diagnostic criteria for PTSD; $\chi^2(23) = .07, p > .75$).

Given the relatively small sample size, measures of effect size (η_p^2) are provided throughout in order to minimize the risk of Type II error. Stevens (1992) defines $\eta_p^2 = .06$ as a medium effect size and $\eta_p^2 = .14$ as a large effect size.

Baseline differences and reactivity to script

Means and standard deviations for baseline and first article self-reported distress and heart rate, along with *F*, *p*, and η_p^2 values from ANOVAs comparing conditions on each variable at each time point, are presented in Table 2. Conditions did not differ significantly in HR, SUDS, or PANAS-NA at either baseline or the first article reading. Participants reported a significant increase in self-reported distress (SUDS: $F(1,22) = 11.12, p < .01, \eta_p^2 = .35$; PANAS-NA: $F(1,22) = 11.96, p < .01, \eta_p^2 = .36$) and a marginally significant decrease in HR ($F(1,22) = 3.13, p < .10, \eta_p^2 = .13$) from baseline to the first narrative.

Effort to suppress thoughts of the article

An ANOVA was conducted on self-reported efforts not to think of the news article; no significant condition effect was revealed, $F(1, 22) = .20, p > .65, \eta_p^2 = .01$, indicating that

² For clarity, nontransformed means of all variables are reported throughout, although transformed variables are used in analyses.

Table 2. Means, standard deviations, and analyses of variance (ANOVA) for baseline and first article periods

Measure	Control		Suppress		ANOVA		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	η_p^2
	<i>n</i> = 11		<i>n</i> = 12				
<i>Baseline</i>							
HR	74.75	13.53	77.15	8.22	.03	.86	.00
SUDS	31.64	31.74	26.33	25.11	.20	.66	.01
PANAS-NA	17.18	9.70	14.83	6.25	.37	.55	.02
<i>First article</i>							
HR	72.69	13.29	76.49	8.60	.44	.51	.03
SUDS	45.55	33.46	39.33	23.60	.27	.61	.02
PANAS-NA	22.72	9.94	18.75	7.26	1.08	.31	.05

Table 3. Means and standard deviations by condition for latency to name neutral and rape-related words

Measure	Control		Suppress	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	<i>n</i> = 10		<i>n</i> = 12	
Neutral	740.70	82.53	646.01	71.38
Rape-related	803.68	112.52	738.67	124.36

participants in the suppression condition did not report greater efforts in cognitive avoidance than those in the control condition.

Effort to suppress thoughts of own assault and intrusive thoughts about own assault

ANOVAs were conducted on self-reported efforts not to think of one's own assault, and on reports of intrusive thoughts about one's own assault. Participants in each condition reported comparable levels of intrusive thoughts about their assaults, $F(1, 22) = .00$, $p > .99$, $\eta_p^2 = .00$ (with participants reporting on average that they thought of their assault "a little") and comparable efforts to suppress these thoughts, $F(1, 22) = .01$, $p > .90$, $\eta_p^2 = .01$.

Accessibility of trauma-related thoughts

Means and standard deviations for reaction times to neutral and rape-related words across conditions are presented in Table 3. Accessibility of trauma-related thoughts was assessed through delayed latency to color name rape related words, relative to neutral words. Therefore, to test the impact of suppression on accessibility, an ANCOVA was conducted on reaction times to rape-related words, controlling for reaction times to neutral words. There was no significant effect of condition, $F(1, 19) = 1.80$, $p = .20$, although there was a medium to large effect size, $\eta_p^2 = .09$, with participants in the suppression condition demonstrating nonsignificantly larger

Table 4. Means and standard deviations by condition for final article reading

Measure	Control		Suppress	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	<i>n</i> = 11		<i>n</i> = 12	
HR	73.18	11.96	76.55	6.72
SUDS	43.18	33.76	32.25	27.21
PANAS-NA	21.64	10.14	16.50	6.99

relative latencies to name rape-related words.³ A total sample size of 82 participants would be needed for adequate power to detect this effect.

Arousal during experimental instructions

In order to explore the concurrent effects of directed suppression on physiological arousal, an ANCOVA was conducted on HR during the experimental period, covarying baseline HR. A significant main effect of condition on HR emerged, $F(1, 20) = 4.68, p < .05, \eta_p^2 = .19$, with participants in the suppression condition demonstrating higher levels of HR ($M = 77.42, SD = 6.91$) than those in the control condition ($M = 72.09, SD = 11.50$).

Rape-related arousal and distress

In order to explore the effects of directed suppression on self-reported and physiological reactivity to rape-related cues, ANCOVAs were conducted on the physiological and self-report distress measures for the final reading of the article, covarying levels during the first reading of the article. No significant effects emerged, $F_s < 1.0, p$'s $> .35, \eta_p^2$'s $< .04$. See Table 4 for means and standard deviations.

Correlates of accessibility of trauma-related material

In order to investigate the relationship between potentially relevant individual difference variables and accessibility of trauma-related thoughts following suppression, exploratory correlational analyses were conducted separately for participants in each condition (see Table 5). We explored whether general psychiatric symptomatology (the GSI of the BSI-18), PTSD specific symptomatology (clinician-rated symptom severity from the PSS-I), reports of effort to suppress thoughts of the article, and general tendency to suppress unwanted thoughts (WBSI) were significantly correlated with latency to color name rape-related words (an indicator of accessibility). Due to the small sample size, these relationships should be considered exploratory. A significant correlation emerged between the WBSI and latency to color name rape-related words only in the suppression condition, suggesting that among those individuals who were instructed to suppress thoughts of the rape-related news article, a general

³ Interestingly, participants in the control condition demonstrated a trend toward longer latencies across word type, $F(1, 20) = 4.03, p < .10, \eta_p^2 = .17$, despite the rape-word specific relative delay among participants in the instructed suppression condition.

Table 5. Correlations between individual difference variables and latency to color naming rape-related words for participants in the suppression and control conditions

Predictors	Individual difference variables			
	SR-Suppress	GSI-18	PSS-I	WBSI
Suppress				
Latency	.20	.24	-.23	.59*
Control				
Latency	.24	.01	.13	.08

SR-Suppress = Participants' reports of how much they tried not to think of the news article.

GSI-18 = Symptom severity on the Brief Symptom Inventory – 18-item version.

PSS-I = Clinician-rated severity of PTSD symptoms from the Post-Traumatic Stress Survey – Interview version.

WBSI = White Bear Suppression Inventory.

* $p < .05$.

tendency toward thought suppression was associated with heightened accessibility of rape-related thoughts. No such relationship emerged in the control condition. Psychiatric symptoms and reports of efforts to suppress during the experimental period were not significantly related to latency in either condition.

Discussion

Before reviewing the findings, it is important to address the absence of a significant condition effect on participants' reported effort at suppression. Although this may indicate a failure of the experimental manipulation, it may also suggest a problem with the manipulation check assessment (Kazdin, 2002). It may be that participants only reported *trying* not to think of the article if they were having difficulty suppressing. In other words, participants might comply with instructions, put the article out of their minds and not think of it again, prompting them to rate their effort in the low range. The significant condition effect on heart rate suggests that there was an effect of the experimental instructions, even though participants did not report differential avoidance efforts across conditions. The medium sized (nonsignificant) effect on latencies to color naming rape words and the differential patterns of correlation between conditions also both suggest some impact of the experimental manipulation. Nonetheless, it remains possible that the absence of difference in self-reported suppression efforts reflects a failure in the experimental manipulation. Other studies in this area have also reported failed manipulation checks: In Harvey and Bryant (1998a), ASD participants instructed to suppress reported significantly elevated intrusive thoughts, even though ASD participants in the control condition reported comparable efforts at suppression. On the other hand, Guthrie and Bryant (2000) found no differences in self-reported efforts to suppress and also no differences in reported intrusive thoughts across conditions.

The findings regarding directed suppression's effect on heightened accessibility of trauma-related material are equivocal. Although no statistically significant effect of suppression instructions on Stroop interference emerged, suppression did have a medium to large sized effect on accessibility in the predicted direction. Future research with a larger sample is needed to determine if this effect is in fact statistically reliable. It is important to note that there was a slight inconsistency in the instructions given to the two groups: those in the

suppression condition were told over the intercom, prior to the modified Stroop task, that it was important for them to focus on the task, while those in the control condition were not. This might explain why the control group had significantly longer latencies, regardless of word type. Alternatively, there may have been some preexisting group differences in Stroop color-naming ability. However, neither of these possibilities account for the differential effect of condition on color-naming rape-related words, with those in the suppression condition, despite instructions to focus on the task, demonstrating nonsignificantly longer latencies to name rape-related words.

However, no evidence emerged supporting the prediction that directed suppression would increase rape-related arousal and self-reported distress. In fact, participants in the suppression condition reported nonsignificantly *lower* levels of distress when they listened to the article the second time, suggesting the absence of findings is not simply due to low power. Analyses revealed an extremely small effects size ($\eta_p^2 = .002$) for heart rate differences, suggesting the absence of significance is similarly unlikely to be due to limited power. These findings are inconsistent with previous studies in which suppression of neutral (Merckelbach et al., 1991) and emotionally charged (e.g. Purdon & Clark, 2001) targets were associated with increased target-related arousal or discomfort. This may be due to methodological differences in studies. In the current study, participants were not instructed to continually report failures of suppression. Such instructions may make such failures more salient, and thus have a stronger emotional impact. However, this impact may not correspond closely to naturalistic suppression, where such monitoring and reporting of failures would not occur.⁴ An alternative hypothesis is that the instructions themselves were insufficiently salient (consistent with the absence of condition effects on reported suppression efforts) to have a strong impact.

Nonetheless, suppression instructions did have a significant effect on concurrent arousal; participants in the suppression condition demonstrated higher levels of heart rate than those in the control condition. Previous analogue and clinical ASD/PTSD studies have failed to reveal suppression effects on general distress (e.g., Guthrie & Bryant, 2000; Harvey & Bryant, 1998a; Shipherd & Beck, 1999); however, these studies have all utilized self-report rather than physiological measures. It will be important to replicate this suppression-induced increased arousal and to see whether such increased arousal has an effect on subsequent suppression efforts. It should be noted, however, that this increased arousal might indicate an orienting response, or increased mental load associated with suppression, rather than emotional distress. Unfortunately, self-report measures were not obtained after this suppression period, so we cannot determine the subjective experience of participants in the suppression condition at that point.

One factor that complicates experimental studies is the effect of individual difference variables that may impact dependent measures, as well as compliance with experimental instructions. Exploratory analyses suggested that a general tendency to suppress unwanted thoughts was significantly associated with hyperaccessibility for participants in the suppression condition. This suggests that participants who naturally tend to avoid their thoughts may be particularly likely to experience the paradoxical effects of instructed suppression. Future

⁴ Although for certain clinical disorders, such as Obsessive-Compulsive Disorder, this type of active self-monitoring may be common, making such techniques more ecologically valid (Abramowitz et al., 2001).

research should explore this, and other potentially relevant individual difference factors, in larger sample sizes.

In addition to the potential failure of the experimental manipulation, other limitations should be noted. Clearly, the sample size is small and findings (and lack thereof) should be replicated in a larger, more diverse sample. It is interesting to note that other studies in this area have typically had comparable sample sizes (e.g. Harvey & Bryant, 1998a, 1998b). The nonsignificant, medium sized suppression effect on accessibility (as opposed to statistically significant effects in other studies) may be a result of the methodological alterations made in this study. Making both the experimental manipulation and the measurement less salient may have made suppression effects smaller, and thus more difficult to detect statistically in a sample of this size. In addition, the current study assessed accessibility during suppression (“immediate enhancement”) as opposed to following suppression (“rebound”), while most studies using thought listing and event markers have demonstrated stronger rebound effects (see Abramowitz et al., 2001, for a review). Immediate enhancement was tested here because studies using the Stroop methodology have assessed concurrent effects (e.g. Wegner & Erber, 1992) based on Wegner’s proposal that accessibility is increased during suppression due to the priming effect of the automatic monitoring process. Similarly, a recent study of OCD patients that used a lexical decision making task in order to assess priming (Tolin, Abramowitz, Przeworski, & Foa, 2002) revealed significant immediate enhancement effects for suppression of neutral material.⁵

It is also possible that the rape-related target (the newspaper article) was insufficiently salient or evocative so that it did not introduce the cognitive load associated with ironic process in Wegner’s (1994) theory. The goal was to provide a target likely to be personally salient, but not overwhelming, while still maintaining uniformity across participants. However, a film clip might be a more evocative stimulus to use in this context; future studies should explore suppression effects using both more intense uniform targets and personally relevant targets among this population.

Although participants with the same type of traumatic history and a uniform trauma-related target were chosen in order to minimize within group variance, several other factors varied across participants such as severity of sexual assault, years since sexual assault, trauma-related symptomatology, general psychiatric symptomatology, and tendency to suppress thoughts, all of which might have minimized the ability to detect between group differences. Shipperd and Beck’s (1999) findings suggest variability in PTSD diagnostic status may have increased within group variance; however, PTSD symptom severity did not correlate significantly with accessibility, contrary to these previous findings.

Other participant characteristics may also be important to consider. To date, studies of the effects of thought suppression (including the current study) have used predominantly white samples. It remains to be determined whether the effects (or absence of effects) observed generalize to individuals from other racial or ethnic groups. Similarly, only women were included in this study, so results may not be generalizable to men. It will be important for

⁵ It should be noted that some authors have argued that the Stroop task may be affected by factors other than attentional bias, such as interference and response bias (MacLeod, Mathews, & Tata, 1986). Future studies might use other tasks such as the dot probe to assess attentional bias, or a lexical decision task to assess priming.

future studies to explore the generalizability of findings in this area across more diverse samples.

This study suggests that there may be physiological consequences to efforts to suppress trauma-related material, and that suppressed target content may become paradoxically more accessible (although a larger sample is needed to confirm this finding). On the other hand, no predicted emotional effects of suppression were revealed. The importance of individual difference variables was demonstrated by the significant correlation between the tendency to suppress unwanted thoughts and heightened accessibility of rape-related material in the suppression condition. Although these findings provide some support for the proposed role of suppression in trauma-related difficulties (i.e. increased arousal and accessibility of trauma-related material), the absence of emotional effects is puzzling and necessitates further study. As Purdon (1999) suggests, it will be important to explore the strategies used by individuals when they attempt to suppress trauma-related thoughts, effort exerted, and the consequences of failures in these efforts. Further, the metacognitive effects of efforts to suppress trauma-related material should be investigated (Purdon, 1999; Rassin et al., 2000). There is some evidence that suppression attempts result in appraisal that a target thought is uncontrollable (Kelly & Kahn, 1994; Shipherd & Beck, 1999), an effect that may have important implications for psychopathology. Finally, the interaction of individual difference variables and experimental instructions on various outcomes needs to be explored more systematically.

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References

- ABRAMOWITZ, J. S., TOLIN, D., & STREET, G. (2001). Paradoxical effects of thought suppression: A meta-analysis of controlled studies. *Clinical Psychology Review*, *21*, 683–703.
- AMERICAN PSYCHIATRIC ASSOCIATION (1994). *Diagnostic and statistical manual of mental disorders*. Washington, DC: American Psychiatric Association.
- BLAKE, D. D., WEATHERS, F. W., NAGY, L. M., KALOUPEK, D. G., GUSMAN, F. D., CHARNEY, D. S., & KEANE, T. M. (1995). The development of a clinician administered PTSD scale. *Journal of Traumatic Stress*, *8*, 75–90.
- CASSIDAY, K. L., MCNALLY, R. J., & ZEITLIN, S. B. (1992). Cognitive processing of trauma cues in rape victims with post-traumatic stress disorder. *Cognitive Therapy and Research*, *16*, 283–295.
- DAVIES, M. I., & CLARK, D. M. (1998). Thought suppression produces a rebound effect in analogue post-traumatic intrusions. *Behaviour Research and Therapy*, *36*, 571–582.
- DEROGATIS, L. R. (2001). *Brief Symptom Inventory 18 (BSI-18) administration, scoring, and procedures manual*. Minneapolis, MN: NCS Pearson Inc.
- EHLERS, A., MAYOU, R. A., & BRYANT, B. (1998). Psychological predictors of chronic posttraumatic stress disorder after motor vehicle accidents. *Journal of Abnormal Psychology*, *107*, 508–519.

- FOA, E. B., & RIGGS, D. S. (1994). Posttraumatic stress disorder and rape. In R. S. Pynoos (Ed.), *Posttraumatic stress disorder: A clinical review* (pp. 133–163). Lutherville, MD: Sidran Press.
- FOA, E. B., RIGGS, D. S., DANCU, C. V., & ROTHBAUM, B. O. (1993). Reliability and validity of a brief instrument for assessing Post-traumatic Stress Disorder. *Journal of Traumatic Stress*, 6, 459–473.
- GUTHRIE, R., & BRYANT, R. A. (2000). Attempting suppression of traumatic memories over extended periods in acute stress disorder. *Behaviour Research and Therapy*, 38, 899–907.
- HARVEY, A. G., & BRYANT, R. A. (1998a). The effect of attempted thought suppression in acute stress disorder. *Behaviour Research and Therapy*, 36, 583–590.
- HARVEY, A. G., & BRYANT, R. A. (1998b). The role of valence in attempted thought suppression. *Behaviour Research and Therapy*, 36, 757–763.
- HOROWITZ, M. (1986). *Stress response syndromes*. New York: Jason Aronson.
- KAZDIN, A. E. (2002). *Research design in clinical psychology* (4th ed.) Boston: Allyn & Bacon.
- KELLY, A. E., & KAHN, J. H. (1994). Effects of suppression of personal intrusive thoughts. *Journal of Personality and Social Psychology*, 66, 998–1006.
- LAVY, E. H., & VAN DEN HOUT, M. A. (1990). Thought suppression induces intrusions. *Behavioural Psychotherapy*, 18, 251–258.
- LAVY, E. H., & VAN DEN HOUT, M. A. (1994). Cognitive avoidance and attentional bias: Causal relationships. *Cognitive Therapy and Research*, 18, 179–191.
- MACLEOD, C., MATHEWS, A., & TATA, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology*, 95, 15–20.
- MCNALLY, R. J., ENGLISH, G. E., & LIPKE, H. J. (1993). Assessment of intrusive cognition in PTSD: Use of the modified Stroop paradigm. *Journal of Traumatic Stress*, 6, 33–41.
- MCNALLY, R. J., KASPI, S. P., RIEMANN, B. C., & ZEITLIN, S. B. (1990). Selective processing of threat cues in post-traumatic stress disorder. *Journal of Abnormal Psychology*, 99, 398–402.
- MCNALLY, R. J., RIEMANN, B. C., & KIM, E. (1990). Selective processing of threat cues in panic disorder. *Behaviour Therapy and Research*, 28, 407–412.
- MERCKELBACH, H., MURIS, P., VAN DEN HOUT, M., & DE JONG, P. (1991). Rebound effects of thought suppression: Instruction-dependent? *Behavioural Psychotherapy*, 19, 225–238.
- MOGG, K., & MARDEN, B. (1990). Processing of emotional information in anxious subjects. *British Journal of Clinical Psychology*, 29, 227–229.
- MURIS, P., MERCKELBACH, H., & HORSELENBERG, R. (1996). Individual differences in thought suppression. The White Bear Suppression Inventory: Factor structure, reliability, validity and correlates. *Behaviour Research and Therapy*, 34, 501–513.
- PURDON, C. (1999). Thought suppression and psychopathology. *Behaviour Research and Therapy*, 37, 1029–1054.
- PURDON, C., & CLARK, D. A. (2001). Suppression of obsession-like thoughts in nonclinical individuals: Impact on thought frequency, appraisal and mood state. *Behaviour Research and Therapy*, 39, 1163–1181.
- ROEMER, L., & BORKOVEC, T. D. (1994). Effects of suppressing thoughts about emotional material. *Journal of Abnormal Psychology*, 103, 467–474.
- RASSIN, E., MERCKELBACH, H., & MURIS, P. (1997). Effects of thought suppression on episodic memory. *Behaviour Research and Therapy*, 35, 1035–1038.
- RASSIN, E., MERCKELBACH, H., & MURIS, P. (2000). Paradoxical and less paradoxical effects of thought suppression: A critical review. *Clinical Psychology Review*, 20, 973–995.
- RASSIN, E., MERCKELBACH, H., & MURIS, P. (2001). Thought suppression and traumatic intrusions in undergraduate students: A correlational study. *Personality and Individual Differences*, 31, 485–493.
- SHIPHERD, J. C., & BECK, J. G. (1999). The effects of suppressing trauma-related thoughts on women with rape-related posttraumatic stress disorder. *Behaviour Research and Therapy*, 37, 99–112.
- STIEL, R., & EHLERS, A. (2000). Dysfunctional meaning of posttraumatic intrusions in chronic PTSD. *Behaviour Research and Therapy*, 38, 537–558.

- STEVENS, J. (1992). *Applied multivariate statistics for the social sciences*. Hillsdale, NJ: Lawrence Erlbaum.
- TABACHNICK, B. G., & FIDELL, L. S. (1996). *Using multivariate statistics*. New York: Harper Collins.
- THAYER, B. A., PAPSDORF, J. D., DAVIS, R., & VALLECORSIA, S. (1984). Automatic correlates of the subjective anxiety scale. *Journal of Behavior Therapy and Experimental Psychiatry*, 15, 3–7.
- TOLIN, D. F., ABRAMOWITZ, J. S., PRZEWORSKI, A., & FOA, E. B. (2002). Thought suppression in obsessive-compulsive disorder. *Behaviour Research and Therapy*, 40, 1255–1274.
- WATSON, D., CLARK, K. A., & TELLEGEN, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 6, 1063–1070.
- WEGNER, D. M. (1994). Ironic processes of mental control. *Psychological Review*, 101, 34–52.
- WEGNER, D. M., & ERBER, R. (1992). The hyperaccessibility of suppressed thoughts. *Journal of Personality and Social Psychology*, 63, 903–912.
- WEGNER, D. M., ERBER, R., & ZANAKOS, S. (1993). Ironic processes in the mental control of mood and mood-related thought. *Journal of Personality and Social Psychology*, 65, 1104.
- WEGNER, D. M., SHORTT, J. W., BLAKE, A. W., & PAGE, M. S. (1990). The suppression of exciting thoughts. *Journal of Personality and Social Psychology*, 58, 409–418.
- WEGNER, D. M., & ZANAKOS, S. (1994). Chronic thought suppression. *Journal of Personality*, 62, 615–640.
- WOLPE, K. (1990). *The practice of behavior therapy* (4th ed.) New York: Pergamon Press.