

THOUGHT SUPPRESSION

Richard M. Wenzlaff and Daniel M. Wegner

*Division of Behavioral and Cultural Sciences, The University of Texas at San Antonio,
San Antonio, Texas 78249-0652; e-mail: rwenzlaff@utsa.edu*

*Department of Psychology, Gilmer Hall, University of Virginia, Charlottesville, Virginia
22903; e-mail: dwegner@virginia.edu*

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■ **Abstract** Although thought suppression is a popular form of mental control, research has indicated that it can be counterproductive, helping assure the very state of mind one had hoped to avoid. This chapter reviews the research on suppression, which spans a wide range of domains, including emotions, memory, interpersonal processes, psychophysiological reactions, and psychopathology. The chapter considers the relevant methodological and theoretical issues and suggests directions for future research.

Again and again I have said to myself, on lying down at night, after a day embittered by some vexatious matter, 'I will *not* think of it any more! . . . It can do no good whatever to go through it again. I *will* think of something else!'

And in another ten minutes I have found myself, once more, in the very thick of the miserable business, and torturing myself, to no purpose, with all the old troubles.

Lewis Carroll (1893)
Curiosa Mathematica

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INTRODUCTION

There is a certain predictability to unwanted thoughts, a grim precision in the way our mental clockwork returns such thoughts to mind each time we try to suppress them. As a result, it is tempting to attribute special significance or power to suppressed thoughts, to see them as expressions of sinister workings of mind—and in fact, it was exactly this approach that led Freud (e.g. 1953) to focus his attention on the nature of thoughts that are expelled from consciousness. As it turns out, however, it may not be especially useful to ascribe significance to unwanted thoughts themselves.

Contemporary research suggests that it is the process of thought suppression, not the product, that should be examined for its significance and power. This realization has emerged from studies in which people are instructed to spend time trying not to think about some particular thought, however neutral or mundane, with the consequences of their activity being measured. Early research hinted that such instructions might make such a thought tend to return (e.g. Antrobus et al 1964, Langfeld 1910). This finding was most pronounced in the “white bear” studies of Wegner et al (1987), and the introduction of this standardized laboratory paradigm has yielded substantial evidence that the paradoxical nature of the process of thought suppression is responsible for the returning of unwanted thoughts to mind.

Evidence on thought suppression is accumulating broadly at a rapid pace. Although there are reviews of aspects of this literature (Beevers et al 1999; Bodenhausen & Macrae 1996; Monteith et al 1998a; Purdon & Clark 1999; Wegner 1989, 1992; Wegner et al 1994a; Wegner & Wenzlaff 1996), the topic deserves an integrated and current review. We endeavor to provide this by focusing on research on the process of thought suppression that has accrued since the white bear studies. We begin by describing the phenomenon—when suppression is apt

to backfire—and the methodological considerations relevant to the detection of this paradoxical effect. Next, we consider the main theoretical accounts for this outcome and examine the key variables that may mediate the effects of thought suppression. We then review the impact of suppression on intrapersonal states (e.g. emotional, cognitive) and interpersonal processes (e.g. attraction, prejudice), and finally we consider the relationship of thought suppression to psychopathology.

THE PHENOMENA

Researchers have identified three classes of suppression-related effects: (a) enhanced occurrence of target thoughts following a period of suppression; (b) an immediate, suppression-induced surge in target thoughts; and (c) an intensification of intrusions during suppression, triggered by cognitive demands. In this section, we examine the evidence for these different suppression-related phenomena. First, however, we briefly discuss the importance of baseline considerations in assessing suppression-related effects.

Emptying the Head

What exactly does it mean not to think of something? If thought suppression were a perfect process, it would ideally leave a person with no vestige of the unwanted thought at all. The initial “white bear” experiments of Wegner et al (1987) compared thought suppression to this ideal and found it wanting. It was assumed in these studies that college students in Texas would almost never think of a white bear spontaneously, and therefore that any evidence of such a thought during suppression was an indication that suppression had failed. And indeed, many such indications were observed. Participants’ signals that the thought was occurring during a 5-minute suppression session—in the form of verbal reports or bell-rings to indicate the thought’s return—on average exceeded one per minute.

This frequency of thinking seems excessive if people can indeed suppress a thought completely, but perhaps this is too much to ask. After all, the instruction to suppress is a sort of reminder of the unwanted thought. Perhaps this instruction cues people to think of the target more than they would have normally. To control for such cuing, investigators have examined several comparisons, each implying a different baseline level of spontaneous thinking.

One baseline approach is the “free monitoring” method, in which participants are asked to report whatever comes to mind. This approach is appealing because it does not produce artificially high rates of target thoughts and avoids potential ceiling and exhaustion effects. It does not, however, control for cuing effects that can result when the suppression group is specifically instructed to inhibit a particular thought. Moreover, the monitoring condition can risk floor effects when natural baseline levels for a particular thought are very low. To avoid the problem of a zero baseline and to minimize differential cuing, this free-monitoring method typically requires that the experimental procedure expose participants to the thought target (e.g. in a film or a reading) prior to the thought reporting period.

Another possible comparison involves a “cued monitoring” or “mention” control. In this case, instructions mention the target thought, either alone or in the context of other thoughts, optionally with some instruction indicating that these are things the participant may or may not consider during the thought report period. In some cases, the participant is also asked to monitor the occurrence of the cued thought. This approach helps equate cuing for the suppression and control groups while minimizing ceiling and floor effects. Although this approach has several advantages, the “mention” instructions may promote excessive attention to the target and could distort responses by making participants suspicious about its role in the study. Indeed, the attempt to monitor a thought may be a component of the mental process of suppression, in which case monitoring serves as a seriously flawed baseline.

The third potential comparison is the “expression” method, in which control participants are instructed to think about the item that the suppression group is trying to inhibit. Not surprisingly, this control method produces high rates of target thoughts in the control condition, and so makes instructed suppression look very successful. Trying not to think of something produces far fewer thoughts than does trying to think of it on purpose—but this effect seems attributable to the effectiveness of expression, not the effectiveness of suppression. Expression is thus used more as an informative comparison condition than as a control. And expression conditions have come to be important in suppression research because of the discovery that prior suppression can enhance the degree of subsequent expression—the post-suppression rebound effect (Wegner et al 1987).

Postsuppression Rebound

In the first experimental demonstration of a suppression-related increase in target thoughts, Wegner et al (1987) compared the thought reports of two groups during a period when each had been instructed to think aloud about a white bear. One group focused on the target from the outset, whereas the other first spent a period of time suppressing white-bear thoughts. Compared with the group that thought about a white bear at the outset, the initial suppression group reported a higher rate of target thoughts during a subsequent expression period. This paradoxical finding prompted follow-up studies that assessed the reliability of this postsuppression rebound effect and addressed some of the methodological issues involved in the original study.

One of the methodological issues concerned comparing the expression thought reports of the suppression group that had already engaged in a think-aloud session with the expression-only group that had no prior exposure to the thought-report protocol. Investigators (e.g. Clark et al 1991) point out that this design precludes distinguishing the potential effects of practice from those of suppression. Moreover, critics contend that the expression-control method lacks ecological validity (Merckelbach et al 1991) and might artificially obscure any immediate suppression-induced surge in target thoughts (Clark et al 1991).

In response to the practice issue, researchers have enlisted a modified design where participants engage in a common subsequent expression period after initial expression or suppression, thus eliminating differential effects of practice. In addition, investigators have addressed the issue of the contrived nature of the expression condition by replacing it with thought-monitoring instructions. A variety of studies using one or more of these methodological modifications have replicated the original postsuppression rebound effect (Clark et al 1991, 1993, Harnden et al 1997, Harvey & Bryant 1998b, Johnston et al 1997a, Kelly & Kahn 1994, Lavy & van den Hout 1994, McNally & Ricciardi 1996, Wegner et al 1991, Wegner & Gold 1995, Wenzlaff et al 1991).

The addition of a second reporting period for the monitoring group raises a new issue concerning differential “exhaustion” of the target thought. Some studies indicate that target thoughts among expression or monitor control groups decrease over time (Roemer & Borkovec 1994, Wegner et al 1991, Wenzlaff et al 1988). Thus, the higher rates of target thoughts for participants who had previously suppressed may be fueled by a decrease in target thoughts among the control group. The viability of this alternative explanation, however, is weakened by findings from a study by Clark et al (1993). The investigators found evidence for the postsuppression rebound even after statistically controlling for the percentage of target thoughts and time spent on the target during the first reporting period. They concluded that the observed rebound was a consequence of thought suppression, and not a methodological artifact.

The viability of an exhaustion interpretation of the rebound effect is further diminished by the results of studies employing a unique comparison group (Wenzlaff & Bates 1999). Participants unscrambled a series of sentences by rearranging five of six available words (e.g. “very looks future the dismal bright”) to form either a positive or negative statement (e.g. “the future looks very dismal” or “the future looks very bright”). A monitor control group formed whatever statements came to mind and the suppression group was instructed to suppress either positive or negative thoughts. The unique addition to these groups was a concentration control, which was instructed to focus on either positive or negative thoughts. During a subsequent time period participants unscrambled a second set of sentences, with all groups receiving instructions to form whatever statement came to mind first. The result was that a rebound effect occurred for the suppression group only, even though both the suppression and the concentration groups produced equal levels of positive and negative statements during the first phase. Thus, an exhaustion account for the rebound effect in this instance is untenable.

Although the preponderance of published studies provides evidence for a post-suppression rebound, some investigations have found only partial support (Kelly & Kahn 1994; Rutledge et al 1993, 1996; Smari et al 1994), and others have failed to find the effect at all (Merckelbach et al 1991; Muris et al 1992, 1993; Roemer & Borkovec 1994). The results of studies that have not fully replicated the rebound effect suggest either that individual differences mediated the effect

(Rutledge et al 1993, 1996; Smari et al 1994) or that the type of thought made a difference (Kelly & Kahn 1994). In some remaining studies that did not find a rebound, methodological limitations preclude adequate control comparisons (e.g. Muris et al 1993).

Enhanced Accessibility During Suppression

The evidence indicates that when thought suppression is relinquished, it leads to more thoughts about the target than would have occurred if suppression had never been undertaken. This finding suggests that thought suppression increases the accessibility of the target (Higgins 1989) and raises the possibility that it may produce a surge in target thoughts during attempted suppression. Research investigating this has assessed the immediate effectiveness of thought suppression under normal circumstances and in the special case where a cognitive demand is imposed to undermine mental-control abilities.

Immediate Enhancement Without Load In the absence of added cognitive demands, most research has failed to find that suppression produces an immediate enhancement of target thoughts. However, these same studies uniformly find some significant incidence of target-related thoughts among suppressing participants—even though it is typically less than in the nonsuppressing group. It is unclear whether the relatively low but notable occurrence of target thoughts during suppression indicates a suppression-related enhancement or whether it simply signals occasional failures of mental control.

The identification of an immediate suppression-induced surge in target thoughts is complicated by a potential interpretive dilemma that occurs when there is no difference in the number of target thoughts reported under suppression or control instructions. In this situation it is unclear whether suppression failed or participants simply did not follow instructions. Under these circumstances, the possibility of a manipulation failure would seem more likely if there were an accompanying absence of postsuppression effects (e.g. Merckelbach et al 1991).

It is less plausible, however, to dismiss as a manipulation failure results that show a higher frequency of target thoughts during suppression than during control monitoring. For example, Salkovskis & Campbell (1994) found a higher rate of personally intrusive thoughts for participants who tried to suppress the thoughts than for those who simply monitored them. In a study by Lavy & van den Hout (1990), participants reported a higher rate of thoughts about a neutral target (vehicles) during suppression than during control monitoring. In a subsequent experiment, Lavy & van den Hout (1994) used a modified version of the Stroop test to detect suppression-related changes in thought accessibility. The investigators found that, compared to a control group, the suppression group showed more selective attentional bias toward target words.

It is not clear why—in the absence of added cognitive demands—a few studies have found an immediate enhancement effect of suppression, whereas most have

not. Conscious biases not to report intrusions might be operating, as most measurements in these experiments depend on self-report (Wegner & Smart 1997). As we see next, the imposition of cognitive demands increases the frequency with which immediate enhancement effects are found.

Immediate Enhancement With Load The evidence we have considered suggests that the paradoxical effects of suppression are most apt to occur when mental control is voluntarily relinquished (i.e. postsuppression rebound). If terminating suppression enhances the accessibility of the target thought, then disrupting the process of mental control during suppression may produce paradoxical effects as well. Operating on the assumption of a limited-capacity information-processing model (Bargh 1994, Gilbert 1989), researchers have reasoned that if suppression is an effortful process (Muraven et al 1998, Wegner 1992), it can be undermined by concurrent cognitive demands.

A variety of studies have found that the imposition of cognitive demands (e.g. time pressures, concurrent memory tasks) during suppression has the effect of not merely diminishing control but also of making the target material more accessible and influential than it would have been without suppression. For example, Wegner & Erber (1992) instructed participants to think or not to think about a target word (e.g. “house”) and then assessed their tendency to respond with the target word to related prompts (e.g. “home”) and unrelated cues (e.g. “adult”). With the imposition of time pressure, participants who were engaged in suppression responded to the prompts with the target word more often than did either suppressing participants not under time constraints or nonsuppressing participants.

In a second experiment, Wegner & Erber (1992) measured the accessibility of target words using a Stroop-type color-naming interference task, in which the participants’ latency to name the color in which the word was printed was taken as a measure of the accessibility of the word. Participants attempting to suppress a target word showed greater accessibility of the word than did participants trying to think of the target word, but only when they were given a mental load—in the form of a nine-digit number to rehearse during the Stroop task. This paradoxical phenomenon was termed the hyperaccessibility of suppressed thought.

Macrae et al (1997) found that instructions to suppress stereotypical material produced enhanced recall of the information when attentional capacity was depleted. During instructed thought suppression, participants in another study (Wenzlaff & Bates 1999) were especially likely to unscramble sentences to form suppression-relevant themes when they were given a cognitive load. Wegner et al (1993) found that participants who tried to suppress thoughts of personal successes or failures experienced increased accessibility of those thoughts in the Stroop task. This effect was only observed on Stroop trials for which participants were given a mental load (a six-digit number). More evidence of a load-induced surge of suppression-related material has been found in other studies using different types of cognitive demands and different types of outcome measures (e.g.

Ansfield et al 1996, Arndt et al 1997, Lane & Wegner 1995, Newman et al 1996, Wegner et al 1998, Wenzlaff & Bates 1998).

Our review indicates that an enhancement of suppression-related thoughts ensues when thought suppression is either voluntarily relinquished or disabled by cognitive demands. Next, we consider theoretical accounts that could help explain these paradoxical effects.

THEORETICAL ACCOUNTS

Several theoretical perspectives are relevant to understanding the paradoxical effects of thought suppression. Although some of these explanations cannot account for the full range of suppression-related effects, they do shed light on potentially important aspects of the mental-control process.

Distracter Associations

In the first study to demonstrate a postsuppression rebound effect, Wegner et al (1987) noted that suppressing participants used many different distracters to divert attention from the prohibited thought. The wide assortment of items mentioned in thought reports during suppression suggested that the distraction target was constantly shifting. This observation led the investigators to hypothesize that such unfocused self-distraction during suppression may be responsible for the rebound effect. The picture that emerged from an analysis of the thought protocols was that participants were relying on cues in the immediate environment for distraction. Most of these highly accessible distractions (e.g. the wall, the chair, the person's attire, etc), however, did not compel sustained attention and allowed awareness to drift back to the suppression target.

The result of this unfocused cycle of self-distraction is that it creates associations between the unwanted thought and all the various distracters. When suppression is ultimately relinquished, the items previously used as distracters become reminders of the suppression target, thereby producing the rebound effect. This explanation is supported by studies showing that the rebound effect is attenuated by either the use of a single distracter during suppression (Wegner et al 1987) or changes in the environmental context (Muris et al 1993, Wegner et al 1991; but see Macrae et al 1994) or mood context (Wenzlaff et al 1991).

Although distracter association can account for the rebound effect, it has difficulty accommodating the finding that cognitive demands produce especially high levels of intrusions during suppression. Distracter association would predict that the introduction of a cognitive load during suppression could interfere with the process of distraction and allow unwanted thoughts to drift into awareness. The research indicates, however, that load-induced intrusions during suppression do not simply rise to the level of the nonsuppressing group: They exceed it. Distracter-association does not offer a mechanism to explain this paradoxical

effect, which suggests that we must look elsewhere for a more comprehensive account.

Goal Interruption

Martin et al (1993; see also Martin & Tesser 1989) propose that the postsuppression rebound of target thoughts stems from the motivation to fulfill a blocked goal. This idea relies on the Zeigarnik effect—the motivated perseverance of goal-related thoughts (Lewin 1951). Zeigarnik (1938) found participants were most apt to recall an experimental task if they had not completed it because of an interruption. Similar results have been obtained by other investigators (Millar et al 1988, Wicklund & Gollwitzer 1982; but see Martin et al 1993) and taken as evidence that thoughts related to an incomplete task remain active in the person's cognitive system. From this perspective, if a person is unsuccessful in accomplishing the goal of suppressing a thought, it should make the target thought especially compelling.

Martin et al (1993) argued that the postsuppression rebound may be fueled by an unfulfilled desire to complete the goal of thought suppression. The goal is typically unfulfilled because intermittent intrusions are likely to occur during suppression (the theory does not explain these sporadic target thoughts). When the individual later relinquishes active suppression efforts, the lingering memory of those occasional failures fosters a preoccupation with suppression-relevant thoughts. In support of this notion, Martin et al (1993) describe an unpublished study in which they instructed participants to suppress or monitor white-bear thoughts prior to a timed word-recognition task. Before the word task, the experimenter gave half the suppression participants success feedback in an attempt to foster a sense of closure. The results indicated that the success feedback eliminated the rebound effect, thereby providing support for the goal-interruption interpretation.

Although Martin et al (1993) believe this formulation can help shed light on some of the paradoxical effects of suppression, they also acknowledge its limitations. For example, a goal-completion motive cannot explain the context-dependent effects involving suppression rebound (Wegner et al 1991, Wenzlaff et al 1991). It also has difficulty explaining both the attenuating effects of focused self-distraction and the intrusion-promoting effects of cognitive load, described earlier. Most crucial, the theory is unable to account for the return of intrusive thoughts during suppression (Erber & Wegner 1996). Despite these limitations, the goal-interruption perspective does highlight the potential importance of motivational considerations, foreshadowing issues having to do with natural suppression targets (discussed below).

Ironic Process Theory

The theory of ironic processes (Wegner 1992, 1994, 1997; Wegner & Wenzlaff 1996) states that thought suppression involves two mechanisms: an intentional operating process that seeks thoughts that will promote the preferred state (i.e.

anything other than the unwanted thought), and an ironic monitoring process that remains in the background of consciousness and searches for mental contents that signal the failure to achieve the desired state (i.e. the unwanted thought). The operating process is effortful and conscious, whereas the monitoring system is usually unconscious and less demanding of mental effort. The monitoring process is ironic in the sense that it opposes the overall goal of suppression by remaining vigilant for occurrences of the unwanted item. Despite its ironic nature, this vigilance is necessary for successful mental control because it alerts the operating process of the need to renew distraction when conscious awareness of the unwanted thought becomes imminent.

The ironic sensitivity supplied by the monitoring process normally exerts only a minor influence over conscious awareness, subtly alerting the operating system of deviations from its intended mental course. However, when the operating process is voluntarily terminated by the individual or disrupted by cognitive demands, the monitoring process continues its vigilance for unwanted thoughts. Once initiated, then, the monitoring process can linger after effortful distraction has abated, thereby enhancing the mind's sensitivity to unwanted material. This can explain both the occurrence of postsuppression rebound and the ironic effects of cognitive demands during thought suppression.

The ironic process theory thus accounts for several features of thought suppression. The theory, however, is not specific regarding if and when the monitoring process ceases its search for occurrences of the target thought. This issue is relevant to questions concerning the cumulative impact of repeated suppression attempts and the role of practice in the mental-control process (Kelly & Kahn 1994, Monteith et al 1998a). Moreover, the theory involves a cognitive model that does not make clear predictions concerning the mediating influences of motivational states (Shoham & Rohrbaugh 1997), and the theory may be overly general (Navon 1994). Nevertheless, ironic process theory is currently the most complete account for suppression-related phenomena.

The Role of Metacognition

Beliefs, expectations, and judgments about our own mental processes and products may contribute in important ways to the effectiveness of thought suppression. These metacognitions (Flavell 1979) arise during cognitive development, as people accrue an understanding of the contents and processes of mind. The sense that some thoughts or mental states are controllable whereas others are not, for example, unfolds with development, and the idea that it might be difficult to suppress a thought is only achieved with development as well (Flavell et al 1998).

The most important metacognition underlying thought suppression, of course, is the belief that suppression could succeed. Feelings of success or failure in controlling one's thoughts are likely to influence the person's propensity to undertake suppression, and fear of not having such control may also motivate people to undertake suppression. Metacognitions of this kind have been implicated in a

variety of disorders that are defined in large part by the dysfunctional nature and high frequency of intrusive cognitions. For example, theories of obsession such as those proposed by Rachman (1997, 1998) and Salkovskis (1998) argue that intrusive thoughts become obsessions by virtue of distorted cognitive processes that magnify the significance, danger, and personal responsibility associated with unwanted thoughts (see Purdon & Clark 1999). Similar distortions in metacognitive processes have been observed in depressed individuals (Beck 1967) and chronic worriers (Wells 1994) and in those with phobias (Thorpe & Salkovskis 1995).

Although metacognitions may not produce the ironic effects associated with thought suppression, they probably help perpetuate attempts at mental control. For example, people can become excessively self-critical and alarmed by their unsuccessful thought-suppression attempts if they have unrealistically high expectations concerning their mental-control abilities or if they tend to magnify the significance of unwanted thoughts (Kelly & Kahn 1994). The resulting distress could rob them of adequate cognitive resources, thereby further undermining their mental-control efforts, setting into motion a downward spiral of mental-control failures. Eventually, this state of affairs would erode the sense of personal control and contribute to anxiety, despondency, and hopelessness. Clinical theorists implicitly suggest this scenario (Rachman 1998, Salkovskis 1998), but they have not yet explicitly integrated the thought-suppression research into their theoretical models (Beevers et al 1999, Clark & Purdon 1993).

KEY VARIABLES

Researchers have identified several variables that can influence the effects of thought suppression, including the valence and relevance of the target, variations in how suppression is experimentally induced, thought assessment techniques, and individual differences. Here we describe these variables and the evidence of their relationship to thought suppression.

Target Characteristics

Emotional Valence Most studies that have varied the emotional valence of the suppression target have found that when other variables are equal, emotional material is more difficult to suppress than is neutral information. For example, Petrie et al (1998) found that participants had more difficulty suppressing thoughts related to personal emotional issues than about everyday events. Davies & Clark (1998) found that a distressing film produced a postsuppression rebound, whereas a film about polar bears did not. In another study, mock jurors who were instructed to disregard murder evidence were more likely to experience recurrence of those thoughts when the evidence was presented in a graphic and upsetting manner rather than in a sterile and legalistic one (Edwards & Bryan 1997). Similarly,

Roemer & Borkovec (1994) found that participants who had suppressed a depressing topic later expressed more target-relevant thoughts than did individuals who had suppressed anxious or neutral thoughts. In contrast, although Harvey & Bryant (1998b) found a postsuppression rebound among participants who had initially suppressed thoughts about a violent, humorous, or neutral film, it was not mediated by the valence of the film.

Although the research indicates that emotional aspects of the target may undermine suppression, it is unclear precisely what those elements are. Possibilities include the personal threat posed by the material (Higgins 1997), the concreteness and vividness of its mental imagery (East & Watts 1994, Erdelyi 1993, Stoeber 1998), its distinctiveness (England & Dickerson 1988, Levinson 1994), or its congruence to the person's mood state (Bower 1981, Wenzlaff et al 1988). The latter notion was tested in a study by Howell & Conway (1992), which found that the induction of a positive or negative mood made it more difficult to suppress, respectively, positive or negative material. In another study (Wenzlaff & Bates 1998), depressed participants had particular difficulty inhibiting the depressive content of ambiguous sentences. Other research indicates that depressed or anxious individuals have special difficulty inhibiting mood-related items in the Stroop task (Gotlib & McCann 1984, Mathews & MacLeod 1985, Mogg et al 1989, Segal et al 1988).

Natural Suppression Targets For purposes of experimental control, suppression researchers typically supply participants with the material to be suppressed. A number of investigators have pointed out that this approach potentially limits generalizability, leaving it unclear whether naturally occurring intrusive thoughts are subject to the same vagaries of mental control as are experimental stimuli. A few studies have addressed this issue by using participant-supplied intrusive thoughts as the target of suppression. Although overall the findings are mixed, some studies suggest that naturally occurring intrusive thoughts are less susceptible to suppression-enhancement effects in the laboratory than are experimentally supplied targets. However, whatever suppression advantage exists for naturally occurring intrusive thoughts in the laboratory seems to erode when mental control is exerted in natural settings for more prolonged periods of time.

Evidence that natural suppression targets are more amenable to suppression in the laboratory was provided in a study by Kelly & Kahn (1994), which found a postsuppression rebound for white-bear thoughts but not for naturally occurring intrusive thoughts. The possibility that naturally occurring intrusive thoughts are more amenable to mental control than are neutral thoughts was also suggested by the results of a study by Wegner & Gold (1995). The investigators asked participants to suppress thoughts of either a previous romantic partner who was still the object of their desires (hot flame) or a former intimate whom they no longer desired (cold flame). The thought reports revealed a rebound effect for the cold flame but not the hot flame, which presumably was a more natural target of suppression. Other published studies have also failed to find a postsuppression

rebound for naturally occurring intrusive thoughts, although neither employed a neutral comparison condition (Rutledge 1998, Smari et al 1995). The situation is complicated by the fact that other laboratory studies have found suppression-related enhancement of naturally occurring intrusive thoughts (McNally & Ricciardi 1996, Salkovskis & Campbell 1994).

One explanation for the studies that fail to find a postsuppression rebound for naturally intrusive targets involves the effects of practice (Kelly & Kahn 1994, Monteith et al 1998a). Because these thoughts occur frequently in everyday life, the person might develop techniques that are relatively effective for suppressing them—at least in a laboratory setting (e.g. an effective set of distracters). It is also possible that repeated efforts to suppress a personally relevant thought make the process of distraction more automatic and efficient (Wegner 1994). Thus, when these thoughts are selected for suppression in an experimental setting, people are better equipped to suppress them than they are to suppress the infrequently encountered thoughts that experimenters are apt to supply (e.g. white bear).

This practice notion, however, begs the fact that the natural suppression targets are, by definition, intrusive in the real world. Thus, whatever laboratory-setting benefits may accrue through real-world experience with these thoughts are likely to be short-lived and not extend to the natural environment. This idea is supported by the results of Trinder & Salkovskis (1994), in which participants identified a negative intrusive thought and recorded its occurrence over a period of four days. One group was instructed to record intrusions, another was told to try to think about the thoughts whenever they occurred, and a third group was advised to suppress the thoughts. The results over the four days indicated that the suppression group experienced more intrusive thoughts and found them more uncomfortable than did participants in the other two groups.

Another reason that natural targets may not lead to paradoxical effects in the lab as often as experimental targets do involves motivational differences. Participants may expend more effort and persist longer in suppressing natural targets. Consequently, for the short time they spend in the lab, participants may never completely relinquish suppression as instructed, thereby precluding a postsuppression rebound (Wegner & Gold 1995). This notion is supported by the finding that boosting incentives to suppress thoughts can lead to increased persistence and extend short-term success on the mental-control task (Letarte et al 1997).

Instructed vs Spontaneous Suppression

Most suppression experiments manipulate mental control by instructing participants to suppress, express, or monitor certain thoughts. Although this approach has the advantage of controlling extraneous variables, it raises questions concerning the relevance of the findings to the real world, where thought suppression is typically a self-initiated enterprise. Asking participants to suppress or monitor naturally occurring intrusive thoughts does not eliminate the problem because it still involves the artificial constraints associated with instructed mental control.

A few studies, however, have addressed this issue by creating circumstances that are likely to produce spontaneous suppression in the laboratory, thereby eliminating the need for suppression instructions and allowing a more naturalistic assessment of the mental-control process.

Arndt et al (1997) implicitly fostered suppression by exposing participants to a mortality salience treatment that primed death-related thoughts. The mortality priming appeared to activate suppression, as evidenced by a decrease in accessibility of death-related thoughts with low cognitive load and an increase with high cognitive load. This is precisely the pattern of results obtained with similar research using instructed suppression.

Wenzlaff & Bates (1998) found that individuals with a recent history of depression reported routinely suppressing depressive thoughts since their recovery. Presumably they were trying to preserve their emotional well-being by warding off the lingering negative thoughts associated with their recent depressive episode. This suppression was reflected in their performance on a laboratory task that involved unscrambling sentences that could form either positive or negative statements. Without a cognitive load they formed a high percentage of positive statements. However, the introduction of a cognitive load caused an increase in the number of negative statements they formed. In fact, the load manipulation led the previously depressed participants to form negative statements at a rate that resembled their actively depressed counterparts.

Macrae et al (1998) indirectly manipulated thought suppression by inducing participants to experience heightened self-focus. The investigators reasoned that because high self-focus increases the salience of internalized standards (Duval & Wicklund 1972), it should lead individuals to suppress prejudicial stereotypes. In support of their hypotheses they found that elevated self-focus reduced stereotype tendencies initially but produced a subsequent rebound effect when self-focus diminished. Wyer et al (1998) also obtained a suppression-related rebound of stereotypic judgments by varying the salience of relevant social standards to trigger spontaneous suppression.

Smart & Wegner (1999) observed spontaneous suppression among women with eating disorders who were asked to play the role in an interview of someone without such a disorder. These women, as compared to those who did not have an eating disorder, showed greater self-reports of suppression and intrusion of eating-related thoughts, higher accessibility of body-related thoughts, and a tendency to perceive the interviewer as likely to have an eating disorder as well.

The conclusion from these studies is that spontaneous suppression leads to the same type of paradoxical effects as does instructed suppression. This correspondence provides some assurance that the experimental benefits of instructed thought suppression do not come at the expense of ecological relevance.

Individual Differences

People vary in their natural tendency to suppress unwanted thoughts. Wegner & Zanakos (1994) developed the White Bear Suppression Inventory as a self-report measure of the tendency to suppress thoughts. The measure shows good internal

and temporal reliability and correlates sensibly with other individual-difference variables, such as obsession, depression, dissociation, and anxiety (Muris & Merckelbach 1997, Muris et al 1996, van den Hout et al 1996, Wegner & Zanakos 1994). Although correlational ambiguities preclude conclusions about causality, these studies show that individuals who report a relatively strong desire for suppression are especially apt to suffer from recurrent intrusive thoughts. There are some indications that this tendency to rely on thought suppression may have its origins in childhood, where certain parental practices are apt to promote avoidant coping (Cooper et al 1998, Eisenberg et al 1998, Fraley & Shaver 1997, Wenzlaff & Eisenberg 1998). In a related vein, recent work suggests that the ability to inhibit unwanted thoughts diminishes in old age (Jacoby 1999, von Hippel et al 1999).

Kelly & Nauta (1997) identified another individual difference relevant to the outcome of thought suppression. The investigators found that thought-suppression instructions made individuals high in reactance feel especially out of control and disturbed by their intrusive thoughts. The investigators suggest that being motivated to restore one's freedom may paradoxically leave one feeling more out of control following attempted suppression.

A suppression-relevant individual difference of another sort has emerged from recent research involving hypnosis. Bowers & Woody (1996) instructed high- and low-hypnotizable participants to suppress thoughts in a normal state and in a hypnotic state. The results showed that both high- and low-hypnotizable participants experienced significant suppression-related intrusions when they were in a normal, waking state. When hypnotized, however, the number of intrusions reported by highly hypnotizable participants dropped to almost zero, whereas the level of intrusive thoughts of low-hypnotizable participants remained high. Investigators found a similar pattern of results with a cognitive load manipulation (King & Council 1998) and with pain tolerance as the dependent variable (Eastwood et al 1998). This research indicates that highly suggestible individuals may be able to suppress mental states with impunity when induced to do so under hypnosis. The reasons for this enhanced suppression ability are unclear and could include factors such as susceptibility to experimenter-demand effects, reporting biases, or unusual mental-control strategies.

Assessment of Thinking

The most obvious variables of interest in thought-suppression research involve cognitive processes and their products. Because investigators lack the means to observe mentation directly, they have employed a variety of self-report techniques, including verbalizing one's stream of consciousness (Clark et al 1991, Wegner et al 1987), writing down thoughts as they occur (Wenzlaff et al 1988), ringing a bell (Wegner et al 1987), clicking a hand counter (Salkovskis & Reynolds 1994), and making tally marks (Kelly & Kahn 1994). Although the correspondence among these various measures has not been systematically assessed,

each has been shown to be sensitive to suppression-related effects in one or more instances.

Despite the fact that these self-report measures have proven useful, there is the obvious issue about the veracity of people's self-reported mental activity. First, the deliberate process of reporting thoughts may itself heighten self-consciousness or otherwise alter the person's frame of mind, thereby producing an unnatural state of mentation (see Whetstone & Cross 1998). In addition, the verity of the thought reports may be undermined by a person's conscious or unconscious defenses. Self-report biases of this sort are especially likely to occur when the thought involves emotionally disturbing or personally unfavorable material (Wegner & Smart 1997). This situation mitigates the odds of detecting suppression-related effects, especially with the added demand characteristics arising from instructions to suppress the target. Finally, it can be difficult to identify target occurrences when the target thought is not discretely defined (e.g. stereotypes, emotions), making it difficult for the participant or experimenter to assess the relevance of various potentially related thoughts.

The issues surrounding cognitive measures highlight the value of using objective behavioral indices that reflect target-relevant thinking. Indeed, a growing number of investigators have detected suppression-related paradoxical effects using behavioral correlates of cognition, including physiological states (Wegner et al 1990), physical avoidance (Macrae et al 1994), motor behavior (Wegner et al 1998), pain tolerance (Cioffi & Holloway 1993), and sleep (Ansfield et al 1996). These behavioral measures of mental state reveal the same susceptibility to the paradoxical effects of suppression as is reflected in the more common method of self-report.

Another approach to overcoming the deficiencies of self-report cognitive measures is the use of measures of automatic cognitive processes (see Bargh & Chartrand 1999, Wegner & Bargh 1998). Measures can be made, for example, of processes of which participants are unaware, of processes that occur before the participant is able to establish conscious control over a response, or of processes that occur when cognitive resources are diverted from attempts at conscious control. The several measures of this kind used in suppression research—such as Stroop interference (Wegner & Erber 1992), sentence unscrambling (Wenzlaff & Bates 1998), word completion (Arndt et al 1997, Smart & Wegner 1999), and recall priority (Lane & Wegner 1995)—suggest that suppression has effects on cognitive processes even when those processes are beyond conscious control. Indeed, it appears that suppression has paradoxical effects on uncontrollable or unconscious cognitive processes, but has more predictable and intended effects on conscious reports. Suppression may succeed in clearing consciousness of a thought, even while measures of cognitive processes beneath consciousness indicate that suppression prompts remarkable levels of activation. Wegner & Smart (1997) describe this influence of suppression as the production of “deep cognitive activation”—an increase in cognitive accessibility that is not accompanied by an increase in conscious experience of the thought.

PERSONAL CONSEQUENCES

Emotional Reactions

To the extent that thoughts influence emotions, one would expect that the paradoxical effects of suppression would promote the mood state associated with the target. This is precisely what Wegner et al (1993) found when they imposed a cognitive load on participants who were trying to control their moods. Unlike participants without load, those under load reported moods that were significantly in opposition to the ones they had tried to achieve.

Wenzlaff et al (1991) tested the idea that thought suppression creates a bond between the suppressed item and one's mood state, such that the reactivation of one leads to the reinstatement of the other. In the first experiment, participants who were induced by music to experience positive or negative moods reported their thoughts while trying to think or not think about a white bear. When all participants were subsequently asked to think about a white bear, those who were in similar moods during thought suppression and a later expression period displayed a particularly strong rebound of the suppressed thought. In the second experiment, the investigators assessed participants' moods following the expression of a previously suppressed or expressed thought. Mood reports showed that participants who had initially tried to suppress their thoughts experienced a reinstatement of the mood that existed during the initial period of suppression.

Ironic emotional effects of suppression have also been found with physiological indices of emotional arousal. For example, Wegner et al (1990) found that trying not to think about sex, like thinking about sex, increased electrodermal responding in comparison to thinking about or not thinking about less exciting topics (e.g. dancing). Wegner et al (1997) found that participants who were instructed to relax under cognitive load experienced more relaxation-incompatible physiological arousal than did a group who was given a load with no relaxation instructions. More evidence that suppression has emotional consequences comes from studies showing that elevated blood pressure is especially prevalent among individuals who chronically suppress anger (Cottingham et al 1986, Dimsdale et al 1986, Thomas 1997).

Substance Cravings

People who should be highly motivated to control their dangerous substance cravings (e.g. drinking, eating, smoking, etc) are often the very ones for whom inhibition seems to backfire (Polivy 1998, Wenzlaff & Wegner 1998). Despite the obvious relevance of mental-control issues to addiction, few studies have examined the impact of suppression on substance-related thoughts. In one study, Salkovskis & Reynolds (1994) found that efforts by abstaining smokers to suppress

cigarette-related thoughts produce especially high levels of intrusions. However, a longitudinal study found no relationship between thought suppression and smoking relapse (Haaga 1989, Haaga & Allison 1994).

In a study on dieting, Harnden et al (1997) instructed participants to suppress thoughts about weighing themselves. When suppression was later relinquished, nondieters experienced a rebound of target-related thoughts. Although dieters consistently reported more target-related thoughts than did nondieters, they did not exhibit a rebound effect. Herman & Polivy (1993) discuss the unique aspects of food-related thoughts that can potentially mediate the effectiveness of mental control. The authors highlight the need for more research on the role of thought suppression in eating-related problems—a recommendation that we echo and suggest applies equally to other types of cravings.

Pain and Psychophysiological Reactions

When one is experiencing physical pain, it seems clear that thinking about it intensifies the discomfort. The alternative, of course, is to suppress thoughts about the pain in an effort to reduce or eliminate the suffering. Although thought suppression is a common method for dealing with pain, few studies have tested its effectiveness (cf Cioffi 1993). With what we know about thought suppression, we would expect that attempts to suppress the experience of pain could backfire. Indeed, Cioffi & Holloway (1993) found that participants who were attempting to suppress pain of a cold pressor experienced more lingering discomfort than did participants who were involved in monitoring or distraction. Moreover, the suppression group later rated an innocuous vibration as more unpleasant than did the other groups, which suggests a postsuppression rebound related to the earlier pain. Sullivan et al (1997) also found that participants who were asked to suppress thoughts about an upcoming pain procedure experienced more thought intrusions during the suppression period and experienced more pain during the ice-water immersion than did a control group.

Although attempts to suppress thoughts about pain intensify subjective discomfort, does thought suppression have more direct physiological effects? As noted earlier, autonomic arousal does appear to be a common physiological reaction to the suppression of emotional thoughts (Cottington et al 1986; Dimsdale et al 1986; Gross 1998; Thomas 1997; Wegner et al 1990, 1997). For example, Gross & Levenson (1993) found that, compared to nonsuppressing participants, those instructed to suppress their emotions while watching a distressing film showed greater constriction of peripheral vasculature and greater electrodermal activity. Individuals who suppress thoughts on a chronic basis show a pattern of physiological responses that are consistent with anxiety (Lorig et al 1995).

Because persistent autonomic reactivity is associated with early disease processes (Jemmott & Locke 1984), one could expect that chronic suppression of emotional material would lead to health-related problems (Pennebaker 1997a).

Indeed, inhibition-related health problems have been associated with individuals who hide their gay status (Cole et al 1996), conceal traumatic experiences in their past (Pennebaker 1993, 1997a,b), suppress anger (Thomas 1997), or are considered inhibited or shy by others (e.g. Kagan et al 1988). Petrie et al (1998) found that thought suppression may compromise immunological functioning. Instructions to suppress either emotional or neutral thoughts produced effects on circulatory immune variables, causing a decrease in circulating T lymphocytes as well as marginal decreases in T suppressor cells and total lymphocyte numbers. In sum, the research suggests that thought suppression can affect physiological states in ways that are likely to have negative repercussions for physical well-being.

Memory

If thought suppression enhances the accessibility of the target, one might expect that the enhanced attention would foster better memory for the information as well. The finding that people often continue to remember items they have been asked to forget is consistent with this possibility (see Bjork 1989, Golding & Long 1998, Wegner et al 1994a, Whetstone & Cross 1998). More direct evidence for the notion that suppression can enhance memory for target material comes from studies by Macrae and his colleagues (1996, 1997). The studies found that the suppression of stereotype-congruent memories is especially demanding of cognitive resources, and when suppression is relinquished or interrupted, memory for the target information is enhanced. In related research, Sherman et al (1997) instructed participants to suppress their use of stereotypes while forming impressions of an Asian woman who revealed stereotypical and nonstereotypical behaviors. This suppression group later displayed better recognition memory for the stereotypical behaviors than did nonsuppressors.

Wegner et al (1996) found that although instructions to suppress thoughts about a recently viewed film did not affect later retrieval of the contents of the film relative to controls, it did disrupt the organization of the material. The suppression instructions undermined retrieval of information about the sequence in which items of content were encountered. Participants who had suppressed the film were also more likely than others to report their memories of the film as having the character of snapshots rather than of moving film. The idea that suppression can disrupt the sequence of events in memory is consistent with findings by Kuyken & Brewin (1995) that depressed patients who reported high levels of suppression of childhood physical or sexual abuse reported memories that were temporally vague or distorted. Suppression-induced disruption of sequence memory, however, may depend on as-yet-unidentified variables. For example, although Rassin et al (1997) found a suppression-induced enhancement of target thoughts, the suppression group did not differ from controls in recall of the sequence of stimulus material.

INTERPERSONAL CONSEQUENCES

Impression Formation

Research on the impact of thought suppression on impression formation has revealed several paradoxical effects. Newman et al (1997) examined how suppressing awareness of unwanted aspects of the self affects judgments of others. They reasoned that as a result of suppression, unwanted personal characteristics would become chronically accessible and would influence the interpretation of others' behavior. The idea of suppression-induced projection was supported in studies showing that people who avoid thinking about having threatening personality traits and deny possessing them are especially apt to impute those traits to others. When participants were either naturally predisposed to suppress personally unfavorable traits or were instructed to do so, they subsequently projected them onto someone else.

Newman et al (1996) hypothesized that priming a concept through thought suppression should have effects on trait inferences that are similar to those resulting from more direct forms of priming. Research on trait priming shows that when people are not distracted, they usually try to eliminate bias by avoiding the use of the primed trait to interpret social information (Lombardi et al 1987, Martin et al 1990, Newman & Uleman 1990). This contrast effect, however, can be eliminated when cognitive demands arise or when motivation to make accurate judgments is low, leading to the biased assimilation of social information, in accord with the primed trait (Martin et al 1990, Thompson et al 1994). Using thought suppression as a priming procedure, Newman et al (1996) found that when impressions were formed with no cognitive load, suppression led to contrast, whereas with a cognitive load it produced assimilation. The investigators concluded that suppression can also adversely affect interpersonal judgments.

A different type of assimilation and contrast process can involve the rejection of undesirable social models. The ironic effects of thought suppression do not bode well for someone who is actively trying not to be like someone else (e.g. an abusive parent, a racist associate, etc). Hodges & Wegner (1997) report the results of a study in which participants tried to assume or reject the perspective of another person. Participants read a story where two boys play in a house that is described in considerable detail. The key experimental conditions involved instructions for the readers either to think like a burglar or to try not to think like a burglar. Without a cognitive load, the "think like a burglar" group recalled more burglar-relevant information about the story than did the suppression group. However, the imposition of a cognitive load caused the suppression group to recall more burglar-related information than did a suppression group without load.

Research has also suggested that thought suppression—in the form of keeping socially relevant information secret—can increase interpersonal attraction (Lane & Wegner 1994). Wegner et al (1994b) found that past relationships that remained a secret were more likely to occupy a person's attention than previous public

relationships. They also found that mixed-sex couples who were induced to play footsie under a table were more strongly attracted to their experimental partner if they tried to keep the activity a secret from others. Lane & Wegner (1995) found that secrets were associated with enhanced cognitive accessibility that was positively correlated with relevant suppression efforts. The findings suggest that secrecy promotes suppression of secretive thoughts, which can produce a preoccupation with the material even after disclosure. Smart & Wegner (1999) observed similarly that individuals with eating disorders who were assigned to role-play having no disorder for an interview then showed higher levels of suppression, intrusion, and accessibility of disorder-related thoughts.

Stereotyping and Prejudice

Several studies have found support for the paradoxical prediction that the suppression of stereotypes should lead to more use of the stereotype concept. In a series of experiments, Macrae et al (1994) found that, compared to a nonsuppression group, participants who had suppressed stereotypes about skinheads subsequently displayed increased accessibility of stereotype-relevant thoughts, formed more biased judgments, and were more apt to avoid skinheads. In another series, Macrae et al (1998) obtained similar findings when they indirectly manipulated the suppression of stereotypes by increasing or decreasing self-focus. Wyer et al (1999) also used an implicit suppression manipulation and found a postsuppression rebound of stereotypic judgments.

Monteith et al (1998b) found that the stereotype rebound associated with suppression may be mediated by the level of prejudice of the suppressor. Participants with low-prejudice attitudes toward gays were not prone to the rebound effect when it was assessed using an overt measure of stereotype use. Bodenhausen & Macrae (1996) and Monteith et al (1998a) provide a more detailed consideration of the potential mediating variables in the suppression of stereotypes.

In the studies that have found suppression-enhanced stereotyping, the enhancement occurred after suppression was relinquished. During suppression itself, stereotyping was actually reduced. Although controlled cognitive processes may correct for the automatic activation of stereotypes that would otherwise prejudice judgments (Devine 1989, Fiske 1989), such compensation is apt to require cognitive resources (Wegner 1994). Thus, relying on thought suppression to control the influence of stereotypes is likely to produce ironic effects when cognitive resources are in short supply. Wyer et al (1999) provided support for this prediction by showing that a cognitive load caused participants who were trying to suppress a stereotype to form more stereotypical judgments than were formed by their counterparts with no load or with no suppression instruction.

Finally, as noted above, paradoxical effects of stereotype suppression have also been observed with regard to memorial processes. For example, when suppression is relinquished or interrupted, memory for the previously suppressed stereotype is enhanced (Macrae et al 1996, 1997; Sherman et al 1997).

PSYCHOPATHOLOGY

One way to view the relation of thought suppression to disordered thought or emotion is simply to suggest that when people have unwanted symptoms, they may try not to think about them. This interpretation is reasonable for many of the studies that have found correlations between self-reported thought suppression and various clinical disorders. In other cases, however, evidence suggests that thought suppression might be implicated in the etiology or maintenance of disorders. Experimental findings showing that instructed suppression promotes the development of symptoms, in particular, suggests a causal rather than a reactive role for thought suppression. It may be, too, that in some cases feedback systems develop in which suppression and symptoms fuel each other cyclically. In this section, we examine clinical disorders—trauma, obsessive-compulsive disorder, and depression—that are associated with disturbing, intrusive thoughts and frequent suppression attempts, and for which there exists at least some experimental evidence that thought suppression may play a role in the production or maintenance of the disorder (see also Beevers et al 1999, Purdon 1999).

Trauma

Exposure to a traumatic event can produce posttraumatic stress disorder (PTSD), which is characterized by recurrent, intrusive thoughts and repeated efforts to suppress the intrusions and avoid situations that might cue more thoughts of the trauma. Although trauma-relevant suppression has sometimes been associated with unconscious repression, the more common scenario involves the conscious, intentional suppression of traumatic thoughts (Christianson & Engelberg 1997, Gold & Wegner 1995, Koutstaal & Schacter 1997).

Shipherd & Beck (1999) assessed baseline rape-related thoughts in an open-ended thought-report period using a sample of women who had recently been raped, approximately half of whom were experiencing PTSD. Following the baseline reporting, participants tried to suppress rape-related thoughts and then subsequently engaged in another open-ended thought-report period. Analysis of the thought protocols and participants' ratings of mental control indicated that although both groups reported equally low levels of rape-related thoughts during the suppression period, the PTSD group reported more difficulty controlling their thoughts. During the postsuppression period, the PTSD group's level of rape-related thoughts returned to the relatively high levels associated with the baseline period. In contrast, the non-PTSD groups' level of rape-related thoughts during the postsuppression period remained at low levels.

Harvey & Bryant (1998a) compared the thought reports of survivors of motor vehicle accidents with and without acute stress disorder to a normal control group using the suppression paradigm of baseline monitoring followed by suppression/monitoring and then monitoring. The results suggested a rebound effect for the

acute stress disorder suppression group by showing that it had the highest occurrence of accident-related thoughts in the final reporting period.

A study of the victims of the Perth flood revealed that thought suppression was one of the best predictors of symptom severity, even after statistically controlling for the emotional intensity of the specific circumstances (Morgan et al 1995). The possibility that thought suppression contributes to the persistence of PTSD was also suggested by a prospective longitudinal study of patients injured in motor vehicle accidents (Ehlers et al 1998). The investigators found that the tendency to suppress accident-related thoughts at three months was an important predictor of PTSD symptoms one year later. Aaron et al (1999) have also found that early reports of thought suppression following physical trauma in children and adolescents are predictive of subsequent rumination and impaired coping.

Individual differences in thought suppression show substantial correlations with self-report measures of anxiety (Muris et al 1996, Wegner & Zanakos 1994), which suggests a broad connection between these dispositions. The desire not to be anxious might underlie attempts to suppress anxiety-related thoughts, and the intrusive return of such thoughts could fuel renewed anxiety (Wegner et al 1997, Wegner et al 1990). Muris et al (1997) observed, for example, that spider-phobic individuals tried harder to suppress spider-related thoughts during an instructed suppression period than did nonphobic participants. The tendency to avoid thinking about traumatic or anxiety-producing topics may prompt the return of those topics to mind, and so activate a cycle that could perpetuate anxiety disorders.

Obsessive-Compulsive Disorder

Among the cardinal symptoms of obsessive-compulsive disorder (OCD) are recurrent unwanted thoughts accompanied by repeated attempts to ignore or avoid them. Despite the obvious relevance of thought suppression to this disorder, there is a dearth of research testing the effects of thought suppression with obsessive-compulsive patients. In one of the only published clinical studies, Janeck & Calamari (1999) asked OCD patients and nonclinical control participants to suppress personally intrusive thoughts in the context of a suppression paradigm. The findings indicated that although the OCD group devoted more effort to thought suppression than did normal controls, they had more intrusive thoughts both during suppression and during the monitoring periods. The OCD participants also were more distressed by their intrusive thoughts and found the thoughts less acceptable and controllable than did control participants. These results are consistent with findings reported by Purdon & Clark (1994) of a positive relationship between perceived uncontrollability and thought intrusions. In the Janeck & Calamari study (1999), however, there were no suppression enhancement effects.

Smari et al (1994) used a normal sample to examine the relationship between scores on a measure of obsessionality and the effects of suppressing thoughts about a depressing story. Participants recorded their thoughts about the story during periods of instructed suppression and monitoring. Although participants'

suppression-effort ratings indicated that they were responsive to the experimental instructions, those high in OCD tendencies reported equally high levels of target thoughts for both suppression and monitor instructions. In contrast, participants low in OCD reported fewer target thoughts under suppression instructions. In a subsequent study, Smari et al (1995) found that obsessionality scores were correlated with intrusions during the suppression of a personally disturbing thought. Rutledge (1998) obtained a similar correlation but only for women; the males in her sample showed a tendency in the opposite direction. Wegner & Zanakos (1994) found that among individuals with high levels of self-reported OCD symptoms, the White Bear Suppression Inventory measure of thought suppression provided a further increment in prediction of an interview-based assessment of obsessive thinking; the thought-suppression measure was not similarly predictive of the interview assessment of compulsive behavior.

Although it is risky to draw conclusions from so few studies, one commonality of the studies is that OCD symptoms are associated with a general failure of suppression (but see Rutledge 1998). The possibility that individuals with OCD have a generalized deficit in the ability to suppress thoughts has been the topic of some debate (Clayton et al 1999, de Silva 1992, Enright & Beech 1997, Salkovskis et al 1995). Future research examining the reliability and extent of thought-suppression deficits among individuals with OCD may help resolve this issue.

Depression

Depression involves a disturbance not only of mood but also of cognition. Depressed individuals are plagued by excessive self-criticism, pessimism, and a generally negative frame of mind (Beck 1967). One of the most popular psychological treatments for the disorder seeks to discourage negative cognitions in favor of more functional, positive thoughts (Sacco & Beck 1995). On their own, however, depressed individuals have considerable difficulty inhibiting their negative thoughts, despite the fact that they often expend considerable time and effort trying to do just that (Wenzlaff 1993, Wenzlaff & Bates 1998).

One of the mental-control problems depressed individuals encounter is that the distracters they find most accessible are tainted by the same negativity that characterizes the thoughts they are trying to suppress. By virtue of their close emotional association with the suppression target, these negative distracters can ultimately lead awareness back to the unwanted thought. This state of affairs explains the results of a study by Wenzlaff et al (1988), which found that compared to their nondepressed counterparts, depressed participants chose more negative distracters that eventually led to a breakdown in their ability to suppress negative material. A similar pattern of findings was obtained by Conway et al (1991), who found that dysphoric participants had more difficulty initially suppressing negative thoughts than positive ones. Howell & Conway (1992) repli-

cated those results and also showed the converse effect by finding that nondysphoric individuals had more difficulty suppressing positive thoughts.

The idea that mood-related distracters create an association between the suppression target and the relevant mood was tested in a pair of studies by Wenzlaff et al (1991). The investigators found that reinstating the original mood (using a mood manipulation) that existed during suppression facilitated the return of the suppressed thought. Conversely, participants who were induced to think about a previously suppressed topic experienced a reinstatement of the mood they experienced during the original period of suppression.

One implication of this research is that thought suppression may prolong or worsen depression by strengthening mood-relevant associations. Some preliminary evidence supports this idea. Wenzlaff & Bates (1998) assessed depression over a 4- to 6-week period and found that higher levels of self-reported suppression of depressive thoughts were associated with a worsening of depressive symptoms. The study also found that participants who were not currently depressed but were at risk because of a previous episode were especially likely to employ suppression and were most apt to reveal depressive thinking under cognitive load. Taken together, the results suggest that by exacerbating negative cognitions, thought suppression may represent a cognitive risk factor for depression.

Treatment Implications

Investigators have only recently begun to consider the treatment implications of the thought-suppression research (Beevers et al 1999, Johnston et al 1997b, Purdon & Clark 1999, Shoham & Rohrbaugh 1997, Wegner 1997; Wenzlaff & Bates, 1998). One obvious recommendation for individuals plagued by unwanted thoughts is to abandon thought suppression in favor of alternative, more effective methods of mental control. Investigators have suggested a variety of options, including concentrating on desirable goals, learning how to use more effective distracters, and accepting and expressing unwanted thoughts. Decisions about the best alternatives to thought suppression should be informed by research examining the relative merits and potential risks of the various options. Much of this work remains to be done.

CONCLUSIONS

Virtually nonexistent fewer than 15 years ago, the study of thought suppression has grown into a significant area of scientific inquiry with a growing database that spans several psychological domains. What has compelled the interest of the scientific and clinical communities is that suppression is not simply an ineffective tactic of mental control; it is counterproductive, helping assure the very state of mind one had hoped to avoid. The problem of thought suppression is aggravated by its intuitive appeal and apparent simplicity, which help mask its false promises.

Despite the fact that the accumulated research is impressive in scope and consistency, our knowledge of the intricacies and idiosyncracies of thought suppression is far from complete. Questions remain concerning the potential mediating effects of certain target characteristics, the role of motivational and personality factors, and the clinical and practical implications, including the relative merits of alternative strategies.

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