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**A STUDY OF THE EFFECTS OF THOUGHT SUPPRESSION
TECHNIQUES**

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Preface

I have been interested in practicing meditation and learning about its effects in relation to enhancing one's ability at mental control for several years. My understanding of this technique is that one aspect of the effects of practicing meditation is to help one reduce unwanted intrusive thoughts. This has been suggested throughout the history of this tradition.

It was with great interest, therefore, that I came across literature stating that attempting to suppress unwanted thoughts may actually lead to more rather than less preoccupation with these thoughts. This immediately caught my attention and several questions soon appeared. I asked myself: "Are meditation techniques such as counting-breaths types of thought suppression technique?" "What is the difference between meditation and the suppression technique described in the thought-suppression research?" "While I believe that thought suppression is possible, why does some of the research demonstrate that thought suppression may backfire? What causes that?" "Is it because people employ different techniques to reduce unwanted thoughts, which thus leads to differential effects of thought control?" This series of questions triggered my interest and passion for further understanding the effects of thought suppression techniques, which eventually became the topic of this dissertation. While this dissertation study does not address all the questions raised above, it can hopefully lead to a series of studies that do so.

A STUDY OF THE EFFECTS OF THOUGHT SUPPRESSION TECHNIQUES

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Some prior research has shown that thought suppression may lead to the rebound of to-be-suppressed thoughts, while focused-distraction may not. In order to replicate the effects of suppression and focused-distraction and also to investigate whether a more approach-based method, concentration, would be more effective in reducing unwanted thoughts than the other two strategies, this study compared the effects of suppression, focused-distraction, and concentration techniques on controlling unwanted distressing thoughts, and examined how affective reactions and prior experience were associated with the use of these techniques and the occurrence of to-be-suppressed thoughts. In the study, college students were told either to suppress thoughts about a distressing story, to suppress the same thoughts by focusing on an alternative distraction task, to simply concentrate on that alternative task, or to think about anything without restrictions for six minutes. This initial period was followed by a “free-thinking” period to assess the delayed effect of thought suppression techniques. As predicted, the results indicated that focused-distraction and concentration led to fewer intrusions of target thoughts than suppression, and concentration in turn resulted in fewer target intrusions than focused-

distraction during the initial period. Subjects in the focused-distraction and concentration condition also tended to report lower anxiety during the initial period than those who were told to suppress thoughts. However, no difference was found in intrusions of target thoughts or anxiety among conditions for the subsequent free-thinking period. Also, the results revealed no evidence of an immediate increase in target thoughts or of a postsuppressional rebound effect for suppression or the other two strategies. In addition, the present study found that during the initial period, higher anxiety, greater perceived distress toward the story, more prior experience, and higher scores on the White bear Suppression Inventory were associated with more target thought intrusions for all conditions combined. During the second period, higher anxiety, higher suppression attempts, and lower self-efficacy were related to more target thought intrusions for all conditions combined. It was also found that higher ratings of suppression attempts were associated with more target thought intrusions during both Period 1 and Period 2 for the suppression condition.

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Chapter 1: Introduction

It is very common for people to experience unwanted intrusive thoughts (Rachman & de Silva, 1978; Salkovskis & Harrison, 1984). Salkovskis and Harrison (1984) found that 88% of the non-clinical subjects in their study reported experiencing unwanted thought intrusions. When an unwanted thought occurs, people may try to deal with it by avoiding it (Folkman & Lazarus, 1991; Lazarus, 1966). This tendency to suppress one's unwanted thoughts in order to achieve a sense of well-being has been suggested in Freud's (1975) work. Yet, the effect of thought suppression has not been systematically examined until recently.

In Wegner, Schneider, Carter, and White's research (1987), half of the subjects were first instructed to "try not to think of a white bear" for five minutes and then to think of it in the next five minutes (the initial suppression condition), whereas the other half of the subjects received the same instructions in the reverse order (the initial expression condition). The results showed that subjects who had initially suppressed thoughts of a white bear experienced more such thoughts during the expressive period than those who had not initially suppressed target thoughts. Therefore, this may suggest that the suppression attempt may ironically cause people to be preoccupied with the unwanted thoughts even more after the suppression attempt ceased. Wegner and his colleague thus called this paradoxical phenomenon of thought suppression the "rebound effect."

To date, more research has accumulated in the area of thought suppression, but the findings remain mixed (Abramowitz, Tolin, & Street, 2001; Wenzlaff & Wegner, 2000) in that some studies have found the postsuppressional rebound effect (e.g., Kelly & Kahn, 1994; Muris, Merckelbach, van den Hout, & de Jong, 1992; Wenzlaff & Bates,

2000), but some studies found the immediate enhancement effect of suppression (e.g., Lavy & van den Hout, 1990; Muris et al., 1992; Turner & Engle, 1989), while other studies did not find any ironic effects due to suppression (e.g., Davies & Clark, 1998; Purdon & Clark, 2001; Roemer & Borkovec, 1994; Rutledge et al., 1993). Therefore, it appears that the results of thought suppression might vary in different contexts. One of the factors that are believed to influence the effects of thought suppression is the method that people use to suppress their thoughts. Research has shown that people who suppressed thoughts by focusing on one specific distracter did not experience a delayed increase in target thoughts (the rebound effect) and also experienced fewer intrusions of target thoughts than those who were simply told to suppress thoughts (Cioffi & Holloway, 1993; Salkovskis & Campbell, 1994; Salkovskis & Reynolds, 1994; Wegner et al., 1987).

Moreover, Wenzlaff and Bates (2000) compared the effects of the concentration and suppression strategies with a scrambled sentence task and found that people who focused on forming statements with positive meanings produced fewer negative sentences than those who emphasized the avoidance of negative statements. This seems to imply that the concentration strategy, that aims to pursue an alternative goal, may result in better effects in reducing undesired cognitions than the suppression strategy which emphasizes avoidance. However, since the design of Wenzlaff and Bates' (2000) study is very different from that of the typical thought suppression research, its implications for the real-life phenomenon of thought control should be interpreted cautiously.

The findings of prior research seem to suggest that the focused-distraction and concentration strategies may be more effective in reducing unwanted thoughts than the suppression strategy, but it is not clear whether one of them would be more effective than

the other in controlling unwanted thoughts. Nonetheless, it can be speculated that if the suppression attempt is the catalyst for unwanted thought intrusions, then concentration, which involves almost no attempts to suppress undesired target thoughts can be expected to produce even better effects in controlling unwanted thoughts than focused-distraction since the latter strategy still involves some degrees of avoidance intentions. However, to the best of the author's knowledge, no research has been conducted within the field of thought suppression to compare the effects of focused-distraction and concentration. The present study therefore aimed to compare the effects of suppression, focused-distraction, and concentration on controlling unwanted thoughts so that the influences of the thought-control methods on occurrences of unwanted thoughts can be more thoroughly understood. Also, through employment of a more typical thought suppression research paradigm, the implications for the real-life practice of thought control could possibly be explored to a greater extent.

Another factor that might affect the results of thought suppression is the type of thought a person is trying to suppress. In Wegner et al.'s (1987) classic research, subjects were told to suppress a thought of a white bear, which has been questioned for inadequate ecological validity in terms of understanding real life thought suppression behaviors (Kelly & Kahn, 1994; Markowitz & Borton, 2002; McNally & Ricciardi, 1996; Purdon & Clark, 1997; Roemer & Borkovec, 1994; Rutledge, 1998; Rutledge et al., 1993; Salkovskis & Campbell, 1994; Trinder & Salkovskis, 1994). For this reason, most recent studies have examined the phenomenon of thought suppression with emotional thoughts in order to increase the generalizability of research findings. (Kelly & Kahn, 1994; Markowitz & Borton, 2002; McNally & Ricciardi, 1996; Rutledge, 1998; Rutledge et al., 1993; Salkovskis & Reynolds, 1994). However, the sources and contents of emotional thoughts appear to vary widely among studies; thus findings on the suppression of

emotional thoughts are inconsistent. For some studies, thoughts were elicited from experiment-provided material such as by having subjects read stories or view films, while others examined thoughts from subjects' personal lives. It can be expected that thoughts from personal lives may contain much more variation than thoughts derived from experiment-provided material, since personal thoughts differ greatly in terms of their significance, content, emotional intensity, and relations to other memories. Therefore, findings on the suppression of personal thoughts (e.g., Kelly & Kahn, 1994; McNally & Ricciardi, 1996; Roemer & Borkovec, 1994; Salkovskis & Campbell, 1994) seem more inconsistent than those on the suppression of thoughts elicited from the same experiment-provided material (e.g., Davies & Clark, 1998; Harvey & Bryant, 1998, 1999) even when thoughts examined in these studies are of the same valence. For this reason, the present study which focused on comparison of the effects of different thought-control techniques examined thoughts elicited from experiment-provided material so that the potential confounding effects due to variation of thought features could possibly be reduced and the effects of thought suppression techniques can thus be better clarified.

While the suppression method and type of thought to be suppressed might affect the effects of thought control, it is reasonable to speculate that the factor of individual differences may also play a role. For example, one's prior experience with suppressing thoughts, one's self-efficacy for thought suppression and one's emotional reactions may all possibly influence the results of thought control. In order to more precisely describe the thought suppression phenomenon and clarify the effects of other unexamined factors, it is necessary for research to explore the relationships between these factors and the effects of thought suppression.

The central purpose of this study was to investigate whether the suppression, focused-distraction, and concentration strategies would result in differential effects on

controlling unwanted distressing thoughts. In addition, the relationships between individual-difference factors (i.e., anxiety, perceived distress, self-efficacy, prior experiences, and suppression tendency), thought control techniques, and occurrences of unwanted thoughts were also explored. In the present study, college students were first instructed either to suppress thoughts about a distressing story, to suppress the same thoughts by focusing on an alternative distraction task, to simply concentrate on that alternative task, or to think about anything without restrictions (control) for six minutes. This initial period was followed by a “free-thinking” period to assess the delayed effects of thought control techniques. It was predicted that the concentration and focused-distraction strategies would lead to fewer occurrences of unwanted thoughts than the suppression strategy, and that the concentration strategy would in turn result in more effective reduction of unwanted thoughts than the focused-distraction strategy. Moreover, the postsuppressional rebound effect should be observed for the suppression condition but not for the focused-distraction and concentration conditions. Furthermore, it was predicted that higher anxiety, higher perceived distress, and lower self-efficacy would be related to fewer intrusions of target thoughts.

Chapter 2: Literature Review

Through meta-analysis of existing studies on thought suppression, Abramowitz et al. (2001) found a rebound effect with only a small to moderate effect size, and the effect of initial thought enhancement was negative and small to moderate. Therefore, it seems that the paradoxical effect of thought suppression is not a phenomenon that occurs consistently.

In Wegner et al.'s (1987) classic study of thought suppression, they found that thought suppression could lead to a delayed increase in to-be-suppressed thoughts when the suppression attempts had been lifted. However, their second experiment showed that this postsuppressional rebound effect could be greatly attenuated when subjects were told to suppress thoughts by focusing on a specific distracter. Therefore, these results implied that the effects of thought suppression may vary in different contexts. One of the factors that might influence the effects of thought suppression is the method through which subjects suppress their thoughts.

Although the findings of Wegner et al.'s study (1987) on thought suppression are noteworthy, some researchers have questioned whether the effects observed with the suppression of an experiment-provided neutral thought such as a "white bear" thought is generalizable to other types of thoughts that people are more likely to suppress in daily life (e.g., Kelly & Kahn, 1994; McNally & Ricciardi, 1996; Purdon & Clark, 2001; Salkovskis & Campbell, 1994). Consequently, researchers have started examining the effects of thought suppression with different types of emotional thoughts in order to more accurately describe real-world thought suppression behaviors.

Besides the thought suppression techniques and the type of to-be-suppressed thought, individual differences such as prior experience and affective reactions might also have an effect on how well a person can control unwanted thoughts. In addition, the methodology that studies employ to investigate the effects of thought suppression may also play a role in determining whether ironic effects occur.

This chapter reviews the literature in four primary domains: thought suppression techniques, the types of thoughts to be suppressed, factors of individual differences, and methodological issues. In the review of research on thought suppression techniques, I will present the literature on the effects of suppression, focused-distraction, and concentration. In the section on types of thoughts to be suppressed, I will review studies that investigated the effects of different valence of thoughts on thought suppression. Regarding the individual-difference factors, I will review related theories and studies on perceived distress, anxiety, self-efficacy and prior experiences, and discuss their implications for the relationship between those factors and thought suppression. In the last section, I will review literature that discusses methodological issues such as operational definitions of control groups and rebound effects that were used in studies on thought suppression.

Before proceeding to the next section, one thing that needs to be noted is that the rebound effects of thought suppression have been defined in several different ways in the current literature. The rebound effect reported in the following literature review is in line with Wegner et al.'s (1987) definition, that the suppression group (or the initial suppression group) experiences more target thoughts during Period 2 than the control group (or the initial expression group) during Period 1.

THOUGHT SUPPRESSION TECHNIQUES

Focused-Distraction versus Suppression

After the rebound effect of thought suppression had been suggested, psychologists started seeking possible reasons for this phenomenon. One theory is the negative-cuing hypothesis (Wegner et al., 1987; Wegner, Schneider, Knutson, & McMahon, 1991). This hypothesis suggests that the rebound effect is probably due to the fact that people usually suppress thoughts by focusing on items found in the immediate environment for self-distraction and those distracters later become associated with the negative cue—“not white bear”; thus reminding people of the target thoughts after the suppression attempt is lifted. According to this hypothesis, the occurrence of a rebound effect may involve two elements: 1) the association of target thoughts and the environment, that is, distracters found in the environment later becoming associated with target thoughts; and 2) using too many items as distracters during thought suppression, therefore causing target thoughts to be frequently recalled.

To test this hypothesis, Wegner et al. (1987) added a “focused-distraction” condition in their second experiment. In this condition, subjects were told to suppress the thought of a white bear by thinking of a “red Volkswagen.” By asking subjects to think about a single distracter not found in the immediate environment, the problems of “environmental association” and “using too many distracters” may be avoided. Consistent with the hypothesis, subjects in the focused-distraction condition did not experience the postsuppressional rebound effect whereas those in the typical suppression condition experienced a rebound during the subsequent expression period. These results thus suggest that suppressing thoughts by focusing on a specific, non-environment-

associated distracter may serve as a strategy to attenuate the postsuppressional rebound effect.

Salkovskis and Campbell's (1994) study provided further evidence of the positive effects of focused-distraction. In their study, two types of distraction conditions were compared: one was general distraction (no specific distracters provided), while the other was specific distraction (a specific distraction task was provided to focus on). They found that simply instructing subjects to suppress personal negative thoughts by self-distraction without informing them of what to focus on did not work any better than the traditional suppression instruction in which subjects were simply told to suppress their thoughts. In fact, both the general-distraction and suppression groups experienced more target thoughts during the suppression and subsequent free-thinking periods than the control group who were told to think about anything they wanted. In contrast, when told to suppress target thoughts by focusing on a given distraction task, subjects not only experienced no postsuppressional rebound effect during the subsequent free-thinking period, but also experienced significantly fewer target thoughts than the suppression-alone and the general-distraction groups during both experimental periods.

Similar results were found with the suppression of thoughts about smoking. In Salkovskis and Reynolds' (1994) study, smokers were instructed either to suppress thoughts of smoking, to suppress thoughts of smoking by focusing on a breathing exercise, or to think whatever they wanted (the control group). Their results again showed that subjects who were told to suppress thoughts by focusing on a specific distraction task (i.e., a breathing exercise) did not experience a postsuppressional increase in target thoughts and also experienced fewer target thoughts than the suppression group during the suppression and subsequent free-thinking periods. In addition, subjects in the focused-distraction condition reported less discomfort relative to occurrences of

smoking-related thoughts than did those in the other conditions. Therefore, the study suggests that focusing on one engaging distraction task such as a breathing exercise not only can reduce intrusions of unwanted thoughts but can also relieve uncomfortable feelings regarding such intrusions, while instructing people to self-distract without guiding them on how to do so likely is not more facilitative than simply telling people to avoid thinking particular thoughts.

These two studies conducted by Salkovskis and his colleagues (Salkovskis & Campbell, 1994; Salkovskis & Reynolds, 1994) provided stronger evidence on the positive effects of focused-distraction in thought control than did Wegner et al.'s (1987) study. Specifically, they demonstrated that focusing on one single distracter can not only prevents the postsuppressional increase of target thoughts (as shown in Wegner et al.'s study), but also may lead to fewer intrusions of target thoughts than the suppression strategy during the suppression period. The stronger findings observed in these two studies were probably due to the fact that the distraction tasks they utilized (taking a test and a breathing exercise) were more engaging than that used in Wegner et al.'s (1987) study (thinking about a red Volkswagen), therefore leading to more pronounced effects. Thus, aside from the number of distracters that might influence the results of thought suppression, the quality of a distracter, in particular whether it is engaging, is also a key factor that might influence the magnitude of the effects of focused-distraction on reducing unwanted thoughts. Prior research (Renaud & McConnel, 2002) further suggests that a more effective distracter should be less related to the content of to-be-suppressed thoughts so that they can distract attention well away from the target thoughts, resulting in better suppression effects.

As described above, the focused-distraction strategy has been shown to be more effective than suppression in the control of intrusions of neutral thoughts (e.g., Wegner et

al., 1987), personal negative thoughts (e.g., Salkovskis & Campbell, 1994), or thoughts of smoking (e.g., Salkovskis & Reynolds, 1994). Similar results were also found in Cioffi and Holloway's (1993) study on the suppression of thoughts of physical pain. In their study, subjects were asked to immerse their hands in the ice-cold water while trying to avoid thinking about pain sensations. They found that subjects who were told to distract themselves by visualizing the details of their room at home recovered from their discomfort more quickly than those who were told to not think about their hand sensations. This may imply that trying to avoid thinking about pain sensations may produce an increase in thoughts about pain after suppression attempts ceased. Consequently, these increased thoughts about pain sensations may strengthen and extend the feelings of discomfort, and therefore slowed down the recovery from painful feelings. An alternative explanation would be that the distraction task could have decreased the intensity of pain felt by subjects when their hands were immersed in ice-cold water; therefore, when their hands were pulled out from the ice water, they might have recovered from the pain more quickly.

In sum, studies showed that the focused-distraction strategy might be more effective than the suppression strategy in reducing unwanted thoughts or at least attenuate the immediate thought enhancement or the rebound effect of thought suppression. The reason that focused-distraction is less likely to induce the rebound effect can probably be explained by the negative-cuing hypothesis (Wegner et al., 1987; Wegner et al., 1991) which suggests that the association of distracters in the environment with target thoughts is the reason why the postsuppressional rebound effect is more likely to occur with suppression but less likely to occur with focused-distraction. Although this hypothesis does not explain why the focused-distraction strategy might also result in fewer intrusions of target thoughts than the suppression strategy during the suppression period, it can be

speculated that to the extent that people rely on multiple distracters or multiple ways to suppress unwanted thoughts, people will alternate focus from one distracter to another or frequently think about how to suppress thoughts, rendering more possibility for target thoughts to intrude during those breaks. Other explanations for the relatively positive effects of focused-distraction can also be inferred from other theories. These theories will be presented in the next section.

Concentration versus Suppression versus Focused-Distraction

In the literature reviewed above, studies' findings mostly showed that the focused-distraction strategy was more effective in controlling intrusions of unwanted thought and more likely to prevent the paradoxical effects of thought suppression than the suppression strategy. However, it is reasonable to predict that the concentration strategy, a fully approach-based method, would be even more effective than the focused-distraction strategy on controlling unwanted thoughts. The following three theories—the motivational explanation of rebound effect (Liberian & Förster, 2000), increased saliency hypothesis (Merckelbach, Muris, van den Hout, & de Jong, 1991; Muris et al., 1992), and the theory of ironic processes (Wegner, 1994; Wegner & Erber, 1992; Wenzlaff & Wegner, 2000), all of which explain the underlying reasons for the paradoxical effects of thought suppression, may provide some support for this view.

Motivational explanation of the rebound effect. Martin, Tesser, and McIntosh (1993) have suggested that the postsuppression rebound effect originates from the motivation to achieve a blocked goal. Liberman and Förster (2000) also suggested that the postsuppressional rebound effect is due to a need to express the to-be-suppressed-construct after suppression. This motivational explanation of the rebound effect suggests that when one is suppressing a thought, this suppression can induce a need to express it,

and thus enhances the accessibility of that very thought. When suppression has been lifted, one would then express or think about the target thought even more than the baseline, and thus the postsuppressional rebound effect is observed. But when a person has expressed the target thought, the need to express the thought would be satisfied and the accessibility of that very thought would be reduced. According to Liberman and Förster's theory, the need induced by suppression is the main reason people experience an increase of to-be-suppressed thoughts after suppression. Reasoning from this, it can be expected that the focused-distraction strategy, that puts an emphasis on the replacement of target thoughts with alternative thoughts, might decrease suppression intentions. Thus, the need to express the to-be-suppressed thought should not be as strong for this strategy as for the typical suppression condition. Along this line of reasoning, the concentration strategy, simply telling people to focus on an alternative goal without mention of suppression intentions, should be less likely than the focused-distraction strategy to arouse the need to express the target thought since one's mind has been framed as approaching something rather than avoiding something. Therefore, it can be expected that the concentration strategy, a fully approach-based method, will be more effective in preventing the rebound of target thoughts than the suppression method which emphasizes avoidance, or the focused-distraction strategy which incorporates both avoidance and approach features.

The theory of ironic Processes. The theory of ironic processes was proposed by Wegner and his colleagues (Wegner, 1994; Wegner & Erber, 1992; Wenzlaff & Wegner, 2000) to describe the underlying reason why a postsuppressional rebound effect occur. According to this theory, thought suppression triggers two mechanisms: an intentional operating process and an automatic monitoring system. The operating process seeks to promote the desired state of mind by searching consciously for alternative thoughts other

than unwanted thought, while the monitoring system searches continuously for unwanted target thoughts, which would signal the failure to achieve successful mental control. When this automatic monitoring system has found a target thought, the controlled operating process can be initiated to eliminate that thought. The automatic monitoring process is the mechanism assumed to produce the ironic effects of thought suppression as it continuously monitors for occurrences of unwanted thoughts even after the operating process has been terminated, thus leads to an delayed increases of target thoughts. In sum, the theory suggests that the automatic monitoring process initiated by suppression attempts is the underlying reason that causes the postsuppressional rebound of target thoughts. Based on this theory, it is reasonable to speculate that the concentration strategy, which does not involve attempts to suppress unwanted thoughts, would be less likely to induce the automatic target-search process and therefore would render less possibilities of producing a delayed increase of unwanted thoughts compared to the suppression and focused-distraction strategies. And since the focused-distraction strategy involves both avoidance and approach features, it is expected to result in an effect falling between that of the concentration and suppression techniques.

Increased saliency hypothesis. In Muris et al.'s (1992) study, subjects experienced an immediate increase of unwanted thoughts when they were suppressing thoughts about a neutral story. Muris et al. (1992) suggested that such an immediate thought enhancement effect is probably due to the fact that suppression attempts may increase the saliency of the to-be-suppressed thoughts and thus make subjects even more preoccupied with them. Muris et al.(1992) stated:

“Let us finally assume that efforts to suppress a thought also act to increase the saliency of the cue...But if a thought suppression instruction is given, saliency

increases and more intrusions will be present than in a group not suppressing thoughts about the insalient cue.” (p. 642).

Given this reasoning, the focused-distraction strategy, which refers to suppressing thoughts by focusing on an alternative thought or task, may involve a lower degree of suppression attempts than the suppression strategy, and thus might reduce the increased saliency problem to some degree. Moreover, the concentration strategy that focuses entirely on pursuing an alternative goal rather than avoiding undesired thoughts should not create an increased saliency problem. From this perspective, the concentration strategy would probably be more effective for preventing an immediate increase of unwanted thoughts than the focused-distraction and suppression strategies when thought control is being applied.

Empirical studies. Surprisingly, very few studies have directly investigated the effects of concentration within the context of thought suppression. One study by Wenzlaff and Bates (2000), which compared the effects of concentration and suppression strategies in the completion of a scrambled sentence task, may provide implications for the effect of the concentration strategy in controlling unwanted thoughts. Based on the theory of ironic processes (Wegner, 1994; Wegner & Erber, 1992), Wenzlaff and Bates (2000) speculated that the reduction of unwanted thoughts may be better accomplished if the monitoring process is not focused exclusively on those thoughts because such as focus is in direct opposition to the goal of eliminating target thoughts. They predicted that if one shifts his or her attention from suppressing unwanted thoughts to focusing on a thought opposite to the target, the ironic problem resulting from the automatic monitoring process would cease. To test this hypothesis, subjects were asked to perform a scrambled sentence task using either a concentration or suppression strategy. In the concentration

condition, subjects were told to unscramble sentences to form positive statements, whereas in the suppression condition subjects were told to not form negative statements. The control group was instructed to unscramble whatever came to mind first. The results of their first study showed that the concentration group unscrambled a lower percentage of negative statements than did either the control group or the suppression group, while the suppression group and the control group did not differ significantly. Moreover, their second study showed that the suppression group unscrambled more negative statements during the subsequent free-unscrambling period than did the control group and the concentration group. These results seem to suggest that the concentration strategy, an approach-based method, may prevent the delayed increase of unwanted cognitions and also might be more effective than the suppression strategy in reducing unwanted cognitions.

Wenzlaff and Bates' (2000) study may serve as an initial look of the effect of the concentration strategy on mental control. However, interpretations with respect to real-life thought-control behaviors should be made cautiously since some features of this study are very different from those of typical thought suppression research. One of the differences of this research paradigm is the type of thought to be suppressed. In Wenzlaff and Bates' (2000) study, subjects were told to avoid "negative meanings" which is relatively vague, as it does not explicitly point to what contents are to be avoided. Subjects therefore did not know in advance which thoughts to avoid before looking at the scrambled sentences. This situation arguably rarely occurs in everyday thought-suppression contexts or in typical thought suppression research, in which subjects are usually told to suppress thoughts with more defined contents, regardless of personal or experiment-provided thoughts.

Another difference of Wenzlaff and Bates' (2000) study is the experimental task they employed. Wenzlaff and Bates (2000) used a scrambled sentence task to measure how well the subjects achieved the goal of avoiding certain constructs (negative statements). However, each scrambled sentence (e.g., I fail will once succeed more) might elicit both of to-be-suppressed constructs (negative meanings) and non-target constructs (positive meanings) every time subjects read them. Therefore, unlike the typical thought suppression contexts in which people commonly use distraction to suppress unwanted thoughts (Muris et al., 1993; Wegner et al., 1991), subjects in their study might not have been able to distract themselves from unwanted thoughts by focusing their attention on alternative cognitions.

Moreover, the instructions given to the experimental conditions in their study could produce ambiguity in the interpretation of the results. That is, one can argue that the reason that the suppression strategy produced higher rates of negative statements than the concentration strategy is due to the fact that the suppression instructions—"Unscramble each sentence so that it DOES NOT form a negative statement..." are more difficult to understand than the concentration instruction as it includes a double negative. Subjects may have needed to translate the suppression instructions into the positive whenever they consulted their memory about goal of the task. Therefore, subjects receiving these instructions may not have performed as well as those in the concentration condition who received more straightforward instructions—"Unscramble each sentence to form a positive statement only." In contrast, in the typical design, the suppression instructions are relatively more straightforward in that subjects are typically told to avoid thoughts with specific contents rather than being instructed to avoid any negative thoughts.

As mentioned, Wenzlaff and Bates' (2000) study seems to suggest that approach-based method may be more effective in thought control than an avoidance-based method. However, more evidence, particularly evidence derived from the more typical thought suppression research paradigm is needed before firm conclusions on this topic can be drawn.

EMOTIONAL VERSUS NEUTRAL THOUGHTS

In Wegner et al.'s (1987) classic study on thought suppression, the target thought to be suppressed was a white bear, which can be characterized as an experiment-provided, discrete, neutral thought. Some researchers have argued that in real-world situations, to-be-suppressed thoughts are usually more complex and emotionally-charged, and that findings obtained from suppressing neutral, discrete thoughts therefore may not fully represent the real-life phenomenon of thought suppression (Kelly & Kahn, 1994; McNally & Ricciardi, 1996; Purdon & Clark, 2001; Salkovskis & Campbell, 1994). With this concern in mind, some researchers have investigated the effects of emotional thoughts on thought suppression, or tested whether the findings obtained from suppressing neutral thoughts can generalize to the suppression of thoughts of other valence.

For example, Muris et al.'s (1992) research compared the effects of suppressing emotional thoughts with those resulting from suppressing neutral thoughts. In their study, subjects were asked to suppress thoughts about a distressing or a neutral story they had just read and then to think about whatever they wanted in the subsequent two periods. They found that the group who had previously suppressed thoughts about a neutral story experienced an immediate increase of target thoughts during the suppression period as

well as experienced a postsuppressional rebound effect in the sense of Wegner et al. (1987), but those who suppressed thoughts about a distressing story did not experience these ironic effects. However, the authors suggested: “In fact, there was no rebound effect in the strict sense of the word (i.e., increased thought frequency subsequent to suppression)” (Muris et al., 1992, p. 642) since there was an overall decline of target thoughts in all conditions over time. Regarding the finding that suppressing neutral thoughts led to an immediate thought enhancement effect but suppressing distressing thoughts did not, Muris et al. (1992) speculated that this was probably due to the suppression instruction, which may have increased the saliency of neutral thoughts but may not increase the saliency of the emotional thoughts because emotional thoughts in themselves are already impressive and compelling. Therefore, when people tried to suppress neutral thoughts, those thoughts may increase ironically, while suppressing emotional thoughts might not have had the same result due to the ceiling effect. The finding of an immediate thought increase when suppressing neutral thoughts was consistent with that of the Lavy and van den Hout’s (1990) study regarding the suppression of thoughts about vehicles.

Muris et al.’s (1992) study seems to suggest that suppressing neutral thoughts is more likely to lead to paradoxical effects (i.e., an immediate thought enhancement or the rebound effect) than suppressing emotional thoughts, however, some other studies did not find the same result (e.g., Clark, Ball, & Pape, 1991; Clark, Winton, & Thynn, 1993). For example, in Harvey and Bryant’s (1998) study on comparing the effects of thoughts of differing valence (i.e., thoughts about humorous, distressing, or neutral films) on thought suppression, subjects told to suppress thoughts did not experience an immediate increase of target thoughts during suppression nor the rebound effect during the subsequent free-thinking period regardless of the type of film they viewed. One of the possible reasons for

the discrepancy between the findings of this study and Muris et al.'s (1992) research is that the two studies used different thought-elicited material; films were used in Harvey and Bryant's (1998) study and stories were used in the Muris et al.'s (1992) study. It is possible that films, as auditory and visual texts, may create stronger impressions than those elicited from reading a story, and therefore thoughts about a film may come to mind relatively more frequently, even when the film is not particularly emotional. As a result, suppression may not increase the saliency of thoughts about a "neutral" film and thus may not enhance intrusions of these thoughts. Although no ironic effects were observed in suppressing thoughts of any type of film, that does not mean that emotional and neutral thoughts can be controlled with the same amount of effort, however. Harvey and Bryant (1998) found that viewing a distressing film led to more film-related thoughts during the suppression period than did viewing a neutral film. This therefore seems to suggest that distressing thoughts may generally intrude on one's mind more frequently and therefore might be more difficult to completely dismiss than neutral thoughts. This result is in fact consistent with the finding in Harvey and Bryant's (1999) another study.

Similar results were found in Davies and Clark's (1998) research in that no immediate enhancement or rebound effect was observed in the suppression of distressing (thoughts about a disaster film) or neutral thoughts (thoughts about a polar bear film). Also in line with Harvey and Bryant's (1998, 1999) findings, their data showed that subjects who viewed the distressing film reported a higher percentage of film-related thoughts than those who viewed the neutral film regardless of whether they were in the suppression or the control group. This again demonstrates that distressing thoughts may occur more readily than neutral thoughts, which suggests that the suppression of distressing thoughts may be harder to accomplish than the suppression of neutral thoughts. Probably because of this or simply because the occurrence of distressing

thoughts is unpleasant, subjects in their study indicated stronger efforts to suppress thoughts of the fire film than of the polar bear film. In sum, the results of this study are mostly consistent with what Harvey and Bryant (1998) found in their research. One of the reasons that cause this consistency is probably that these two studies employed the same type of material, films, to elicit target thoughts, and thus found similar results on the effects of thought suppression.

Also consistent with Davies and Clark's (1998) findings, no immediate enhancement effect or rebound effect was found in Roemer and Borkovec's (1994) research on the suppression of either personal depressing, personal anxious, or neutral thoughts (i.e., about overhearing a conversation about a movie or brands of coffee). Moreover, their results suggested that negative (depressing or anxious) thoughts might be more difficult to suppress than neutral thoughts as suppressing depressing and anxious thoughts led to a higher percentage of statements indirectly related to the target thoughts during the suppression period and a higher percentage of directly related statements during the subsequent expression period than suppressing the neutral thoughts. In addition, they found that subjects who suppressed unpleasant thoughts (i.e., distressing and anxious thoughts) reported an increase in directly related thoughts from the initial to the subsequent period, yet this finding might be partly caused by the study design, in which the suppression groups were told to "think about" the target thoughts in the period subsequent to suppression. In contrast, the control-expression groups were found to experience a decrease in target thoughts. This result is in line with the findings of most prior studies on thought suppression (e.g., Clark et al., 1991; Clark et al., 1993; Davies & Clark, 1998; Harvey & Bryant, 1998; Muris et al., 1992; Purdon & Clark, 2001; Wegner & Gold, 1995), which seems to suggest that control groups have probably gotten tired of thinking about target thoughts in the subsequent expression period.

As seen in the aforementioned studies (Davies & Clark, 1998; Harvey & Bryant, 1998, 1999; Roemer & Borkovec, 1994), suppressing distressing thoughts may not necessarily lead to a postsuppressional rebound effect. The reasons that lead to this result, however, are not clear. One explanation might be that people may exhibit spontaneous attempts to suppress certain types of distressing thoughts even in the absence of suppression instructions, therefore, making the rebound effect less likely to be detected (Wegner & Gold, 1995). This explanation may be inferred from Purdon and Clark's (2001) study. In their study, subjects in the suppression conditions were told to suppress a personal upsetting obsessive thought, a personal positive thought or the thought of a white bear. The results indicated, again, no evidence of immediate thought enhancement or postsuppressional rebound for any suppression group. Moreover, the results showed that obsessional-control group indicated higher ratings of suppression effort as well as experienced fewer target thoughts than did the neutral-control and positive-control groups during the suppression period. This is probably the reason for the non-significant difference in target thought intrusions between the suppression-obsessional group and their control counterpart during the suppression period, while the other suppression groups (positive and neutral) experienced fewer target thoughts than their control counterparts. The reason why the obsessional-control group demonstrated relatively higher spontaneous attempt to suppress distressing obsessive thoughts can probably be inferred from the result that showed that subjects in the obsessive thought condition indicated feeling more unacceptable about intrusions of target thoughts than did the neutral and positive thought groups.

In addition, Purdon and Clark (2001) found that subjects who had suppressed obsessional thoughts experienced fewer target thoughts during the second period than did those who had suppressed positive or neutral thought. The rating of suppression effort

also was higher for the obsessional thought condition (for both the suppression and control groups) than the other thought conditions during the subsequent free-thinking period. These results probably imply that people may continue to suppress distressing thoughts in the later non-suppression period in order to avoid uncomfortable feelings (Wegner & Gold, 1995). To the extent that suppression attempt can decrease target thought intrusions, the rebound effect would be more difficult to detect in this context.

Another factor that might influence the occurrence of the rebound effect is a person's prior experience. In Kelly and Kahn's (1994) study, subjects were either told to suppress either personal thoughts or a white bear thought. They found that neither an immediate thought enhancement nor a postsuppressional rebound occurred for the personal thought condition, whereas a postsuppressional rebound effect was observed for the "white bear" thought condition. Moreover, subjects who were told to suppress the thought of a white bear experienced more target thoughts during both the suppression and expression periods than those who were told to suppress personal intrusive thoughts. Kelly and Khan thus speculated that the reason that personal thoughts were suppressed relatively more successfully than the thought of a white bear was probably due to the fact that people had developed strategies to suppress personal thoughts but not for suppressing a novel thought. The finding of a rebound effect with suppressing a thought of a white bear is consistent with Wegner et al.'s (1987) finding, however, inconsistent with some other research (e.g., McNally & Ricciardi, 1996; Purdon & Clark, 2001). Some researchers (McNally & Ricciardi, 1996; Merckelbach et al., 1991) have speculated that the rebound effect with suppressing a white bear thought is probably more likely to occur when subjects are required to express the target thoughts (e.g., Kelly & Kahn, 1994; Wegner et al., 1987) during the expression period rather than are told to think whatever they wanted (e.g., McNally & Ricciardi, 1996; Purdon & Clark, 2001). However, this

speculation is tentative since still other studies that employed the “forced expression” design did not find a rebound effect with suppressing a white bear thought (e.g., Roemer & Borkovec, 1994; Rutledge et al., 1993).

For example, Rutledge et al. (1993) found no immediate enhancement nor postsuppressional rebound effect resulting from the suppression of the thought of a white bear or a personal thought (i.e., test worry) with the “forced expression” design. But consistent with Kelly and Khan’s (1994) finding, they did find that subjects told to suppress thoughts of test worry experienced fewer target thought intrusions during the suppression period than those who suppressed a white bear thought.

In most of the aforementioned studies (e.g., Davies & Clark, 1998; Harvey & Bryant, 1998; Kelly & Kahn, 1994; Purdon & Clark, 2001; Roemer & Borkovec, 1994; Rutledge et al., 1993), suppressing negative thoughts did not result in an immediate increase of target thoughts or in a postsuppressional rebound effect. However, those findings may only represent short-term effects of thought suppression. It is possible that in the case of a longer-term, the results would be different. Trinder and Salkovskis (1994) investigated the relatively long-term effects of thought suppression. In their study, subjects were asked to suppress, think through, or record their personal negative thoughts in the context of their lives over a four-day period. They found that the suppression groups constantly experienced more target thoughts than did the think-through and record-only groups; therefore a thought enhancement was observed in this long-term study. However, it is difficult to compare the results of this study to those of short-term studies, since subjects in Trinder and Salkovskis’ (1994) study were told to suppress thoughts in their daily lives, whereas other studies were conducted in the lab-controlled environment. Therefore it is not possible to discern if differences observed can be attributed merely to different experimental time periods or to contextual differences.

In sum, most studies reviewed above found that suppression may lead to a short-term reduction or at least to no immediate increase of target thoughts regardless of the valence of thoughts to be suppressed. And also, the postsuppressional rebound effect was not observed in most of the studies that examined the effects of suppressing distressing thoughts, no matter whether the thoughts were personal or experiment-elicited. However, the findings on comparison of the suppression of emotional versus neutral thoughts are still inconclusive as some studies (e.g., Davies & Clark, 1998; Harvey & Bryant, 1998, 1999; McNally & Ricciardi, 1996; Roemer & Borkovec, 1994) found that distressing thoughts intruded more frequently or are more difficult to suppress than neutral thoughts during the suppression or non-suppression period, while others did not find this (e.g., Kelly & Kahn, 1994; Purdon & Clark, 2001; Rutledge et al., 1993).

One of the factors that might contribute to these inconsistencies is the variation among studies in thoughts examined. Some studies have focused on thoughts elicited from experiment-provided material, such as stories (e.g., Muris et al., 1992) or films (e.g., Davies & Clark, 1998; Harvey & Bryant, 1998, 1999), while others examined the thought suppression of subjects' personal thoughts (e.g., Kelly & Kahn, 1994; McNally & Ricciardi, 1996; Roemer & Borkovec, 1994; Rutledge et al., 1993; Salkovskis & Campbell, 1994; Salkovskis & Reynolds, 1994) or obsessional thoughts identified from an inventory (e.g., Purdon & Clark, 2001). The study results are thus inconsistent probably because thoughts derived from different sources may possess different features, contents, intensities of emotions, even if characterized as the same valence.

In addition to the thought suppression techniques and the types of thoughts, it is possible that factors related to personal characteristics might also play a role in the effect of thought suppression. In the following section, I will discuss the issues regarding individual-difference factors and thought suppression.

INDIVIDUAL-DIFFERENCE FACTORS

Perceived Distress Toward Thought Contents

As previously demonstrated, findings on thought suppression are mixed. Aside from variations in thought content and source (e.g., viewing a film, reading a story, or personal life), another factor that might influence the results of thought suppression is individual difference in perceptions and emotional reactions. For example, people may perceive the same distressing film differently and thus feel varying levels of distress over its contents. It is thus possible that differential levels of perceived distress toward thought content would thus induce different levels of motivation to suppress such thoughts. For example, Davies and Clark (1998) found that subjects exerted more efforts to suppress thoughts of the distressing fire film than of the polar bear film, regardless of whether they received the suppression instructions or not. Purdon and Clark's (2001) study also showed that subjects in the upsetting-obsessional thought condition indicated higher ratings of suppression effort than did those in the white bear thought condition, in the absence of the suppression instructions. Wegner and Gold's (1995) defensive suppression hypothesis also suggests that a person's emotional reactions could be the underlying reason that induces the suppression tendency or maintains one's ongoing suppression attempts in the non-suppression period. In sum, these findings and theories all seem to suggest that distressing thoughts may link to higher levels of suppression efforts than non-distressing thoughts.

Although level of distress may be associated with degree of suppression efforts, it is unclear how suppression efforts correspond to occurrences of target thought intrusions,

since findings on this issue are still sparse and controversial. For example, Trinder & Salkovskis (1994) found that higher degrees of suppression efforts were related to more target thought intrusions, while Purdon & Clark (2001) found that subjects in the distressing thought condition indicated higher ratings on suppression efforts for the free-thinking period but reported fewer target thoughts as compared to those in the neutral thought condition. One notion worthy of our attention is that suppression efforts might derive from different conditions, which therefore may complicate the results. For example, suppression efforts may derive from attempts to rid oneself of distress caused by unwanted thoughts. Also, one's willingness to comply with the suppression demand or personal beliefs in thought control may motivate one to exert more efforts. Moreover, higher suppression efforts may be compelled by greater difficulties in suppressing unwanted thoughts or simply derive from a stronger dispositional inclination toward suppression (Wegner & Zanakos, 1994). In reality, it is possible that suppression efforts can be motivated by one or a combination of several sources, and therefore interpreting the causal relationship between suppression efforts and intrusions of unwanted thoughts might be very complicated.

From the above analysis, it can be seen that the relationship between perceived distress and thought suppression is very complex and needs to be disentangled. Although some research suggests that this relationship is probably mediated by suppression efforts, it is not known exactly how they relate to target thought intrusions or whether there are other unexamined factors that also mediate or moderate this relationship. These problems thus await more research and further clarification.

Anxiety

Besides perceived distress toward thought content, another emotional factor that may also influence the effects of thought suppression is anxiety levels. The anxiety theory (Eysenck, 1992; Eysenck & Calvo, 1992) suggests that anxiety may undermine some cognitive processing and compete for resources in one's working memory, thus interfering with cognitive performance. Based on this theory, it can be assumed that if an individual is in a high state of anxiety, he may not be able to focus on the suppression task well because anxiety might weaken one's capacity to effectively search for distracters or fully attend to distracters at hand. Consistent with this theory, Gaskell et al.'s (2001) study found that state anxiety correlated positively with the number of target thought intrusions experienced during the suppression period, regardless of neutral or anxiety-provoking thoughts were suppressed.

The sources of anxiety in the thought suppression context could be many. Anxiety may be due to external (e.g., the presence of a stranger or being placed in a new environment) and/or internal factors (e.g., trait anxiety). In addition, performing the suppression task itself might also play a role in increasing levels of anxiety. For example, Roemer and Roemer (1994) found that suppressing thoughts led to an increase in anxiety at the end of the experiment regardless of distressing or neutral thoughts had been suppressed. In addition, Trinder and Salkovskis' (1994) study indicated that higher suppression efforts were associated with higher levels of discomfort over thought occurrences, while the levels of discomfort correlated positively with a clinical measure of anxiety for participants who were instructed to suppress thoughts. The notion that suppression may increase anxiety could probably be inferred from the theory of psychological reactance (Brehm, 1966; Brehm & Brehm, 1981) in that restrictions and regulations could be perceived as threats to one's freedom, and thus induce an unpleasant

state of arousal. It is also possible that anxiety could result from intrusions of unwanted thoughts during suppression (Trinder & Salkovskis, 1994) either because the thought contents are distressing or because the thought intrusions represent a failure in achieving the goal of mental control, or due to both reasons.

According to the findings and theorizations discussed above, the relationship between anxiety and effects of thought suppression might be multi-directional. That is, suppression may induce anxiety, and anxiety induced from suppression or other internal and external factors may harm one's suppression performance and thus lead to more intrusions of target thoughts; the occurrence of unwanted thoughts during suppression may in turn arouse anxiety. However, little research has been conducted to examine the interrelationships among suppression efforts, anxiety levels, and thought intrusions. It is thus necessary for researchers to further clarify this issue.

Prior Experiences and Self-Efficacy

Another factor that might influence the effects of thought suppression is one's prior experience with thought control. Although this notion has not yet been tested, some researchers have addressed this possibility. For example, after finding that high disinhibitors (i.e., people who tend to overeat or to binge on food in this case) tended to suppress thoughts about eating more successfully than low disinhibitors, Oliver and Huon (2001) speculated that the reason for this result is that high disinhibitors might have more prior experience in trying to suppress thoughts about food and eating in their life. This speculation can be supported by the fact that high disinhibitors reported less difficulty controlling their thoughts than low disinhibitors. Kelly and Kahn (1994) posited that when people have more prior experiences suppressing a specific thought, they may have formed "a rich network of thoughts that they had previously used to distract themselves

from their intrusive thoughts” (Kelly & Kahn, 1994, p, 1004), which therefore allows them to suppress that very thought more efficiently than a novel thought. However, it is not clear whether these prior experiences of thought suppression can eventually build up and be internalized as a general skill that enables one to more successfully suppress any thought, or whether these prior experiences are merely “thought-specific” and therefore are not generalizable to other thought suppression conditions.

Although it is not fully clear whether prior experiences with thought suppression can be applied to the suppression of different thoughts, the success or failure of prior suppression experiences may affect one’s self-efficacy for thought suppression. Self-efficacy represents one’s judgments of his/her abilities in a specific domain (Bandura, 1986). When perceptions of self-efficacy in performing a given task are high, one may be more motivated to take on that task and demonstrates greater persistence when facing difficulties. However, if self-efficacy perceptions are low, one may tend to avoid a particular task or give up more easily. From the perspective of this theory, it is reasonable to expect that higher self-efficacy for thought suppression may be associated with higher motivation and efficiency regarding thought suppression. Although little research has been conducted to directly examine the effects of self-efficacy on thought suppression, Rassin, van Brakel, and Diederens (2003) have examined how manipulated beliefs regarding suppression efficacy would affect thought suppression performance. In their study, participants were told either that research showed that memories could be successfully suppressed or that memories were impossible to suppress. They found that participants who had been told that memories could be suppressed reported experiencing fewer target thought intrusions (about a distressing story) during the two-hour suppression session than those who were told that thought suppression was impossible. Moreover, participants who were told that suppression could be achieved indicated higher

ratings of perceived efficacy of suppression attempts, and lower unpleasantness ratings for the distressing story than those who were told that suppression could not work. However, there was no significant difference between “suppression works” and “suppression does not work” groups in the performance of free recall of the story contents subsequent to suppression.

In sum, individual differences such as perceived distress over thought contents, anxiety levels, prior experiences and self-efficacy might influence the results of thought suppression. However, the relationship between individual factors and the efficiency of thought suppression is far from clear. It is thus necessary for researchers to further explore those issues in future studies.

In addition to the suppression technique, thought type, and individual-difference factors, variations in methodology may also affect a study’s findings on thought suppression. As mentioned previously, some of the discrepant findings between studies might be due to the fact that researchers adopted different operational definitions of the control condition. In some studies the instruction given to the control condition was “free-thinking” while in others the instruction was “expression—think about the target thoughts.” Probably because of such discrepancies, some studies are more likely to find significant ironic effects of thought suppression than others. Therefore, in the next section, I will discuss the issue regarding the design of the control condition within the context of thought suppression.

OPERATIONAL DEFINITIONS OF THE CONTROL CONDITION AND REBOUND EFFECT

In Wegner et al.’s (1987) study on thought suppression, the task instruction for the non-suppression period was “expression”—to think about thoughts of a white bear.

The rebound effect of thought suppression was thus assessed by comparing the expression period subsequent to suppression for the initial suppression group with the initial expression period for the initial expression group. Lavy and van den Hout (1990), however, raised questions about the employment of expression as a control condition. They argued that only when a design has the control group receive neutral rather than expression instructions can direct conclusions be made on whether the paradoxical effects of thought suppression occur. Therefore in Lavy and van den Hout's (1990) study, the control group was told to think about anything they wanted, including the target thoughts.

Merckelbach, Muris, van den Hout, and de Jong (1991) also questioned the ecological validity of using expression as the task for the control condition. They suggested, "...in real life, obsessive individuals are not requested to try to produce obsessions. Consequently, the conditions under which rebound effects have been observed are rather artificial." (p. 227). They suggested that "liberal expression" instruction (i.e., instructions telling subjects to think whatever they wanted including the target thoughts) could better approximate everyday situations than "forced expression" instructions (i.e., instructions telling subjects to think about the target thoughts). Through employing the "liberal expression" instruction for the control condition, they found neither an immediate increase in target thoughts (i.e., thoughts of a white bear) during suppression nor a postsuppressional rebound during the subsequent expression period. They thus suggested that using "liberal expression" rather than "forced-expression" as the instruction for the control condition was probably less likely to lead to a rebound effect. They also speculated that the postsuppressional rebound effect might be "a product of a highly artificial condition (i.e., "forced" expression)" (p. 236) in the Wegner et al.'s (1987) study. That is, the rebound was probably due to the fact that "initial suppression

leads to a priming of memory structures which, during consequent forced expression, makes it easier for the subject to concentrate on the target thought.” (p. 237).

McNally and Ricciardi (1996) also raised questions about the ecological relevance of using expression of target thoughts as the instruction for the control condition. They argued that asking people with obsessive-compulsive disorder to think about their obsessive thoughts would not occur in daily life, as obsessions occur in a context in which people are free to think about anything. By using free-thinking as the instruction for the control condition, McNally and Ricciardi (1996) found that subjects who suppressed the thought of a white bear did not experience a rebound effect during the subsequent expression period, which is consistent with Merckelbach et al.’s (1991) findings. However, they found a rebound tendency with the suppression of personal negative thoughts.

From the findings of the above studies, it seems that a postsuppressional rebound effect is less likely to be observed in a design using liberal expression or free-thinking as the instruction for the control condition particularly when the target thought to be suppressed is the thought of a white bear.

Clark et al. (1991) had a different opinion about the operational definition of the rebound effect used by Wegner et al. (1987). They argued that the postsuppressional rebound effect found in Wegner et al. (1987) was probably due to the fact that the initial suppression group (who first suppressed thoughts and then expressed thoughts) had more practice with the thought recording technique than the initial expression group. As mentioned, the rebound effect found in Wegner et al.’s (1987) study was assessed by comparing the expression period subsequent to suppression for the initial suppression group with the initial expression period for the initial expression group. Moreover, Clark et al. (1991) speculated that the use of expression as the instruction for the control

condition was more likely to produce a ceiling effect and thus the immediate enhancement effect (i.e., thought intrusions during the first period for the initial suppression group were greater than those for the initial expression group or the control group) might be harder to detect. As suggested by other researchers (Lavy & van den Hout, 1990; McNally & Ricciardi, 1996; Merckelbach et al., 1991; Roemer & Borkovec, 1994), Clark et al. (1991) argued that a more appropriate instruction for the control condition would be to simply mention the target thought and allow subjects to think about anything they wanted rather than asking them to express any thought. Moreover, they did not think that Wegner et al.'s (1987) Latin square design could avoid the problem of practice effects. Therefore, unlike Wegner et al.'s (1987) and others' (e.g., Kelly & Kahn, 1994, Rutledge, 1993; Lavy & van den Hout, 1990; McNally & Ricciardi, 1996; Merckelbach et al., 1991; Wegner et al., 1987) design including the initial suppression group and initial expression group (i.e., who were asked to first think about target thoughts in Period 1 and then suppress them in Period 2), Clark and his colleagues' (Clark et al., 1991; Clark et al., 1993) studies asked the suppression group to first suppress the target thought, followed by a liberal-expression period, while asking their control group to think about whatever they wanted (i.e., liberal expression) for both experimental periods. The postsuppressional rebound effect was then measured by comparing the frequency of target thoughts during the second (liberal expression) period for the suppression group and the control group. With this design and operational definition of the rebound effect, their results showed that while there was no immediate thought enhancement, a postsuppressional rebound effect was observed (Clark et al., 1991; Clark et al., 1993).

Clark et al.'s (1991) study design and operational definition of the rebound effect has been adopted by some other researchers examining the effects of thought suppression

(e.g., Davies & Clark, 1998; Gaskell et al., 2001; Harvey & Bryant, 1998, 1999; Muris et al., 1992; Oliver & Huon, 2001; Purdon & Clark, 2001; Renaud & McConnell, 2002; Salkovskis & Campbell, 1994; Salkovskis & Reynolds, 1994). However, there is still some problem created by this design. As seen in the literature, most studies (e.g., Clark et al., 1991; Clark et al., 1993; Davies & Clark, 1998; Harvey & Bryant, 1998; Muris et al., 1992; Purdon & Clark, 2001; Roemer & Borkovec, 1994; Wegner & Gold, 1995) that used this design found that the control group experienced a decrease in target thoughts between Period 1 and Period 2. This is probably due to a habituation effect, a loss of interest in thinking about the target thoughts (Wegner & Gold, 1995), or the exhaustion of a limited number of target thoughts (Purdon & Clark, 1997) for the control group. Given that the control group experienced a decrease in target thoughts from Period 1 to Period 2, the postsuppressional rebound effect, as defined by Clark et al. (1991), would be more likely to be found, considering that it was assessed by comparing the number of target thoughts experienced by the suppression and control groups during the second (free-thinking) period. Later studies conducted by Wegner and his colleagues (e.g., Wegner et al., 1991; Wegner et al., 1995) also employed a design similar to that of Clark et al. (Clark et al., 1991; Clark et al., 1993) except the instruction for the control condition was “expression” rather than “free thinking”.

Although Clark et al.’s (1991) design solves the possible practice problem in Wegner et al.’s (1987) original design, it nevertheless creates a new problem in interpretation. As Roemer and Borkovec (1994) mention,

[Wegner et al.’s design] controlled for the effects of repeated verbalization, a confounding factor in the first Wegner et al. (1987) investigation (Clark, Ball, & Pape, 1991). However, it created ambiguity in the interpretation of the rebound effect, which may have been the result of a decrease in target thoughts when

expressed by subjects over repeated periods (a finding reported in both studies) rather than an increase in target thoughts following suppression. (p.467)

For this reason, although Roemer and Borkovec (1994) asked their control group to express thoughts over two periods, which is a design similar to Clark et al.'s (1991), they still adopted Wegner et al.'s (1987) original definition of the rebound effect. With this design and definition, neither an immediate thought enhancement nor a postsuppressional rebound effect was found. Consistent with most of the other research (e.g., Clark et al., 1991; Clark et al., 1993; Davies & Clark, 1998; Harvey & Bryant, 1998; Muris et al., 1992; Wegner & Gold, 1995), target thoughts expressed by the control group (the expression group) were decreased from Period 1 to Period 2.

To prevent the ecological problem of using expression as the control condition, the present study used "free thinking" as the instruction for the control condition to better imitate real-life situations (Lavy & van den Hout, 1990; McNally & Ricciardi, 1996; Merckelbach et al., 1991). Moreover, to avoid the interpretation problem associated with a decrease in target thoughts between periods for the control group, the postsuppressional rebound effect was measured in a manner similar to that employed in Wegner et al.'s (1987) study. That is, the rebound effect was assessed by comparing the subsequent period (the free-thinking period) for the experimental groups with the initial period (the first free-thinking period) for the control group. In fact, this design is similar to that of Roemer and Borkovec (1994), except that free-thinking was used as instruction for the control condition rather than expression.

STATEMENT OF THE PROBLEM

Although a substantial body of research has been conducted to investigate the phenomenon of thought suppression, the results remain mixed. However, research (e.g., Salkovskis & Campbell, 1994; Salkovskis & Reynolds, 1994; Wegner et al., 1987) has shown that, instructing subjects to suppress thoughts by focusing on one specific distracter not only prevents a postsuppressional rebound effect from occurring, but also leads to fewer intrusions of unwanted thoughts than simply instructing people to suppress thoughts. One explanation for the lack of ironic effects for focused-distraction is that focusing on one distracter may circumvent the problem that people may attempt suppression by focusing on items in the immediate environment for self-distraction and those distracters would eventually become associated with the target thoughts and might remind subjects of these thoughts after the suppression attempt is lifted (Wegner, et al., 1987). Also, to the extent that people may use multiple distracters or try multiple methods to suppress thoughts, this may render more possibility for target thoughts to intrude when they are searching for a distracter or thinking about how to suppress. Another explanation might be that focused-distraction may involve lower suppression attempts since people are instructed to avoid target thoughts by directing their attention to one specific distracter. Consequently, the problem of automatic monitoring (Wegner, 1994), increased need to express thoughts (Lieberman & Förster, 2000), or increased saliency of to-be-suppressed thoughts (Muris et al., 1992) triggered by suppression intentions might occur to a lesser degree for the focused-distraction condition.

According to this reasoning, the ironic effects of thought suppression are primarily due to the attempt to avoid something or the use of many ineffective distracters for suppression. Therefore, if a method can frame one's mind to approach an alternative

goal rather than avoiding something, this may not only preclude the problems associated with suppression attempts, such as initiation of an automatic monitoring function or increased need to express to-be-suppressed thoughts, but also prevent the environmental associations related to relying on distracters found in the environment or the problem of using many ineffective distracters. If one's concern is to pursue a separate goal without thinking about avoiding unwanted thoughts, the alternative task they focus on is not a "distracter" but another task. If so, it can be expected that this concentration strategy would be even more effective in reducing unwanted thoughts than the focused-distraction strategy since this method does not involve suppression attempts, while focused-distraction still does, though less than the typical suppression method. Wenzlaff and Bates (2000) have compared the effects of concentration and suppression techniques with a scrambled sentence task and found that subjects who were instructed to focus on forming sentences with positive meanings unscrambled fewer negative statements than those who were instructed to avoid forming negative statements. In addition, subjects who had previously focused on avoiding forming negative meanings produced more negative sentences in the subsequent period during which they were free to form positive or negative sentences than the control group, whereas the concentration group did not produce this result. Therefore, this seems to support that the concentration strategy may preclude the problems associated with suppression. However, Wenzlaff and Bates' (2000) study paradigm was very different from that of typical thought suppression research. Thus it is not known whether their findings with a scrambled sentence task can be applied to a more typical thought suppression context. To the best of the author's knowledge, no research has been conducted to directly compare the effects of suppression versus concentration with a more typical thought-suppression research paradigm, and also, no research was found to contrast the effects of focused-distraction

versus concentration within the field of thought suppression. Therefore, the central purpose of this study was to investigate whether the suppression, focused-distraction, and concentration strategies would result in differential effects in controlling unwanted thoughts in the case of a more typical thought suppression paradigm.

In addition to thought suppression techniques, the factor of individual differences might also play a role in controlling unwanted thoughts. However, individual-difference factors such as levels of anxiety, perceived distress, prior experiences, self-efficacy, and suppression inclination have not been fully investigated within the context of thought suppression. Therefore, the second goal of this study is to explore how these factors are related to thought suppression techniques and occurrences of unwanted thoughts.

Overall, the present study sought to compare the effects of suppression, focused-distraction, and concentration on occurrences of unwanted thoughts as well as to explore the relationships among individual-difference factors, thought suppression techniques, and unwanted thought intrusions, so that the phenomenon of thought suppression can be better clarified.

Chapter 3: Method

RESEARCH QUESTIONS AND HYPOTHESES

Research Question 1

Will suppression, focused-distraction and concentration lead to differential effects on the occurrence of target thought intrusions during Period 1?

Hypothesis 1

- (a) The suppression strategy will lead to more intrusions of the target thoughts during Period 1 than the focused-distraction strategy.
- (b) The suppression strategy will lead to more intrusions of the target thoughts during Period 1 than the concentration strategy.
- (c) The focused-distraction strategy will lead to more intrusions of the target thoughts during Period 1 than the concentration strategy.

Rationale

There are several reasons that Hypotheses (a) and (b) were proposed. First, according to theories, suppression intentions may initiate an automatic monitoring mechanism (Wegner, 1994; Wegner & Erber, 1992) and increase the saliency of the to-be suppressed thoughts (Muris et al., 1992). Therefore, when subjects' attention is directed to a distraction task or a concentration task, they may be less likely to think about avoiding target thoughts. The ironic effects associated with suppression attempts therefore may occur to a lesser degree, and the rates of target intrusions would correspondingly be lower in these two conditions than in the suppression condition. In addition, several existing studies also suggested that that the focused-distraction (e.g., Salkovskis & Campbell, 1994; Salkovskis & Reynolds, 1994) and concentration

strategies (e.g., Wenzlaff & Bates, 2000) may be more effective in reducing unwanted thoughts than the suppression-alone technique. Therefore, hypotheses (a) and (b) were made in line with the aforementioned theories and findings.

Hypothesis (c) was made based on the same reasoning above. Given that concentration does not involve an attempt to avoid target thoughts, whereas distraction still involves this attempt to a certain degree, this study hypothesized that in comparison to the focused-distraction strategy, the concentration strategy would be less likely to suffer from the ironic effects of suppression and thus lead to fewer target thought intrusions.

Research Question 2

Will suppression, focused-distraction and concentration lead to differential effects on the occurrence of target thought intrusions during Period 2?

Hypothesis 2

- (a) The suppression strategy will lead to more intrusions of the target thoughts during Period 2 than the focused-distraction strategy.
- (b) The suppression strategy will lead to more intrusions of the target thoughts during Period 2 than the concentration strategy.
- (c) The focused-distraction strategy will lead to more intrusions of the target thoughts during Period 2 than the concentration strategy.

Rationale

Hypotheses (a) and (b) were based on Liberman and Förster's (2000) theory which states that suppression may induce a need to express the to-be-suppressed construct and thus cause individuals to think more about the target thoughts after suppression to satisfy their need of expression. Also, the theory of ironic processes

(Wegner, 1994; Wegner & Erber, 1992) postulates that the automatic target search process may continue after the suppression attempt is lifted. Therefore it was predicted that the suppression strategy would lead to more target intrusions during Period 2 than the focused-distraction and concentration strategies. In addition, several studies have found that the focused-distraction (e.g., Salkovskis & Reynolds, 1994; Wegner et al., 1987) and concentration strategies (e.g., Wenzlaff & Bates, 2000) can result in fewer thought intrusions during the subsequent expression or free-thinking period than the suppression strategy. Hypotheses (a) and (b) were therefore based on these theories and findings.

Hypothesis (c) was also based on Liberman and Förster's (2000) theory and the theory of ironic processes (Wegner, 1994; Wegner & Erber, 1992). Since the concentration strategy does not involve suppression attempts, it was predicted that it would lead to fewer target-thought intrusions than the focused-distraction strategy.

Research Question 3

Will suppression, focused-distraction, or concentration lead to different rates of target-thought intrusions during Period 1 than the non-suppression control?

Hypothesis 3

- (a) Target-thought intrusions in the suppression condition will be no greater than those in the non-suppression control condition during Period 1.
- (b) The focused-distraction condition will lead to fewer intrusions of the target thoughts than will the non-suppression control condition during Period 1.
- (c) The concentration condition will lead to fewer intrusions of the target thoughts than will the non-suppression control condition during Period 1.

Rationale

Hypothesis (a) was based on the findings of most research in which no immediate increase in target thoughts was observed for suppressing distressing thoughts (Harvey & Bryant, 1998, 1999; McNally & Ricciardi, 1996; Muris et al., 1992; Purdon & Clark, 2001; Roemer & Borkovec, 1994).

Hypothesis (b) was based on the findings of some prior research (e.g., Salkovskis & Reynolds, 1994; Wegner et al., 1987) which found that the focused-distraction condition led to fewer target thought intrusions than did the non-suppress control condition during the Period 1 (or the suppression period).

Hypothesis (c) was based on Wenzlaff and Bates' (2000) finding that the concentration condition led to fewer unwanted cognitions during the first period as compared to the control condition.

Research Question 4

Is there a postsuppressional rebound effect observed for the suppression, focused-distraction, or concentration condition?

Hypothesis 4

- (a) A postsuppressional rebound effect will be observed in the suppression condition in that subjects in the suppression condition will experience more target thoughts during Period 2 than those in the control condition during the Period 1.
- (b) No postsuppressional rebound effects will be observed in the focused-distraction condition in that subjects in the focused-distraction condition will experience non-significantly different or fewer target thoughts during Period 2 than those in the control condition during the Period 1.

(c) No postsuppressional rebound effect will be observed in the concentration condition in that subjects in the concentration condition will experience non-significantly different or fewer target thoughts during Period 2 than those in the control condition during the Period 1.

Rationale

Hypotheses (a), (b) and (c) are consistent with Liberman and Förster's (2000) motivational explanation of rebound effect, as well as the theory of ironic processes (Wegner, 1994; Wegner & Erber, 1992) which suggests that suppression attempt will induce a need to express the to-be-suppressed construct and initiate an automatic target search even after the suppression attempt ceases. Therefore, the suppression condition was expected to result in a postsuppressional rebound effect, whereas the focused-distraction and concentration conditions were considered less likely to yield this result. However, hypothesis (a) is not a strong prediction since many studies have not found a postsuppressional rebound effect (e.g., Davies & Clark, 1998; Kelly & Kahn, 1994; Purdon & Clark, 2001; Roemer & Borkovec, 1994) with the suppression of negative thoughts. In addition, hypothesis (b) and (c) were also based on the findings of prior research in that a lack of rebound effect has been observed for the focused-distraction condition (e.g., Salkovskis & Campbell, 1994; Salkovskis & Reynolds, 1994; Wegner et al., 1987) and concentration condition (Wenzlaff & Bates, 2000).

Research Question 5

What is the relationship of anxiety levels with the suppression, focused-distraction, and concentration strategies?

Hypothesis 5

- (a) Subjects in the suppression condition will experience higher levels of anxiety during Period 1 than before Period 1.
- (b) The suppression group will experience higher levels of anxiety than the focused-distraction group during Period 1.
- (c) The suppression group will experience higher levels of anxiety than the concentration group during Period 1.

Rationale

Liberman and Förster's (2000) theory states that suppressing a thought may induce a need to express this very thought. Therefore, it can be speculated that during suppression subjects would experience a conflict of need (expression) versus goal (suppression), which probably would induce increased uncomfortable arousal. In addition, Roemer and Borkovec (1994) found that suppressing thoughts produced increased anxiety at the end of the experiment. Based on the above theoretical reasoning and findings of prior research, it was thus predicted that subjects in the suppression condition would experience increased anxiety from pre-Period 1 to Period 1. And also, subjects in the suppression condition would experience higher levels of anxiety than those in the focused-distraction and concentration conditions during Period 1.

Research Question 6

What is the relationship between target thought intrusions and individual-difference factors (i.e., anxiety, perceived distress over thought contents, self-efficacy, prior experiences with thought suppression, and engagement in thought control-related activities)?

Hypothesis 6

- (a) Higher levels of anxiety will be associated with higher rates of target thought intrusions.
- (b) Higher levels of perceived distress over thought contents will be associated with higher rates of target thought intrusions.
- (c) Higher self-efficacy for thought suppression will be associated with fewer target thought intrusions.
- (d) When one's prior experiences with thought suppression were more successful, a greater amount of prior experiences will be associated with fewer target thought intrusions.
- (e) When one's prior experiences with thought suppression were less successful, a greater amount of prior experiences will be associated with more target thought intrusions.
- (f) Higher scores on the White Bear Suppression Inventory (WBSI) will be associated with more target thought intrusions.

Rationale

Hypothesis (a) was based on the anxiety theory (Eysenck, 1992; Eysenck & Calvo, 1992) which suggests that anxiety can tax working memory capacity and thus interfere with cognitive processing. Therefore, it was predicted that when people have higher levels of anxiety, they may not focus well on the experimental tasks and thus may experience a greater number of target-thought intrusions.

Hypothesis (b) was based on research (Davies & Clark, 1998; Harvey & Bryant, 1998, 1999) findings that showed that distressing thoughts intruded more frequently than neutral thoughts when thoughts were elicited by experiment-provided material. Reasoning from this, it was predicted that higher levels of perceived distress over thought

contents would be related to higher rates of target thought intrusions during Periods 1 and 2.

Hypothesis (c) was based on the following reasoning. Higher self-efficacy for certain domain is usually formed based on prior successful experiences with that domain. Therefore, it can be expected that higher self-efficacy for thought suppression might be associated with higher efficiency of thought suppression. Moreover, Rassin et al. (2003) found that subjects who were informed that thought suppression could be achieved reported experiencing fewer thought intrusions about a distressing story than those who were informed that thought suppression was impossible. Hypothesis (c) was thus made in line with this finding.

Hypotheses (d) and (e) are based on the following reasoning. Prior experiences with thought suppression may connote different meanings. If one has a great deal of prior experiences, that could mean that one has developed strategies of thought control or imply the opposite, that one may encounter more difficulties in controlling their thoughts and thus they need to suppress their thoughts more frequently than others. Therefore, the relationship between unwanted thought intrusions and amount of prior experiences may be conditioned upon how successful one's prior experiences of thought suppression have been. Based on this, it was predicted that when prior experiences with thought suppression were more successful, more prior experiences would be associated with fewer intrusions of target thoughts. When prior experiences were less successful, the reverse relationship would be observed.

Hypothesis (f) was based on previous findings that people with higher scores on the WBSI tended to experience higher levels of obsessive-compulsive symptom, depression, trait anxiety (Hoping & de Jong-Meyer, 2003; Wegner & Zanakos, 1994), and anxiety sensitivity (Wegner & Zanakos, 1994). Therefore, it was predicted that

people obtaining higher scores on the WBSI would tend to experience higher frequency of target thought intrusions.

Finally, it is possible that mental-control training may enhance one's abilities in thought control. However, there are many different thought-control related programs. It is likely that engaging in some thought-control activities would lead to more effective reduction of unwanted thoughts, whereas engaging in other types of activities would not have this effect. However, this is a more exploratory question in this study; therefore, no specific hypothesis was made regarding this issue.

Research Question 7

What are the relationships between suppression attempts, distraction attempts, or concentration attempts and the level of target thought intrusions?

This is a more exploratory question in this study, thus no specific hypotheses were made regarding this issue.

OVERVIEW OF THE DESIGN

The purpose of the present study was to investigate whether the suppression, focused-distraction, and concentration strategies would lead to differential effects on the occurrence of unwanted thoughts. In the study, 100 college students were assigned non-systematically to one of four conditions, including suppression, focused-distraction, concentration, and the control conditions. Subjects were first told to read a distressing story about a car accident (Wenzlaff, Wegner, & Roper, 1988) and then rated their levels of perceived distress toward the story and state-anxiety. During the first period, students in the suppression condition were instructed to suppress thoughts about the traffic-

accident story, whereas those in the focused-distraction condition were instructed to suppress their thoughts through focus on an alternative distraction task. Those in the concentration condition were instructed to simply concentrate on the same alternative task without mention of suppression intentions. The control group was instructed to think about anything they wanted but record the occurrence of the target thoughts. After Period 1, all subjects then rated state-anxiety and completed a word-completion test to implicitly assess the accessibility of target thoughts. During Period 2, subjects in all conditions were told to think about whatever they wanted and record the target thoughts if they arose. After Period 2, subjects rated their anxiety level, completed a word-completion test, and estimated the frequency of target thought intrusions during the first period. The subjects were finally asked to complete rating scales regarding suppression, distraction, or concentration attempts, imagery ability, their prior experience with thought suppression, and self-efficacy for thought suppression, as well as to complete the WBSI.

STUDY DESIGN

Participants

One hundred and four students at the University of Texas participated in this study to fulfill a requirement of the courses they took in the Department of Educational Psychology. The data obtained from four subjects was excluded from the analyses because of failing to follow the instructions (one from the suppression condition, two from the focused-distraction condition, and one from the concentration condition). Finally, the data from 100 students (68 women, 32 men) remained in the data analyses of this study (average age = 21.07, age range = 18 to 47; White: n = 58, Asian American: n = 21, Hispanic: n = 11, African American: n = 5, Multiracial: n = 3, Foreign: n = 2).

Measures and Material

The Revised Six-Item Short-Form of the State Scale of the Spielberger State Anxiety Inventory (The Revised STAI-6). The STAI-6 (see Appendix A) was developed by Marteau and Bekker (1992). This state anxiety scale consists of 6 items selected from STAI representing the three highest anxiety-present and anxiety-absent items. The original rating scale ranged from 1 (not at all) to 4 (very much). To be consistent with other rating scales used in the present study, the scale was changed to 5 points ranging from 1 (not at all) to 5 (extremely). Given that the present study aimed to assess subjects' anxiety levels both at the present moment and during the previous experimental period, the instructions "at this moment" or "right now" were changed to "during the previous six minutes during which you were carrying out the experimental task". The present tense in each item also was changed to the past tense when it was used for measuring previous anxiety levels. The reliability coefficient for this scale was: $\alpha = .82$. The concurrent validity of this scale was satisfactory in that there were no differences between the mean scores of using the full-form STAI and those of using the six-item short-form on three groups (pregnant women, student nurses, and medical students).

Measures of individual-difference factors. A questionnaire was created for this study to measure the individual-difference factors. (a) Perceived distress toward the story: One item measured the levels of perceived distress toward the traffic-accident story. This item read: "Please indicate the degree to which you feel distressed about the traffic-accident story you just read." Subjects responded to this item on a 5-point scale ranging from 1 (not at all distressed) to 5 (extremely distressed). (b) Imagery: Five items assessed subjects' imagery ability. Two measured imagery pertaining to the traffic-accident story: "When you were reading this traffic-accident story, to what extent can you vividly

imagine every detail described in the story?” and “When you were reading this traffic-accident story, to what extent can you vividly imagine yourself in the situations described in the story?” Subjects responded to each item on a 5-point scale ranging from 1 (not at all) to 5 (very much). Another two items assessed imagery ability with respect to reading novels and stories: “I can easily visualize the figures and images described in novels or stories when I am reading.” and “I can vividly imagine the details described in novels or stories.” One item assessed the ability to visualize places one has been to: “I can vividly form mental pictures of the familiar places I have been to.” Responses to the latter three items ranged from 1 (not at all true of me) to 5 (very true of me). (c) Amount of experience: Two items assessed the amount of prior experience with thought suppression. One item was “In daily life (before participating in this experiment), do you have experiences of trying not to think of an unwanted thought?” Responses ranged from 1 (no experience at all) to 5 (an extreme amount of experience). The other item was “How often do you use this strategy (of trying not to think of a thought) to deal with unwanted thoughts in your life?” Responses ranged from 1 (never) 5 (every time). (d) Degree of prior success with thought suppression: One item assessed the degree of success in prior thought suppression experiences: “Based on your prior experience (before participating in this experiment), how good were you at stopping a thought by trying not to think of it?” Subjects indicated their ratings on a 5-point scale ranging from 1 (not at all successful) to 5 (extremely successful). (e) Self-efficacy: One item assessed the level of self-efficacy for thought suppression: “How successfully do you think that you can stop thinking about a thought (by trying not to think of it) if you need to do so in daily life?” Subjects responded to this item on a 5-point scale ranging from 1 (not at all successfully) to 5 (extremely successful). (f) Engagement in thought control activities. Two items elicited information about engagement in thought control-related activities: “Have you engaged

in any activities, training, or workshops (e.g., meditation, Yoga...etc) that may influence your ability to control your thoughts?" (yes, no) "If yes, what are those activities and how long have you engaged in these activities? Please specify:" (see Appendix B)

The word-completion test. In order to implicitly measure the accessibility of target thoughts (i.e., thoughts about the traffic-accident story) in the manner that would be unlikely to disclose the purpose of this study while at the same time supplementing the data obtained from counter-pressing and retrospective-estimations, two alternative forms of the word-completion test (see Appendix C) were developed for this study . Each form of the test contained 22 word-stems, and 12 of them could be completed with words either related to or not related to the main content of the traffic-accident story. The items in this test were selected from a pilot study in that word-completion items were given to students who either had read or had not read the traffic-accident story, and the target word-stems were eliminated or replaced if the words completed were shown unable to distinguish those who had read from those had not read the story. In the present study, half of the subjects in each condition were given Form 1 of the word-completion test after Period 1 and then given Form 2 after Period 2, whereas the other half of subjects were given the tests in the reverse order.

Measures of thought intrusion frequency and accuracy of thought-recording. Four items were developed for this study to measure the number of target thoughts occurring during the first period. The item for the suppression condition was "Please estimate as accurately as possible how many times thoughts about the traffic-accident story came to your mind in the first six minutes during which you were trying to not think of the traffic-accident story." The item for the focused-distraction condition was "Please estimate as accurately as possible how many times thoughts about the traffic-accident story came to your mind in the first six minutes during which you were trying to not think

of the traffic-accident story by focusing on thinking about and describing the kitchen where you grew up.” The item for the concentration condition was “Please estimate as accurately as possible how many times thoughts about the traffic-accident story came to your mind in the first six minutes during which you were trying to concentrate on thinking about and describing the kitchen where you grew up.” The item for the control condition was “Please estimate as accurately as possible how many times thoughts about the traffic-accident story came to your mind in the first six minutes during which you were free to think about anything.” One item was created for this study to assess the degree of accuracy of thought-recording. This item was: “Please indicate the extent to which you have pressed the counter each time to record the thoughts about the traffic-accident story when they arose.” Subjects indicated their ratings on a 5-point scale ranging from 1 (not at all) to 5 (every time) (see Appendix D).

Measures of suppression/distraction/concentration attempts. Seven items were developed for this study to assess suppression, distraction or concentration attempts. Two items assessed the attempt to suppress target thoughts during the first period. The one given to the suppression group was: “In the first six minutes (the period of avoiding thought about the story), to what extent have you tried to not think about the traffic-accident story?” The one given to the control condition was: “In the first six minutes (you were told to think about whatever you wanted in that period), to what extent have you tried to not think about the traffic-accident story?” One item was designed to assess the attempt to suppress target thoughts during the second period, and this item was administered to all four conditions. This item was “In the second six minutes (you were told to think about whatever you wanted in that period), to what extent have you tried to not think about the traffic-accident story?” Two items designed for the suppression condition assessed the attempt to think about alternative thoughts: “In the first six

minutes (the period of avoiding thoughts about the story), to what extent have you tried to focus your attention on alternative thoughts or objects in order to not think about the traffic-accident story?” and “In the second six minutes (you were told to think about whatever you wanted in that period), to what extent have you tried to focus your attention on alternative thoughts or objects in order to not think about the traffic-accident story?” One item designed for the focused-distraction condition assessed the attempt to focus on the distraction task: “In the first six minutes, to what extent have you tried to not think about the traffic-accident story by focusing on thinking about and describing the kitchen where you grew up?” One item designed for the concentration condition assessed the attempt to concentrate on the given task: “In the first six minutes, to what extent have you tried to concentrate on thinking about and describing the kitchen where you grew up?” For all of these items, subjects indicated their responses on a 5-point scale ranging from 1 (not at all) to 5 (extremely hard—with great effort) (see Appendix D).

The White Bear Suppression Inventory (WBSI). The WBSI, developed by Wegner and Zanakos (1994), was designed to measure the tendency to suppress unwanted thoughts. Although this inventory was designed to measure a single construct and Wegner and Zanakos (1994) did find a single factor for these items with factor analysis, Höping and de Jong-Meyer (2003) found two factors, which they named “Unwanted Intrusive Thoughts” and “Thought Suppression” (see Table 1), for items of the German version of the WBSI. This self-report measure contains 15 items; responses are indicated on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). This measure demonstrated acceptable temporal stability ($r = .69$ for three weeks to three months; $r = .92$ for one week). Wegner and Zanakos (1994) found a positive correlation between this measure and obsessive-compulsive behaviors, depression, trait anxiety and anxiety sensitivity. However, Höping and de Jong-Meyer (2003) found that the

“unwanted intrusive thoughts” factor correlated moderately to strongly with depression, trait anxiety, obsessive-compulsive behaviors, and vigilance, but that the “thought suppression” factor correlated only with depression, and not very substantially ($r = .15$, $p < .05$).

Table 1
Two-Factor Solutions for the German Version of the White Bear Suppression Inventory

Factor 1: “Unwanted Intrusive Thoughts”

4. There are images that come to mind that I cannot erase.
3. I have thoughts that I cannot stop.
5. My thoughts frequently return to one idea.
9. There are thoughts that keep jumping into my head.
6. I wish I could stop thinking of certain things.
2. Sometimes I wonder why I have the thoughts I do.
7. Sometimes my mind races so fast I wish I could stop it.
12. Sometimes I really wish I could stop thinking.
15. There are many thoughts that I have that I don't tell anyone.

Factor 2: “Thought Suppression”

11. There are things that I try not to think about.
14. I have thoughts that I try to avoid.
1. There are things I prefer not to think about.
8. I always try to put problems out of mind.
13. I often do things to distract myself from my thoughts.
10. Sometimes I stay busy just to keep thoughts from intruding on my mind.

Source: From “Differentiating unwanted intrusive thoughts from thought suppression: what does the White Bear Suppression Inventory measure?” by W. Höping & R. de Jong-Meyer, *Personality and Individual Differences*, 34, 1049-1055.

Procedure

Upon arrival, the subject was asked to participate in a study that investigated “how people think in simulated daily situations.” One or two subjects would participate in this study at a time. If two subjects participated in the study in the same time period, they still carried out all of the experimental tasks individually in separate rooms except receiving some of the instructions together. The experiment was conducted in quiet,

windowless small rooms in which subjects were seated in front of a table to carry out the experimental tasks.

Generating target thoughts. The experimenter played the pre-recorded instructions for reading a story. This instruction was adapted from that used in Wenzlaff et al.'s (1988) study. In the present study, instructions for reading a story, Period 1 instructions and Period 2 instructions were given by playing a pre-recorded audiotape as well as providing a paper version for subjects to read. Instructions for reading a story were:

Your next task is to read a life-event description. When you are reading this story, please try to vividly imagine every detail and event in the situation described as if you are encountering those events yourself. There is no time limit for reading this story and it's important that you not skip any sentence in this description. Now, please immerse yourself in the story. Any questions?

The life-event description that students were asked to read was taken from Wenzlaff et al. (1988, p. 884). The story described a scenario in which the main character in the story caused a fatal traffic accident when he is driving a car to an important job interview (see Appendix E).

After finishing reading the story, the subject were asked to rate the degree of distress they felt about this story and how well they could imagine the details of the story. After that, the subject then rated his/her anxiety levels at that moment. Next, the Period 1 instructions were given.

Period 1—Thought suppression tasks. Instructions for the suppression condition (Wenzlaff et al., 1988) were: "In the next six minutes, please try not to think about the traffic-accident story you just read. Make an effort to keep the story out of your mind. Any questions?"

Instructions for the focused-distraction condition were:

In the next six minutes, please try not to think about the traffic-accident story you just read. Make an effort to keep the story out of your mind. In order to do so, please first close your eyes, and try to form a vivid mental picture of the kitchen where you grew up. Carefully notice the qualities of every object in it, and fill your mind with the details of the kitchen. Try to form the images in enough detail so that you could be able to describe it. When you have formed a vivid mental picture of the kitchen, write down what is in your mind about it. So, what you need to do is that, do not think about the traffic accident story. Rather, form the mental picture of the kitchen where you grew up in enough detail and write down the description of it. Okay? Any questions?

Instructions for the concentration condition were:

In the next six minutes, please try to form a vivid mental picture of the kitchen where you grew up. First, please close your eyes. Carefully notice the qualities of every object in it, and fill your mind with the details of the kitchen. Try to form the images in enough detail so that you could be able to describe it. When you have formed a vivid mental picture of the kitchen, write down what is in your mind about it. So, what you need to do is that, form the mental picture of the kitchen where you grew up in enough detail and write down the description of it. Okay? Any questions?

Instructions for the control condition (Davies & Clark, 1998; McNally & Ricciardi, 1996) were:

In the next six minutes, you can think of absolutely anything you want, with no restrictions. All I want you to do is that, every time a thought or image about the story you just read comes to mind, no matter how vague or fleeting, please record it by pressing the counter. Any questions?

Note that except for the control group, the three experimental groups (suppression, focused-distraction, and concentration) did not record the occurrence of target thoughts during Period 1. One of the reasons for this arrangement was to ensure

that the validity of each thought control manipulation, particularly the concentration manipulation, would not be compromised by the interference of recording thoughts by pressing a counter. The other reason was to make the assessment of the rebound effect more appropriate (the rebound effect was evaluated by comparing the second period for each experimental group with the first period for the control group) since the experimental groups were asked to record target thoughts by pressing a counter during the second period, it thus should have the control group also record target thoughts during the first period.

After listening to the instructions, subjects in the control condition were taught how to use the counter to record the occurrence of target thoughts. Then Period 1 started. The counter was placed in a chair beside the subjects (at their dominant hand side) to reduce the possibility that they would always see it, while still keeping it within reach. Also, subjects were reminded of not to keep holding the counter in their hands so that cues originating from the sensations of holding a counter might be reduced. The screen of the counter showing the accumulated frequency was shielded so that it would not provide a cue for subjects regarding how many times target thoughts had occurred.

After Period 1. After six minutes, the experimenter reentered and subjects were asked to rate their anxiety level at that moment and during Period 1. Then subjects completed the word-completion test to assess the accessibility of target thoughts.

Period 2—Free Thinking. All subjects were instructed to think about whatever they wanted during Period 2. The instruction was identical to what the control group received for Period 1. Subjects in the experimental conditions were then taught how to use the counter to record the occurrence of target thoughts. Following this, the experimenter then left and Period 2 started.

After Period 2. After six minutes, subjects were asked to rate their anxiety levels during Period 2, and then completed the word-completion test again. After finishing the test, subjects completed a questionnaire that asked them to estimate the frequency of target-thought intrusions for Period 1 and to make ratings on the accuracy of the thought-recording, the suppression, distraction or concentration attempts, their imagery ability, prior experience and self-efficacy for thought suppression, as well as to indicate what thought control-related activities they had engaged in. The questionnaire also included some filler items (see Appendix B) to reduce the possibility that subjects' answers might be influenced by their previous performance during Period 1 or Period 2. Finally, the WBSI was administered. After completing all the ratings, subjects were thanked for their participation and debriefed. A summary of the procedure is shown in the flowchart on the next page.

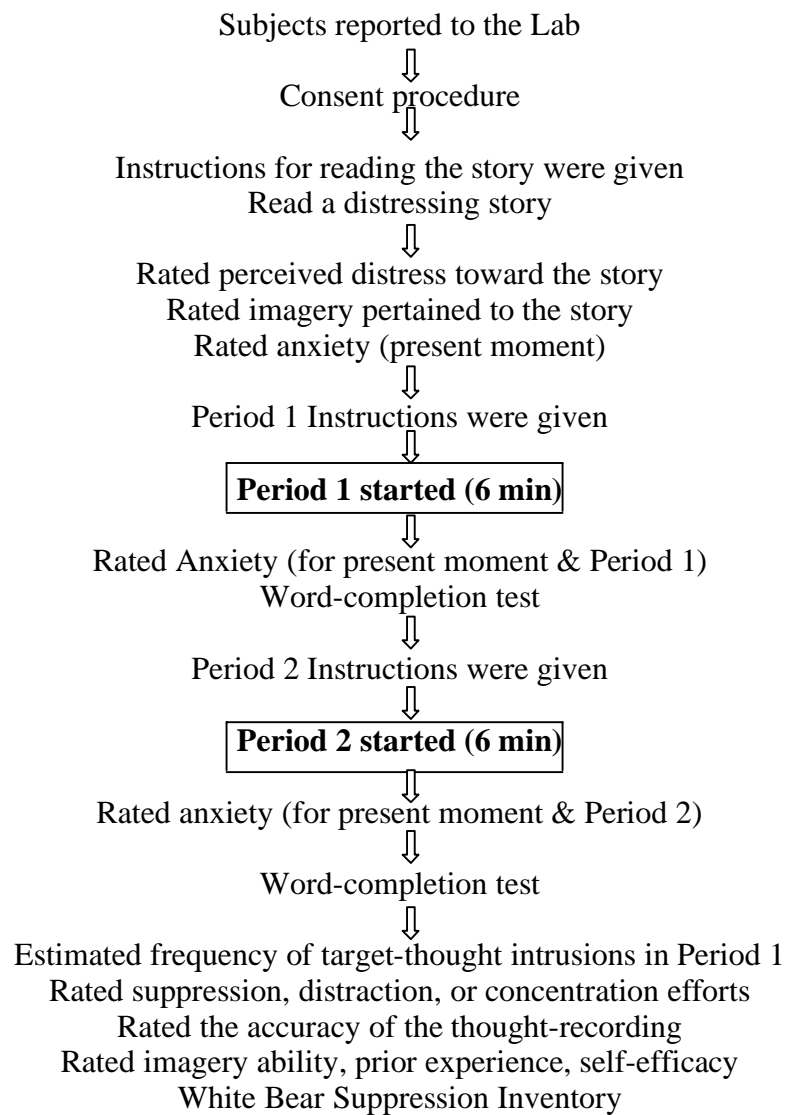


Figure 1. Summary of the study procedure.

DATA ANALYSIS

Hypothesis 1

- (a) The suppression strategy will lead to more intrusions of the target thoughts during Period 1 than the focused-distraction strategy.
- (b) The suppression strategy would lead to more intrusions of the target thoughts during Period 1 than the concentration strategy.
- (c) The focused-distraction strategy would lead to more intrusions of the target thoughts during Period 1 than the concentration strategy.

Hypothesis (a), (b), and (c) were tested with planned comparisons by using the “Contrast” function in SPSS. The alpha value was set at .05 to indicate significance.

Hypothesis 2

- (a) The suppression strategy will lead to more intrusions of the target thoughts during Period 2 than the focused-distraction strategy.
- (b) The suppression strategy will lead to more intrusions of the target thoughts during Period 2 than the concentration strategy.
- (c) The focused-distraction strategy will lead to more intrusions of the target thoughts during Period 2 than the concentration strategy.

Hypothesis (a), (b), and (c) were tested with planned comparisons. The alpha value was set at .05 to indicate significance.

Hypothesis 3

- (a) Target-thought intrusions in the suppression condition will be no greater than the non-suppression control condition during Period 1.
- (b) The focused-distraction condition will lead to fewer intrusions of the target thoughts than will the non-suppression control condition during Period 1.
- (c) The concentration condition will lead to fewer intrusions of the target thoughts than will the non-suppression control condition during Period 1.

Hypothesis (a), (b), and (c) were tested with planned comparisons. The alpha value was set at .05 to indicate significance.

Hypothesis 4

- (a) A postsuppressional rebound effect will be observed in the suppression condition in that subjects in the suppression condition will experience more target thoughts during Period 2 than those in the control condition during Period 1.
- (b) No postsuppressional rebound effects will be observed in the focused-distraction condition in that subjects in the distraction condition will experience non-significantly different or fewer target thoughts during Period 2 than those in the control condition during Period 1.
- (c) No postsuppressional rebound effect will be observed in the concentration condition in that subjects in the concentration condition will experience non-significantly different or fewer target thoughts during Period 2 than those in the control condition during Period 1.

Hypothesis (a), (b), and (c) were tested with planned comparisons. The alpha value was set at .05 to indicate significance.

Hypothesis 5

- (a) Subjects in the suppression condition will experience higher levels of anxiety during Period 1 than before Period 1.
- (b) The suppression group will experience higher levels of anxiety than the focused-distraction group during Period 1.
- (c) The suppression group will experience higher levels of anxiety than the concentration groups during Period 1.

A Paired t-test was performed to test hypothesis (a).

One-way ANOVA to test hypothesis (b) and (c). An overall significant F was followed by Tukey's honestly significant difference (HSD) tests. In addition, one-way analysis of covariance (ANCOVA) was performed to test hypothesis (b) and (c) to control anxiety levels experienced prior to Period 1 as a covariate. The alpha value was set at .05 to indicate significance.

Hypothesis 6

- (a) Higher levels of anxiety will be associated with higher rates of target-thought intrusions.
- (b) Higher levels of perceived distress over thought contents will be related to higher rates of target-thought intrusions.
- (c) Higher self-efficacy for thought suppression will be associated with fewer target-thought intrusions.
- (d) When one's prior experiences with thought suppression were more successful, a greater amount of prior experiences will be associated with fewer target thought intrusions.

(e) When one's prior experiences with thought suppression were less successful, a greater amount of prior experiences will be associated with more target thought intrusions.

(f) Higher scores on the WBSI will be associated with more target thought intrusions.

Pearson correlation coefficients were performed to test hypothesis (a), (b), (c), (d), (e), and (f). The alpha value was set at .05 to evaluate whether the correlation is significantly different from 0.

A t-test was conducted to answer the question about whether engaging in thought control-related activities would enhance one's ability to control unwanted thoughts. The alpha value was set at .05 to indicate significance.

Research Question 7

What are the relationships between the suppression attempts, distraction attempts, or concentration attempts and the level of target thought intrusions?

Pearson correlation coefficients were performed to answer this research question. The alpha value was set at .05 to evaluate whether the correlation is significantly different from 0.

Chapter 4 Results

This chapter presents the results of the present study. It begins with the results of the preliminary analyses. This section includes the results for the rated accuracy of thought-recording of the four thought-control conditions, a comparison of the two alternative forms of the word-completion test, and a check for differences in imagery ability among the four conditions. The second section presents the results regarding the occurrence of target thought intrusions for four thought-control conditions. This section includes a comparison of the occurrence of target thought intrusions among the four conditions, an evaluation of the rebound effect, and a comparison of target thought intrusions between periods for each condition. The third section presents the results of comparison of anxiety ratings among the four conditions and between periods. The fourth section presents the results of analyses of the relationships between individual-difference factors and intrusions of target thoughts. These individual-difference factors include anxiety levels, perceived distress toward the traffic-accident story, self-efficacy for thought suppression, prior experience with thought suppression, suppression tendency, and engagement with thought-control related activities. The last section presents the results of analyses of the relationships between the reported suppression/distraction/concentration attempts and the occurrence of target thought intrusions.

PRELIMINARY ANALYSES

Ratings for Accuracy of Thought-Recording

An item asked subjects to rate on a 5-point scale to what extent they had pressed the counter each time when thoughts about the traffic-accident stories came to mind. As seen in Table 1, the majority of subjects (64% of subjects in the suppression condition, 75% in the focused-distraction condition, 56% in the concentration condition, and 61% in the control condition) indicated that they had pressed the counter most of the time or every time when target thoughts came to mind. Also, one-way analysis of variance (ANOVA) showed that there was no significant difference for the mean ratings of accuracy of thought-recording among the four conditions, $F(3,96) = .670, p = .573$ (see Table 2 for means and standard deviations).

Table 2
Ratings for Accuracy of Thought-Recording for the Four Conditions

Condition	M (SD)	Rated 4 and above		Rated 3 and above	
		% of subjects	% of subjects	% of subjects	% of subjects
Suppression	3.60 (1.29)	64%	74.0%		
Focused-Distraction	3.96 (1.20)	75%	83.3%		
Concentration	3.52 (1.08)	56%	76.0%		
Control	3.69 (1.01)	61%	84.6%		

Note. Ratings of 3, 4 and 5 correspond to “sometimes”, “most of time” and “every time” respectively.

A Comparison of Two Forms of the Word-Completion Test

As mentioned previously, there are two forms of the word-completion test and these two forms were counterbalanced for order of presentation. A *t*-test was conducted to test the differences between the scores on Form 1 and Form 2. Results indicated that

the mean scores on Form 1 and Form 2 did not differ significantly either at Time 1, $t(98) = .62, p = .535$, or Time 2, $t(98) = -1.03, p = .304$ (see Table 3 for means and deviations). This suggests that the word stems used in one form did not differ significantly from those in the other form in terms of the number of target words induced.

Table 3
Scores on the Two Forms of the Word-Completion Test at Time 1 and Time 2

		Time 1 (after Period 1)	Time 2 (after Period 2)
Form		M (SD)	M (SD)
Form 1	n=50	3.42 (1.99)	3.00 (1.54)
Form 2	n=50	3.20 (1.51)	3.30 (1.36)

Imagery Ability Among the Four Conditions

Due to the concern that one's imagery ability might influence how one would perceive the content of the story they read or the extent to which one can form a mental picture of the kitchen where one grew up (the focused-distraction and concentration task), one-way ANOVA was performed to examine whether subjects in the four conditions differed on imagery abilities. The results revealed no overall significant difference on the imagery measures pertaining to the traffic-accident story, $F(3,96) = .27, p = .845$, to reading novels/stories, $F(3,96) = .11, p = .952$, to visualizing a place one has visited, $F(3,96) = .248, p = .863$, among the four conditions (see Table 4 for means and standard deviations). This suggests that subjects in the four conditions did not differ significantly on imagery ability.

Table 4
Mean Ratings on Imagery for Each Condition

		Imagery ^a (The traffic story)	Imagery ^b (Stories in general)	Imagery ^c (Places)
Condition		M (SD)	M (SD)	M (SD)
Suppression	n = 25	7.96 (1.49)	15.48 (2.50)	4.24 (.78)
Focused-Distraction	n = 24	7.92 (1.82)	15.42 (3.09)	4.08 (.72)
Concentration	n = 25	7.60 (1.89)	15.32 (2.50)	4.08 (.70)
Control	n = 26	7.73 (1.12)	15.08 (2.54)	4.08 (.98)

- a. This imagery score is the sum of two items that asked subjects to rate the extent to which they could imagine the details of and themselves in the traffic-accident story. Subjects indicated the ratings immediately after reading the traffic-accident story.
- b. This imagery score is the sum of four items. These four items include two items that measured imagery of the traffic-accident story (the same items as mentioned above) and two items that measured general imagery ability when reading novels or stories. The latter two items were administered at the end of the experiment.
- c. This score represents the degree to which one could visualize familiar places they have been to. One item assessed this ability and was administered at the end of the experiment.

TARGET THOUGHT OCCURRENCE

A Comparison of Four Conditions in Period 1

The frequency of target thought intrusions. Planned comparisons were performed to compare the number of target thoughts reported for Period 1 among the suppression, focused-distraction, concentration, and control conditions (note that the data analyzed here were obtained from subjects' retrospective estimations). Consistent with the hypotheses, the results showed that subjects in the suppression condition reported more target thoughts than those in the focused-distraction condition, $t(40.10) = 2.67, p = .011$, and the concentration condition, $t(29.46) = 4.50, p < .001$. Subjects in the focused-distraction condition in turn reported more target thoughts than those in the concentration condition, $t(35.56) = 2.25, p = .031$ (see Table 5 for means and deviations).

Also in line with predictions, the results indicated that the focused-distraction group and the concentration group reported significantly fewer target thought intrusions

during Period 1 than did the control group (focused-distraction vs. control, $t(42.44) = -3.461$, $p = .001$; concentration vs. control, $t(31.13) = -5.467$, $p < .001$), and there was no significant difference found between the suppression group and the control group, $t(48.82) = -.592$, $p = .557$. Since the Levene test indicated that homogeneity of variances was not achieved, the data were reanalyzed after having performed square root transformations on the frequency of target thought intrusions. But still, these patterns remained the same.

Table 5
Means of Frequency of Target Thoughts By Condition and Period

Condition		Period 1 M (SD)	Period 2 M (SD)
Suppression	n = 25	6.68 (5.58) ^e	5.36 (4.22) ^c
Focused-Distraction	n = 24	3.17 (3.43) ^e	5.21 (2.64) ^c
Concentration	n = 25	1.38 (1.89) ^e	5.37 (3.68) ^{**}
Control	n = 26	7.60 (5.47) ^e 7.38 (4.25) ^c	5.65 (3.31) ^c

* An outlier (with 3.93 SD above the mean = 6.26) found in the Period 2 of the concentration condition was excluded from the analyses. Therefore, only 24 subjects remained in the analysis regarding the concentration condition in Period 2.

c. This number (the number of target thoughts) was generated from pressing a counter.

e. The number of target thoughts was generated from subjects' retrospective estimations.

Moreover, these results were not changed when the data (frequency of target thought intrusions in Period 1) obtained from retrospective estimations for the control group was replaced with the data derived from counter-pressing (suppression vs. control, $t(44.87) = -.506$, $p = .615$; focused-distraction vs. control, $t(47.17) = -3.876$, $p < .001$; concentration vs. control, $t(34.84) = -6.555$, $p < .001$). Since the results indicated a high correlation between the data derived from counter-pressings and that from retrospective estimations for the control group ($r = .810$, $p < .001$) as well as no significant difference between the means of target thought frequency generated from these two methods, $t(25) = -.336$, $p = .739$ (counter-pressings: $M = 7.38$, $SD = 4.25$; retrospective estimations: $M =$

7.60, $SD = 5.47$), to keep the type of data (i.e., from retrospective estimations) consistent across all conditions, the following analyses involving the control groups' target thought frequencies for Period 1 will refer to results derived from retrospective estimation data unless otherwise indicated.

The word-completion test. Planned comparisons were performed to compare the number of accident story-related words completed on the word-completion test at Time 1 (i.e., administered right after Period 1) among four conditions. The results revealed no significant differences in the comparison of any two of the four conditions (suppression vs. focused-distraction: $t(96) = 1.505$, $p = .136$; suppression vs. concentration: $t(96) = 1.444$, $p = .152$; focused-distraction vs. concentration: $t(96) = -.076$, $p = .940$; suppression vs. control: $t(96) = .997$, $p = .321$; focused-distraction vs. control: $t(96) = -.533$, $p = .595$; concentration vs. control: $t(96) = -.461$, $p = .646$) (see Table 6 for means and standard deviations).

Table 6
Scores on the Word-Completion Test for Each Condition at Time 1 and Time 2

Condition		Time 1 M (SD)	Time 2 M (SD)
Suppression	n = 25	3.80 (1.89)	3.44 (1.50)
Focused-Distraction	n = 24	3.04 (1.85)	3.67 (1.60)
Concentration	n = 25	3.08 (1.38)	2.96 (1.10)
Control	n = 26	3.31 (1.87)	2.58 (1.39)

A Comparison of Four Conditions in Period 2

The frequency of target thought intrusions. An outlier (which was 3.93 standard deviations above the mean of the concentration condition in Period 2, $M = 6.26$) found in the concentration condition was excluded from the analyses. Planned comparisons were performed to compare the number of target thoughts as measured by

counter-pressings for Period 2 among the four thought-control conditions. No significant differences were found in any pairwise comparison (suppression vs. focused-distraction: $t(95) = .151, p = .880$; suppression vs. concentration: $t(95) = -.015, p = .988$; focused-distraction vs. concentration: $t(96) = -.164, p = .870$; suppression vs. control: $t(95) = -.299, p = .766$; focused-distraction vs. control: $t(95) = -.448, p = .655$; concentration vs. control: $t(95) = -.280, p = .780$) (see Table 5 for means and deviations). Therefore, inconsistent with the hypotheses, the results showed that subjects in four conditions did not report significantly different levels of target thought intrusions for the subsequent free-thinking period.

The word-completion test. Planned comparisons were performed to test whether subjects in the four conditions differed in their scores on the word completion test at Time 2 (i.e., administered right after Period 2). No significant differences were found among the suppression, focused-distraction, and concentration conditions (suppression vs. focused-distraction: $t(96) = -.563, p = .575$; suppression vs. concentration, $t(96) = 1.204, p = .232$; focused-distraction vs. concentration: $t(96) = 1.75, p = .083$) (see Table 6 for means and deviations).

However, the results indicated that subjects in the suppression condition and focused-distraction condition completed significantly more accident story-related words than those in the control condition after Period 2 (suppression vs. control, $t(96) = 2.186, p = .031$; focused-distraction vs. control, $t(96) = 2.731, p = .008$), while no significant difference was observed between the concentration and control conditions, $t(96) = .970, p = .334$.

The Rebound Effect

The frequency of target thought intrusions. To investigate whether a rebound effect was experienced in any one of the experimental conditions, planned comparisons were performed to compare the target thought frequency (obtained from counter-pressings) in Period 2 for each experimental condition with that in Period 1 for the control condition (as shown in Table 7). The results indicated no rebound effects for any experimental condition (see Table 5 for means and standard deviations). Specifically, the data showed that subjects in the focused-distraction condition reported significantly fewer intrusions of target thoughts in Period 2 than did the control condition in Period 1, focused-distraction vs. control, $t(95) = -2.04, p=.044$. The same pattern was observed for the suppression, $t(95) = -1.92, p=.058$, and concentration conditions, $t(95) = -1.89, p=.063$, but only reached marginal significance.

Table 7
The Way of Evaluating the Rebound Effect

Condition	Period 1 task (6min)	Period 2 task (6min)
Suppression	Suppression	Free-thinking
Focused-Distraction	Distraction	Free-thinking
Concentration	Concentration	Free-thinking
Control	Free-thinking	Free-thinking

The word-completion test. Planned comparisons were performed to test whether the rebound effect was evident in any experimental condition for the word-completion measure. The results revealed no significant difference in any comparison of an experimental condition at Time 2 and the control condition at Time 1 (suppression vs. control: $t(96) = .305, p = .761$; focused-distraction vs. control: $t(96) = .819, p = .415$; concentration vs. control: $t(96) = -.802, p = .425$). Therefore, consistent with the result

from counter-pressing data, no rebound effects were found for the suppression, focused-distraction, or the concentration condition (see Table 6 for means and standard deviations).

Between Periods

The frequency of target thoughts. Paired t-tests were conducted to compare the number of target thought intrusions between Period 1 and Period 2 for each condition. The results showed that subjects in the distraction condition and concentration condition reported significantly more target thought intrusions for Period 2 than for Period 1 (focused-distraction: $t(23) = -3.153, p = .004$; concentration: $t(23) = -5.253, p < .001$). In contrast, subjects in the control condition (the thought frequency data were obtained from counter-pressings) reported significantly more target thought intrusions for Period 1 than for Period 2, $t(25) = 2.967, p = .007$ (see Table 5 for means and standard deviations). The pattern remained the same when the counter-pressing data for Period 1 for the control condition were replaced with retrospective estimation data, $t(25) = 2.135, p = .043$. For the suppression condition, however, no significant change was found between Period 1 and Period 2, $t(24) = 1.371, p = .183$. Although the four conditions showed different patterns of changes between periods, this may reflect the fact that subjects in the four conditions experienced a similar rate of target thought intrusions in Period 2, during which they were free to think about anything.

The word-completion tests. Paired t-tests were performed to compare the scores of the word-completion tests at Time 1 (after Period 1) and Time 2 (after Period 2). The results revealed no significant difference between Time 1 and Time 2 for the suppression, $t(24) = .921, p = .366$, focused-distraction, $t(23) = -1.457, p = .159$, and concentration condition, $t(24) = .305, p = .763$. However, the results indicated that the control group

completed significantly fewer target-related words at Time 2 than Time 1, $t(25) = 2.309$, $p = .030$, which is consistent with the results of the thought frequency data.

ANXIETY RATINGS

Anxiety Among the Four Conditions

One-way ANOVA was conducted to compare pre-Period 1 anxiety ratings among the suppression, focused-distraction, concentration, and control conditions. The results revealed a marginally significant difference among conditions, $F(3,96) = 2.601$, $p = .056$ (see Table 8 for means and standard deviations). Post hoc Tukey's honestly significant difference (HSD) tests showed that subjects in the suppression condition indicated higher ratings on anxiety than those in the concentration condition ($p = .044$).

For anxiety ratings reported for Period 1, one-way ANOVA revealed an overall significance among conditions, $F(3,96) = 6.422$, $p = .001$. Post hoc HSD tests showed that subjects in the suppression condition indicated higher ratings on anxiety than those in the concentration condition ($p = .040$), and also tended to report more anxiety than those in the focused-distraction condition ($p = .062$, marginally significant). In addition, subjects in the control condition reported more anxiety than those in the focused-distraction condition ($p = .006$) and concentration condition ($p = .003$). However, no significant differences were found between the focused-distraction and concentration condition ($p = .999$), or between the suppression and the control condition ($p = .841$). Since four conditions differ marginally significantly in anxiety ratings for pre-Period 1, one-way ANCOVA was performed to control for the pre-Period 1 anxiety levels among conditions. The results revealed an overall significant difference among conditions,

$F(3,95) = 4.83, p = .004$. The pairwise comparisons showed that subjects in the suppression condition indicated higher ratings of anxiety than those in the focused-distraction condition ($p = .041$) and tended to report higher levels of anxiety than those in the concentration condition ($p = .074$, one-tailed, marginally significant). Consistent with the findings of the planned comparisons, ANCOVA showed that subjects in the focused-distraction and concentration conditions reported lower levels of anxiety than those in the control condition (focused-distraction vs. control, $p = .001$; concentration vs. control, $p = .005$). Also, no differences were found between the focused-distraction and concentration groups ($p = .558$) or between the suppression group and the control group ($p = .167$) (see Table 8 for means adjusted by controlling for pre-Period 1 anxiety levels).

For Period 2, one-way ANOVA revealed no overall significant difference in anxiety among conditions, $F(3,95) = .685, p = .564$. The same results were obtained when one-way ANCOVA was conducted to control for anxiety levels experienced before Period 1, $F(3,94) = .821, p = .485$. This corresponds to the pattern we observed in the comparison of the frequency of target thoughts in Period 2 among four conditions.

Table 8
Anxiety Ratings for Each Condition and Period

Condition	Before Period	Period 1	Period 1	Period 2	Period 2
	1				
	M (SD)	M (SD)	Adjusted M*	M (SD)	Adjusted M*
Suppression	17.40 (5.07)	14.40 (4.28)	13.65	12.48 (4.70)	11.74
Focused-Distraction	15.46 (5.19)	11.33 (3.93)	11.48	13.42 (4.90)	13.58
Concentration	13.76 (4.25)	11.16 (4.28)	12.10	11.63 (4.92)	12.57
Control	16.46 (4.79)	15.38 (4.45)	15.07	13.08 (4.16)	12.77

* Means were adjusted by controlling for the anxiety levels experienced before Period 1.

Anxiety Between Periods

Paired t-tests were conducted to compare the anxiety levels between periods for each condition. Inconsistent with the hypothesis, the results showed that subjects in the suppression condition reported higher levels of anxiety for pre-Period 1 than Period 1, $t(24) = 4.575, p < .001$. The same pattern was also found for the focused-distraction, $t(23) = 3.928, p = .001$, and concentration conditions, $t(24) = 2.686, p = .013$. However, the control group did not report significantly more anxiety for pre-period 1 than Period 1, $t(25) = 1.272, p = .215$ (see Table 8 for means and standard deviations).

In the comparison of anxiety levels between Period 1 and Period 2, paired t-tests showed that subjects in the suppression condition and the control condition reported higher levels of anxiety for Period 1 than for Period 2, (suppression: $t(24) = 2.352, p = .027$; control: $t(25) = 4.492, p < .001$). By contrast, subjects in the focused-distraction condition tended to report higher levels of anxiety for Period 2 than for Period 1, $t(23) = -1.995, p = .058$. However, no significant difference was found for anxiety experienced between Period 1 and Period 2 for the concentration condition, $t(23) = -.267, p = .791$.

INDIVIDUAL-DIFFERENCE FACTORS AND TARGET-THOUGHT INTRUSIONS

Anxiety

The relationship between anxiety levels and target thought occurrence was investigated with Pearson correlation coefficients. As shown in Table 9, the anxiety ratings for pre-Period 1, Period 1, and Period 2 correlate positively with the number of target thoughts in Period 1 (pre-P1 anxiety, $r = .401, p < .001$; P1 anxiety, $r = .443, p < .001$; P2 anxiety, $r = .333, p = .001$) and Period 2 (pre-P1 anxiety, $r = .303, p = .002$; P1

anxiety, $r = .254, p = .011$; P2 anxiety, $r = .404, p < .001$) for all conditions combined ($N = 100$). In addition, the anxiety ratings for pre-Period 1 were found to correlate significantly with the scores on the word-completion test at Time 1 ($r = .295, p = .003$) and correlate marginally significantly with the word-completion scores at Time 2 ($r = .190, p = .058$).

The relationship between anxiety levels and target thought occurrence was further explored for each condition. For the suppression condition (see Table 10), the anxiety rating for pre-Period 1 was found to correlate positively with the number of target thoughts during Period 1 ($r = .420, p = .037$) and Period 2 ($r = .431, p = .031$). Also, the anxiety rating for Period 2 was correlated with target thought intrusions during Period 1 ($r = .407, p = .044$) and Period 2 ($r = .505, p = .010$). For the focused-distraction condition (see Table 11), a marginally positive relationship was found between Period 2 anxiety and the number of target thought intrusions during Period 1 ($r = .396, p = .055$). In addition, anxiety ratings for pre-Period 1 were found to correlate positively with the word-completion scores at Time 1 ($r = .572, p = .003$). For the control condition (see Table 13), anxiety ratings for pre-Period 1, Period 1, and Period 2 were found to correlate with the number of target thoughts experienced during Period 1 (pre-P1 anxiety, $r = .491, p = .011$; P1 anxiety, $r = .470, p = .015$; P2 anxiety, $r = .458, p = .019$) and Period 2 (pre-P1 anxiety, $r = .480, p = .013$; P1 anxiety, $r = .501, p = .009$; P2 anxiety, $r = .488, p = .012$). No significant results were found between anxiety ratings and the occurrence of target thoughts for the concentration condition (all $ps > .08$, see Table 12).

Perceived Distress Toward the Story

Pearson correlation coefficients were conducted to explore the relationship between perceived distress toward the traffic-accident story and target thought

occurrences. As Table 9 shows, the distress ratings correlate positively with the number of target thoughts reported for Period 1 ($r = .238, p = .017$) for all conditions combined ($N = 100$). However, no significant relationship was found for between distress ratings and target thought frequency in Period 2, or between distress levels and scores on the word-completion test at Time 1 or Time 2 (all $ps > .10$). In addition, ratings of perceived distress correlated positively with anxiety ratings for pre-Period 1 ($r = .390, p < .001$) and anxiety for Period 1 ($r = .224, p = .025$) for all conditions combined.

The relationship between perceived distress and other variables was further explored for each condition. Pearson correlation coefficients revealed no significant results for the relationship between distress ratings and target thought frequency or between distress ratings and scores on the word-completion tests in that analysis (all $ps > .10$) (see Table 10-13). Nonetheless, a positive relationship was found between perceived distress and pre-Period 1 anxiety ($r = .557, p = .004$) for the concentration condition (see Table 12).

Table 9

Intercorrelations Among Individual-Difference Factors, Target Thought Intrusions, and Word-Completions for All Conditions Combined (N = 100)

	1	2	3	4 ^a	5	6	7	8	9	10	11 ^b	11	12
1. Distress	1.000												
2. Anxiety Before P1	.390 .000	1.000											
3. Anxiety P1	.224 .025	.554 .000	1.000										
4. Anxiety P2 ^a	.101 .320	.481 .000	.438 .000	1.000									
5. Self-Efficacy	.019 .849	-.140 .163	-.080 .431	-.103 .312	1.000								
6. Prior Success	.094 .353	-.185 .066	-.143 .157	-.143 .159	.607 .000	1.000							
7. Amount of Experience	.169 .093	.123 .122	.193 .055	.164 .104	.145 .150	.165 .101	1.000						
8. WBSI ^b	.238 .017	.250 .012	.329 .001	.317 .001	-.015 .881	.075 .460	.526 .000	1.000					
9. Target Thoughts P1 ^c	.282 .004	.418 .000	.468 .000	.351 .000	-.058 .567	-.145 .151	.233 .019	.253 .011	1.000				
10. Target Thoughts P1 ^c	.238 .017	.401 .000	.443 .000	.333 .000	-.094 .350	-.193 .054	.202 .044	.246 .014	.947 .000	1.000			
11. Target Thoughts P2 ^f	.142 .162	.303 .002	.254 .011	.404 .000	-.243 .015	-.206 .041	.146 .150	.104 .306	.456 .000	.419 .000	1.000		
N = 98													
12. Word Completion after P1	.079 .432	.295 .003	.163 .104	.003 .977	-.037 .716	-.176 .081	.033 .747	-.034 .740	.127 .207	.130 .196	.067 .511	1.000	
13. Word Completion after P2	.021 .832	.190 .058	.011 .912	.166 .101	-.125 .214	-.045 .653	.181 .071	.118 .241	.175 .082	.200 .046	.158 .117	.278 .005	1.000

Note. The top and bottom value in each cell correspond with the Pearson correlation coefficient and the *p* value respectively.

a. N = 99 due to the missing data.

b. WBSI represents the White Bear Suppression Inventory.

c. The data on target thought frequency for the control group were obtained from the counter-pressings.

e. The data on target thought frequency for the control group were obtained from subjects' retrospective estimations.

f. N = 99 due to the exclusion of an outlier.

Table 10
Intercorrelations Among Suppression/Distraction Attempts, Individual-Difference Factors and Target Thought Intrusions for the Suppression Condition (n = 25)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Distress	1.000																
2. Anxiety Before P1	.197	1.000															
3. Anxiety P1	.119	.766	1.000														
4. Anxiety P2	.063	.609	.590	1.000													
5. Self-Efficacy	-.083	-.109	-.026	-.234	1.000												
6. Prior Success	.133	-.234	-.250	-.222	.370	1.000											
7. Amount of Experience	.074	.087	.143	.227	-.029	.142	1.000										
8. WBSI ^a	-.047	.286	.338	.590	-.228	-.089	.603	1.000									
9. Accuracy of Thought-Recording	.023	-.115	-.083	.026	-.301	-.196	.140	.185	1.000								
10. Target Thoughts P1	.200	.420	.291	.407	.174	-.345	.327	.166	.077	1.000							
11. Target Thoughts P2	.099	.431	.236	.505	-.147	-.271	.214	.146	.058	.547	1.000						
12. Word Completion after P1	.021	.209	-.041	-.073	-.350	-.249	-.400	.009	-.136	-.140	-.011	1.000					
13. Word Completion after P2	-.188	.359	.185	.193	-.278	-.052	.323	.372	.223	.338	.316	.355	1.000				
14. Attempt To Suppress Target P1 ^b	.090	.269	.128	.405	-.006	.037	.541	.269	.209	.575	.281	-.229	.247	1.000			
15. Attempt to Distract P1 ^c	.083	.326	.159	.433	-.127	-.146	.558	.301	.107	.524	.507	-.179	.192	.817	1.000		
16. Attempt To Suppress Target P2 ^d	.073	.411	.369	.294	.336	.139	.612	.348	.120	.476	.316	-.204	.344	.612	.594	1.000	
17. Attempt to Distract P2 ^e	.296	.485	.280	.308	.047	.087	.327	.221	.171	.559	.418	-.033	.461	.645	.665	.816	1.000

Note. The top and bottom value in each cell correspond with the Pearson correlation coefficient and the *p* value respectively.

- WBSI represents the White Bear Suppression Inventory.
- The extent to which one has tried to not think about the target thoughts (the traffic-accident story) in Period 1.
- The extent to which one has tried to focus on alternative thoughts or objects in order to avoid the target thoughts in Period 1.
- The extent to which one has tried to not think about the target thoughts in Period 2.
- The extent to which one has tried to focus on alternative thoughts or objects in order to avoid the target thoughts in Period 2.

Table 11
Intercorrelations Among Suppression/Distraction Attempts, Individual-Difference Factors, and Target Thought Intrusions for the Focused-Distraction Condition (n = 24)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Distress	1.000														
2. Anxiety Before P1	.214	1.000													
3. Anxiety P1	.204	.391	1.000												
4. Anxiety P2	-.037	.570	.345	1.000											
5. Self-Efficacy	.017	-.022	.018	.007	1.000										
6. Prior Success	-.225	-.298	-.165	-.030	.650	1.000									
7. Amount of Experience	.322	-.053	.103	.244	.116	.266	1.000								
8. WBSI ^a	.027	-.119	.333	.230	-.138	.029	.684	1.000							
9. Accuracy of Thought-Recording	.375	.024	.151	-.049	-.185	-.111	.189	.183	1.000						
10. Target Thoughts P1	-.071	.151	.298	.396	-.184	-.052	.367	.293	-.094	1.000					
11. Target Thoughts P2	.186	.094	.324	.222	-.629	-.352	.390	.408	.333	.477	1.000				
12. Word Completion after P1	.250	.572	.231	.137	-.110	-.342	-.151	-.325	-.117	.170	.096	1.000			
13. Word Completion after P2	-.009	.056	-.023	.267	-.177	.000	.118	.119	.286	.050	.263	.268	1.000		
14. Attempt To Distract P1 ^b	.423	.018	-.092	.138	.243	.285	.588	.283	.459	.070	.035	-.145	.357	1.000	
15. Attempt To Suppress Target P2 ^c	.215	.044	-.024	.084	-.407	-.433	.248	.373	.355	.010	.449	-.014	.157	.365	1.000

Note. The top and bottom value in each cell correspond with the Pearson correlation coefficient and the *p* value respectively.

a. WBSI represents the White Bear Suppression Inventory

b. The extent to which one has tried to not think about the target thoughts by focusing on the distraction task (thinking about and describing the kitchen where they grew up) in Period 1.

c. The extent to which one has tried to not think about the target thoughts in Period 2.

Table 12
Intercorrelations Among Concentration/Suppression Attempts, Individual-Difference Factors, and Target Thought Intrusions for the Concentration Condition (n = 25)

	1	2	3	4 ^a	5	6	7	8	9	10	11 ^c	12	13	14	15	
1. Distress	1.000															
2. Anxiety Before P1	.557 .004	1.000														
3. Anxiety P1	.110 .599	.355 .081	1.000													
4. Anxiety P2 ^a	.107 .620	.283 .179	.132 .538	1.000												
5. Self-Efficacy	.169 .418	-.010 .963	-.168 .422	-.228 .284	1.000											
6. Prior Success	.299 .147	.097 .645	-.184 .380	-.324 .122	.692 .000	1.000										
7. Amount of Experience	-.049 .818	.138 .511	.290 .160	.005 .983	.329 .108	.223 .283	1.000									
8. WBSI ^b	.109 .603	.190 .364	.112 .596	-.007 .974	.200 .337	.183 .381	.620 .001	1.000								
9. Accuracy of Thought-Recording	-.231 .267	-.270 .191	.134 .523	-.361 .083	.135 .518	.120 .567	.507 .010	-.022 .916	1.000							
10. Target Thoughts P1	.214 .304	.035 .868	.013 .952	.085 .693	.095 .651	.109 .605	.119 .571	.164 .434	-.100 .634	1.000						
11. Target Thoughts P2 ^c	.103 .632	.166 .437	.023 .915	.369 .083	.082 .704	.174 .417	-.091 .671	-.117 .587	-.024 .913	.247 .245	1.000					
				n = 23												
12. Word Completion after P1	-.110 .599	.039 .853	.139 .519	-.385 .063	-.032 .881	-.230 .268	.302 .142	.061 .772	.332 .104	-.259 .212	-.111 .605	1.000				
13. Word Completion after P2	.263 .205	.025 .907	-.140 .503	.076 .725	.151 .473	.167 .424	-.067 .751	-.015 .942	.018 .931	.338 .098	-.078 .718	-.245 .238	1.000			
14. Attempt To Focus on Kitchen P1 ^d	-.150 .475	-.019 .927	.077 .716	-.394 .056	.226 .278	.329 .108	.392 .052	-.054 .799	.604 .001	-.105 .618	-.030 .891	.119 .573	.069 .744	1.000		
15. Attempt To Suppress Target P2 ^e	.160 .444	.200 .337	-.234 .260	.108 .615	.241 .245	.348 .088	.208 .318	.125 .552	.079 .706	.001 .995	.380 .067	.082 .696	.123 .558	.343 .094	1.000	

Note. The top and bottom value in each cell correspond with the Pearson correlation coefficient and the *p* value respectively.

a. n = 24 due to the missing data.

b. WBSI represents the White Bear Suppression Inventory

c. n = 24 due to the exclusion of an outlier.

d. The extent to which one has tried to concentrate on thinking about and describing the kitchen where one grew up in Period 1.

e. The extent to which one has tried to not think about the target thoughts in Period 2.

Table 13

Intercorrelations Among Suppression Attempts, Individual-Difference Factors, and Target Thought Intrusions for the Control Condition (n = 26)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Distress	1.000															
2. Anxiety Before P1	.353 .077	1.000														
3. Anxiety P1	.135 .511	.565 .003	1.000													
4. Anxiety P2	.151 .460	.451 .021	.817 .000	1.000												
5. Self-Efficacy	-.083 .686	-.407 .039	-.166 .416	.021 .920	1.000											
6. Prior Success	.049 .811	-.384 .053	-.233 .251	-.057 .783	.691 .000	1.000										
7. Amount of Experience	.323 .108	.286 .157	.267 .187	.195 .341	.147 .473	.076 .710	1.000									
8. WBSI	.628 .001	.472 .015	.443 .023	.446 .022	.034 .868	.070 .735	.337 .092	1.000								
9. Accuracy of Thought-Recording	-.137 .506	.113 .582	-.062 .765	-.175 .392	-.221 .278	-.280 .166	.138 .501	-.330 .099	1.000							
10. Target Thoughts P1 ^e	.298 .139	.588 .002	.597 .001	.562 .003	-.317 .114	-.454 .020	.244 .230	.300 .136	.103 .616	1.000						
11. Target Thoughts P1 ^e	.123 .550	.491 .011	.470 .015	.458 .019	-.381 .055	-.561 .003	.141 .491	.258 .203	.284 .159	.810 .000	1.000					
12. Target Thoughts P2	.248 .222	.480 .013	.501 .009	.488 .012	-.387 .051	-.484 .012	.142 .488	.102 .621	.110 .591	.717 .000	.534 .005	1.000				
13. Word Completion after P1	-.015 .940	.185 .367	.202 .323	.264 .192	.263 .194	.025 .903	.341 .088	.026 .901	.094 .647	.392 .048	.345 .084	.283 .162	1.000			
14. Word Completion after P2	-.073 .724	.295 .143	.228 .263	.089 .666	-.140 .496	-.136 .509	.286 .157	.059 .775	.188 .357	.374 .060	.448 .022	.158 .440	.544 .004	1.000		
15. Attempt To Suppress Target P1 ^a	-.283 .162	.101 .623	.243 .232	.078 .703	-.343 .086	-.139 .499	.015 .940	-.210 .303	.166 .419	-.221 .278	-.104 .613	.206 .313	-.037 .857	.030 .885	1.000	
16. Attempt To Suppress Target P2 ^b	-.108 .599	.140 .494	.420 .033	.382 .054	-.028 .890	.100 .626	.368 .064	.113 .583	.167 .416	.134 .514	.197 .335	.238 .242	.262 .196	.126 .539	.535 .005	1.000

Note. The top and bottom value in each cell correspond with the Pearson correlation coefficient and the *p* value respectively.

a. The extent to which one has tried to not think about the target thoughts in Period 1.

b. The extent to which one has tried to not think about the target thoughts in Period 2.

c. The data on target thought frequency for the control group were obtained from the counter-pressings.

e. The data on target thought frequency for the control group were obtained from subjects' retrospective estimations.

Self-Efficacy for Thought Suppression

The relationship between self-efficacy for thought suppression and target thought intrusions was investigated with Pearson correlation coefficients. As shown in Table 9, self-efficacy correlates negatively with the number of target thoughts reported for Period 2 ($r = -.243, p = .015$) for all conditions combined ($N = 100$), indicating that subjects who reported higher self-efficacy for thought suppression reported fewer target thought intrusions in the subsequent free-thinking period. However, no significant relationship was found between self-efficacy and target thought intrusions in Period 1 or between self-efficacy and the scores on the word-completion tests (all $ps > .20$). In addition, self-efficacy for thought suppression was found to be correlated strongly with ratings of degree of prior success at thought suppression ($r = .607, p < .001$). This suggests that one's self-efficacy for thought suppression may be formed based on prior experience with thought suppression.

The relationship between self-efficacy and other variables was further explored for each condition. Pearson correlation coefficients showed a significantly negative relationship between self-efficacy and the number of target thoughts reported for Period 2 for the focused-distraction condition ($r = -.629, p = .001$) (see Table 11). In addition, a marginally significant and negative relationship between self-efficacy and the number of target thoughts in Period 1 ($r = -.381, p = .055$) and Period 2 ($r = -.387, p = .051$) was also found for the control condition (see Table 13). No significant results emerged for the suppression and concentration conditions (see Table 10 and 12 respectively). In addition, a significantly positive relationship was found between self-efficacy and ratings of prior success at thought suppression for the focused-distraction ($r = .650, p = .001$), concentration ($r = .692, p < .001$), and control conditions ($r = .691, p < .001$). A similar

result was also observed for the suppression condition, but only reached marginal significance ($r = .370, p = .068$) (see Tables 10-13).

Prior Experience with Thought Suppression

To test the hypothesis that predicted a positive relationship between the amount of thought suppression experience and intrusions of target thoughts for people whose experience with thought suppression was less successful, as well as the hypothesis that predicted a negative relationship between these two variables for people whose experience with thought suppression was more successful, Pearson correlation coefficients were performed to examine these relationships for high and low-success groups. Since the ratings of degree of success and amount of experience pertained to prior experience with thought suppression, these relationships were examined only with subjects who were instructed to suppress thoughts (the suppression condition) and those who were instructed to suppress thoughts by distraction (the focused-distraction condition) ($n = 49$ for the suppression and focused-distraction conditions combined).

High ($n = 29$, consisting of 15 subjects from the suppression condition and 14 from the distraction condition) and low-success groups ($n = 20$, consisting of 10 subjects from the suppression condition and 10 from the focused-distraction condition) were formed based on the mean-split ($M = 2.755$ for the suppression and focused-distraction groups combined), in that subjects with ratings higher than the mean were assigned to the high-success group and those with ratings lower than the mean to the low-success group. Pearson correlation coefficients were performed to explore the relationship between the amount of thought suppression experience and target thought intrusions for the high and low-success groups. Consistent with the hypothesis, the results (see Table 14) showed that, for the low-success group, the amount of experience with thought suppression was

correlated positively with the number of target-thought intrusions reported for Period 1 ($r = .539, p = .014$).

Inconsistent with predictions, for the high-success group (see Table 15), the results also revealed a positive relationship between the amount of experience and the number of target thought intrusions reported for both Period 1 ($r = .379, p = .042$) and Period 2 ($r = .434, p = .019$). From the data on target thought frequency, the results seem to suggest that, regardless of success levels, a greater amount of prior experience was associated with a greater number of target thought intrusions experienced in Period 1 and also in Period 2.

Table 14
Intercorrelations Among Variables for Subjects with Less-Successful Prior Experience with Thought Suppression—The Suppression and Focused-Distraction Groups Combined (n = 20)

	1	2	3	4	5	6	7	8	9	10	11	12
1. Distress	1.000											
2. Anxiety before P1	.347 .134	1.000										
3. Anxiety P1	.576 .008	.411 .072	1.000									
4. Anxiety P2	.173 .466	.321 .167	.266 .257	1.000								
5. Self-Efficacy	.205 .386	.310 .184	.652 .002	.145 .541	1.000							
6. Accuracy of Thought-Recording	.109 .647	.061 .798	.088 .712	-.163 .493	.157 .510	1.000						
7. Amount of Experience	.331 .154	.220 .350	.428 .060	.449 .047	.271 .248	.253 .283	1.000					
8. WBSI	.232 .325	.149 .530	.459 .042	.447 .048	.221 .348	.377 .102	.741 .000	1.000				
9. Target Thoughts P1	.299 .201	.539 .014	.517 .020	.479 .033	.405 .076	-.098 .682	.539 .014	.134 .573	1.000			
10. Target Thoughts P2	.285 .223	.456 .043	.258 .273	.644 .002	.000 1.00	-.038 .872	.333 .151	.163 .494	.525 .017	1.000		
11. Word Completion after P1	.196 .408	.317 .174	.134 .573	-.168 .479	-.104 .661	-.278 .236	-.111 .641	-.148 .533	-.006 .980	-.177 .454	1.000	
12. Word Completion after P2	.000 1.00	.155 .513	.034 .886	.102 .668	.012 .961	.000 1.00	.389 .099	.214 .366	.287 .219	.243 .302	.202 .392	1.000

Note. The top and bottom value in each cell correspond with the Pearson correlation coefficient and the *p* value respectively.

Table 15

Intercorrelations Among Variables for Subjects with More-Successful Prior Experience with Thought Suppression—The Suppression and Focused-Distraction Groups Combined (n = 29)

	1	2	3	4	5	6	7	8	9	10	11	12
1. Distress	1.000											
2. Anxiety before P1	.189 .327	1.000										
3. Anxiety P1	.016 .934	.684 .000	1.000									
4. Anxiety P2	-.106 .583	.666 .000	.459 .012	1.000								
5. Self-Efficacy	-.105 .588	-.006 .977	-.157 .415	-.131 .500	1.000							
6. Accuracy of Thought-Recording	.209 .277	-.212 .270	-.156 .419	-.060 .758	-.347 .046	1.000						
7. Amount of Experience	.170 .379	.020 .919	.051 .795	.190 .325	-.248 .194	.176 .361	1.000					
8. WBSI	-.157 .417	.031 .871	.206 .284	.376 .044	-.433 .019	.029 .883	.660 .000	1.000				
9. Target Thoughts P1	-.006 .977	.053 .784	.134 .489	.107 .582	.070 .717	-.099 .608	.379 .042	.301 .112	1.000			
10. Target Thoughts P2	.045 .816	.061 .755	.141 .465	.135 .486	-.326 .084	-.204 .289	.434 .019	.276 .147	.341 .070	1.000		
11. Word Completion after P1	.187 .330	.407 .029	.030 .878	.070 .719	.019 .922	-.186 .333	-.297 .118	-.211 .271	-.189 .325	-.009 .962	1.000	
12. Word Completion after P2	-.154 .424	.146 .450	.005 .979	.288 .129	-.268 .160	.377 .044	.198 .304	.255 .182	-.049 .801	.248 .194	.311 .101	1.000

Note. The top and bottom value in each cell correspond with the Pearson correlation coefficient and the *p* value respectively.

When correlations were computed for the high and low- success groups combined ($n = 49$), the amount of prior experience was correlated positively with the number of target thoughts reported for Period 1 ($r = .315$, $p = .028$) and correlated marginally significantly with the number of target thoughts reported for Period 2 ($r = .274$, $p = .057$), whereas the degree of success at prior suppression was correlated negatively with the number of target thoughts reported for Period 2 ($r = -.293$, $p = .041$).

Suppression Tendency

The White Bear Suppression Inventory (WBSI) (Wegner & Zanakos, 1994) was designed to measure one's dispositional inclination toward thought suppression. However, as mentioned previously, prior studies have found that this measure assessed either one single construct (e.g., Wegner & Zanakos, 1994) or two constructs (i.e., unwanted intrusive thoughts and thought suppression) (Höping & de Jong-Meyer, 2003). Therefore, the scores on the WBSI may simply represent the level of suppression tendency or represent both the suppression tendency and the extent to which one has experienced unwanted intrusive thoughts in daily life.

Pearson correlation coefficients were performed to examine the relationship between scores on the WBSI and intrusions of target thoughts. As Table 9 shows, the WBSI scores correlate positively with the number of target thoughts reported for Period 1 ($r = .246, p = .014$) for all conditions combined.

The relationships between scores on the WBSI and individual-difference factors were also explored with Pearson correlations. The results showed that, for all conditions combined, the scores on the WBSI correlated positively with anxiety levels prior to Period 1 ($r = .250, p = .012$), during Period 1 ($r = .329, p = .001$) and during Period 2 ($r = .317, p = .001$). In addition, the WBSI scores are also correlated positively with perceived distress toward the traffic-accident story ($r = .238, p = .017$) as well as correlated strongly with amount of prior experience with thought suppression ($r = .526, p < .001$).

These relationships were further examined under each condition. Pearson correlations showed a positive relationship between scores on the WBSI and the number of target thought intrusions in Period 2 ($r = .408, p = .048, n = 24$) only for the focused-distraction condition (see Table 11). The WBSI scores were found to correlate positively with Period 2 anxiety ratings ($r = .590, p = .002$) for the suppression condition and

correlated positively with anxiety ratings for pre-Period 1 ($r = .472, p = .015$), Period 1 ($r = .443, p = .023$), and Period 2 ($r = .446, p = .022$) for the control condition (see Table 10 and 13). In addition, a positive relationship was found between the WBSI scores and ratings of perceived distress for the control condition ($r = .628, p = .001$) (see Table 13). The WBSI scores were also found to correlate positively with amount of prior experience for the suppression ($r = .603, p = .001$), focused-distraction ($r = .684, p < .001$), and concentration conditions ($r = .620, p = .001$) (see Tables 10-12).

Prior Engagement in Thought Control Related Activities

Of the 100 subjects, 18 indicated having engaged in some activities or programs that might have influenced their ability for thought control. However, four of the 18 were excluded from this category because the activities they indicated were daily activities such as exercises, sports, shopping, and cleaning that most people might have engaged in but did not report. Consequently, 14 subjects were coded as having engaged in previous thought control-related activities. Of these 14 subjects, two persons were from the suppression condition, three were from the distraction condition, six were from the concentration condition, and three were from the control condition.

A t-test was performed to compare the frequency of target thought occurrences of the group which had engaged in related activities ($n = 14$) with that of the group who had not engaged in related activities ($n = 86$). The results revealed no significant differences between these two groups either in the number of target thought intrusions (Period 1: $t(98) = .888, p = .377$; Period 2: $t(97) = .022, p = .983$) or in their scores on the word-completion tests (Time 1: $t(98) = -.433, p = .666$; Time 2: $t(98) = .613, p = .541$). In fact, it is hard to interpret these results without considering which type of thought control technique (i.e., suppression, distraction, concentration, or control) was being employed.

However, the sample size in the attended-related-activities category is too small to allow for comparison of target thought frequency of the attended and that of had-not-attended groups under each thought-control condition.

Also, due to the small number of subjects in each type of thought-control related activity, a comparison of the effects of different types of thought-control activities on target thought intrusions was disallowed (see Table 16 for means and standard deviations).

Table 16

Frequency of Target Thoughts and Scores on the Word-Completion Tests for Each Thought-Control Activity Category

		Target thoughts P1 M (SD)	Target thoughts P2 M (SD)	Word completion at T1 M (SD)	Word completion at T2 M (SD)
Had Not Attended Related Activities	n = 86	4.91 (4.64)	5.41 (3.47)	3.28 (1.69)	3.19 (1.44)
Attended Related Activities	n = 14	3.39 (4.93)	5.38 (3.55) n = 13*	1.50 (.21)	2.93 (1.59)
Church	n = 1 ^a	3.00 (----)	4.00 (----)	0.00 (----)	1.00 (----)
Church/Meditation	n = 5 ^b	1.90 (2.19)	5.00 (2.94) n = 4*	3.40 (2.07)	2.80 (1.30)
Church/Meditation/Yoga	n = 1 ^c	1.00 (----)	5.00 (----)	5.00 (----)	5.00 (----)
Yoga	n = 3 ^d	4.83 (6.71)	5.67 (2.52)	4.00 (2.65)	4.00 (1.00)
Yoga/Martial Art	n = 1 ^e	3.00 (----)	13.00 (----)	2.00 (----)	2.00 (----)
Mental control	n = 2 ^f	0.00 (0.00)	1.00 (0.00)	3.00 (1.41)	1.00 (0.00)
Mental control/Meditation	n = 1 ^g	20.00 (----)	9.00 (----)	7.00 (----)	5.00 (----)

* This number excludes the outlier found in the data on target thought frequency in Period 2 for the concentration condition.

- a. The Church category consisted of one subject from the control group. The value of target thought frequency obtained from counter-pressings is the same as that obtained from retrospective estimations.
- b. The Church/Meditation category consisted of one subject from the suppression condition, three subjects from the concentration condition, and one subject from the control condition. The thought frequency data for the control condition were obtained from retrospective estimations. When this value was replaced with the counter pressing data, the mean of this category became 2.00 and the standard deviation was 2.35.
- c. The Church/Meditation/Yoga category consisted of one subject from the suppression condition.
- d. The Yoga category consists of two subjects from the focused-distraction condition and one from the concentration condition.
- e. The Yoga/Martial Art category consisted of one subject from the concentration condition.
- f. The Mental control category consisted of one subject from the focused-distraction condition and one from the concentration condition.
- g. The Mental control/Meditation category consisted of one subject from the control condition. The thought frequency value shown in the table was obtained from retrospective estimations. The value was 16 for counter-pressing data.

ATTEMPTS TO SUPPRESS, DISTRACT, OR CONCENTRATE

For All Conditions Combined

Pearson correlations were performed to examine the relationship between attempts to suppress target thoughts in Period 2 and the occurrence of target thoughts in the same period for all conditions combined ($N = 100$). The results indicated that attempts to suppress target thoughts in Period 2 correlated positively with the number of target thoughts reported for the same period ($r = .317, p = .001$) and with the scores on the word-completion tests at Time 2 ($r = .240, p = .016$). This suggests that subjects who reported having tried harder to avoid the target thoughts in Period 2 experienced higher levels of target thought intrusions in the same period. Another way to interpret this result is that subjects who experienced more target thought intrusions in the subsequent free-thinking period exhibited higher attempts to avoid those thoughts even they were not requested to do so.

Moreover, Pearson correlations showed that attempts to suppress target thoughts in Period 2 correlated positively with the scores on the WBSI ($r = .198, p = .048$). In other words, people with a higher suppression tendency (or more experience with encountering obsessive thoughts) were more likely to exhibit higher spontaneous attempts to suppress target thoughts in the subsequent free-thinking period.

Within the Suppression Condition

Pearson correlation coefficients were performed to explore the relationship between suppression attempts (i.e., the rating of the extent to which one had tried to suppress target thoughts), distraction attempts (i.e., the rating of the extent to which one

had tried to distract oneself by focusing on alternative thoughts), and the occurrence of target thought intrusions within the suppression condition. As seen in Table 10, the results indicated that suppression attempts in Period 1 and Period 2 correlate strongly with distraction attempts in Period 1 ($r = .817, p < .001$) and Period 2 ($r = .816, p < .001$) respectively. Therefore, these results suggest that for the suppression condition, subjects who reported having tried hard to suppress target thoughts mostly attempted this goal through self-distraction, that is, thinking about alternative thoughts. In addition, suppression attempts in Period 1 correlated positively with suppression ($r = .612, p = .001$) and distraction attempts ($r = .645, p < .001$) in Period 2. Similarly, distraction attempts in Period 1 also correlated positively with suppression ($r = .594, p = .002$) and distraction attempts ($r = .665, p < .001$) in Period 2.

Pearson correlation coefficients (see Table 10) also showed that for Period 1, suppression and distraction attempts correlated positively with the number of target thought intrusions (suppression attempt: $r = .575, p = .003$; distraction attempt: $r = .524, p = .007$). For Period 2, distraction attempts correlated positively with the number of target thought intrusions ($r = .418, p = .038$) and with scores on the word-completion test at Time 2 ($r = .461, p = .020$). This seems to suggest that the higher suppression or distraction attempts that subjects exhibited in Period 1 and 2, the more target thoughts reported for Period 1 and Period 2 respectively. However, since this is correlational data, both directions of cause and effect were possible. That is, subjects who reported higher intrusions or accessibility of target thoughts during Period 1 or Period 2 were more likely to exhibit higher suppression or distraction attempts during the same periods. In addition, suppression and distraction attempts in Period 1 and Period 2 were found to correlate positively with the amount of experience with thought suppression (Period 1 suppression attempts: $r = .541, p = .005$; Period 1 distraction attempts: $r = .558, p = .004$; Period 2

suppression attempts: $r = .612$, $p = .001$; Period 2 distraction attempts: $r = .449$, $p = .024$). This suggests that people with more experience with thought suppression may try harder to suppress or distract themselves from target thoughts during both Period 1 and Period 2.

Within The Focused-Distraction Condition

Pearson correlation coefficients were performed to examine the relationship between distraction attempts in Period 1 (i.e., the rating of the extent to which one had tried to not think about the target thoughts by focusing on the given distraction task of describing the kitchen), suppression attempts in Period 2, and the occurrence of target thoughts. As seen in Table 11, the results indicated a significantly positive relationship between suppression attempts in Period 2 and the number of target thought intrusions in the same period ($r = .449$, $p = .028$).

Moreover, Pearson correlations showed that attempts to suppress target thoughts in the second period correlated negatively with self-efficacy for thought suppression ($r = -.407$, $p = .048$). In other words, people who indicated higher self-efficacy for thought suppression made lower ratings on the attempt to suppress target thoughts in the free-thinking period (Period 2). Since the results also demonstrated that self-efficacy for thought suppression correlated negatively with the frequency of target thoughts in Period 2 for the focused-distraction condition ($r = -.629$, $p = .001$), therefore, these results suggest that people with higher self-efficacy for thought suppression were more likely to report fewer target thought intrusions for the subsequent free-thinking period. Probably due to the low levels of target thought intrusions, they had less need to exert efforts toward avoiding target thoughts in this period.

In addition, the data showed that distraction attempts in Period 1 correlated positively with the amount of experience with thought suppression ($r = .558, p = .002$). This suggests that people with more experience with thought suppression may try harder to suppress thoughts by focusing on the given distraction task in Period 1.

Within The Concentration Condition

Pearson correlation coefficients were performed to examine the relationship between attempts to focus on the given concentration task (i.e., the rating of the extent to which one had tried to concentrate on the task of describing the kitchen) in Period 1, attempts to suppress target thoughts in Period 2, and occurrences of target thoughts within the concentration condition. As seen in Table 12, Pearson correlations indicated a trend that the attempt to suppress target thoughts in Period 2 correlated positively with the number of target thought intrusions in Period 2 ($r = .380, p = .067$). This result is similar to the pattern found in the suppression and focused-distraction conditions. In addition, Pearson correlations showed that the concentration attempt correlated marginally significantly with the amount of prior experience with thought suppression ($r = .392, p = .052$). This suggests that people with a greater amount of experience with thought suppression tended to report trying harder to concentrate on the alternative task.

Within the Control Condition

Pearson correlation coefficients were performed to examine the relationship between attempts to suppress target thoughts in Period 1, attempts to suppress target thoughts in Period 2, and the occurrence of target thoughts for the control condition. As seen in Table 13, the results indicated that suppression attempts in Period 1 correlated

positively with suppression attempts in Period 2 ($r = .535, p = .005$). This result suggests that subjects who reported having tried harder to avoid the target thoughts in the initial free-thinking period were very likely to also indicate trying harder to avoid target thoughts in the subsequent free-thinking period. However, no significant relationship was found between attempts to suppress target thoughts and the occurrence of target thought intrusions.

In addition, Pearson correlations indicated that attempts to suppress target thoughts in Period 2 correlated positively with the anxiety level reported for Period 1 ($r = .420, p = .033$) and correlated marginally significantly with anxiety reported for Period 2 ($r = .382, p = .054$). Therefore, subjects who reported trying harder to avoid target thoughts in Period 2 tended to indicate higher anxiety ratings both in Period 1 and Period 2. This suggests that subjects who tried harder to suppress target thoughts in Period 2 tended to feel more anxious during both periods. Another way to interpret this is that subjects who felt more anxious may tend to try harder to avoid target thoughts. In addition, suppression attempts in Period 2 were found to correlate marginally significantly with the amount of prior experience with thought suppression ($r = .368, p = .064$). This suggests that people who indicated having more experience with thought suppression tended to report having tried harder to suppress target thoughts during the second period.

Chapter 5 Discussion

This study compared the effects of suppression, focused-distraction, and concentration techniques on occurrences of unwanted distressing thoughts and examined how anxiety, perceived distress and prior experience were associated with the use of these techniques and the intrusion of target thoughts. In this study, college students were told either to suppress thoughts about a distressing story (suppression), to suppress those thoughts by focusing on an alternative distraction task (focused-distraction), to simply concentrate on that alternative task (concentration), or to think about anything, without restrictions (control) during the first period. This initial period was then followed by a “free-thinking” period to assess the delayed effect of these thought suppression techniques. Consistent with the hypothesis, the results showed that, during the initial period, the focused-distraction and concentration strategies were more effective in reducing target thoughts than the suppression strategy. The concentration strategy in turn was more effective than the focused-distraction strategy. However, inconsistent with predictions, no difference was found among conditions for the subsequent free-thinking period. Also, the present study found that subjects in the suppression condition tended to report more anxiety than those in the distraction and concentration conditions during the initial period, while no difference was observed for the subsequent period. Consistent with predictions, no immediate enhancement effect was observed for suppression. That is, subjects who were told to suppress thoughts did not report more target thought intrusions during the suppression period than those in the control condition. However, inconsistent with the hypotheses, no rebound effect was found for the suppression condition. As to the relationships between the individual-difference factors and intrusions

of target thoughts, the present study found that for Period 1, higher anxiety, greater perceived distress, more prior experience and higher scores on the WBSI were associated with more target thought intrusions for all conditions combined. For Period 2, higher anxiety, greater suppression attempts, and lower self-efficacy were related to more intrusions of target thoughts for all conditions combined. The important findings of this study are discussed in greater detail in the sections below.

THE EFFECTS OF THOUGHT SUPPRESSION TECHNIQUES

Superior Effects of Focused-Distraction and Concentration During Period 1

Consistent with the hypotheses, the thought frequency data (by retrospective estimations) showed that subjects who were told to suppress thoughts by focusing on a distraction task reported fewer intrusions of target thoughts for the suppression period than those who were simply told to suppress target thoughts. This result is consistent with prior studies (e.g., Salkovskis & Campbell, 1994; Salkovskis & Reynolds, 1994; Wegner et al., 1987) that found that focused-distraction was more effective in reducing unwanted thoughts than suppression.

Moreover, the present study found that, when people were instructed to suppress thoughts, most of them may in fact have employed distraction (i.e., thinking about alternative thoughts) to achieve suppression, because data demonstrated a very high correlation between ratings of suppression and distraction attempts within the suppression condition. This finding replicates the findings of Davies and Clark's (1998) study and also are in line with Muris et al.'s (1993) results that people mainly used distraction (e.g., thinking of what they have to do that day; thinking of someone; or focusing on objects in

the room...etc.) to suppress a thought. If the suppression strategy mainly involves the use of distraction, it appears that this self-generated distraction is less effective in reducing unwanted thoughts than being instructed to focus on a single engaging distracter. One possible reason is that finding an engaging distracter to focus on may not be easy, and individuals thus may frequently switch their attention from one distracter to another. At the moments people are not focusing on the distracter, a self-monitoring mechanism may be initiated and people may rethink about their suppression objective. Acknowledgement of this goal of suppression then serves as a negative cue that reminds people of the to-be-suppressed thought (Wegner et al., 1987; Wegner et al., 1991). This speculation about the ineffectiveness of self-generated distraction can be supported by Salkovskis and Campbell's (1994) research, which demonstrated that simply telling subjects to distract themselves from target thoughts without instructing them how to do so would not work better than instructing them to suppress thoughts. This suggests that, although people may spontaneously use distraction to suppress a thought, self-generated distraction may not be as effective as the focused-distraction strategy. It is probably because for most people, distracting oneself from unwanted thoughts is not an easy task to accomplish without specific instructions.

Also consistent with the hypothesis, the present study found that subjects who were told to concentrate on an alternative task (concentration condition) reported fewer target thought intrusions during the first period than those who were told to suppress thoughts. This is possibly due to the fact that focusing on achieving an alternative goal does not involve intentions of suppressing target thoughts and thus rules out the problem that suppression intentions may serve as a negative cue that reminds people of the target thoughts. This result is also in line with Wenzlaff and Bates' (2000) finding that subjects who were instructed to focus on forming positive statements unscrambled fewer

sentences with negative meanings than those who were instructed to avoid forming negative statements.

In addition, the present study found that the concentration strategy was more effective in reducing target thoughts during the initial period than the focused-distraction strategy. To the best of the author's knowledge, this study might be the first to demonstrate this pattern within the context of thought suppression. This finding supports the reasoning that the concentration strategy, which does not involve the intention of avoiding target thoughts, may better get around the problems associated with suppression than the focused-distraction strategy as focused-distraction still involves some degree of suppression intentions and thus it is more likely that target thoughts would intrude sometimes when one does not focus their attention on the distracter.

No immediate Increase in Target Thoughts During Suppression

Consistent with the prediction, no immediate thought enhancement was found for the use of the suppression strategy in the present study. That is, subjects who were told to suppress thoughts did not report more target thought intrusions during the initial period than the control group. This result is consistent with the findings of most of the prior research (e.g., Davies & Clark, 1998; Harvey & Bryant, 1998; Kelly & Kahn, 1994; McNally & Ricciardi, 1996; Muris et al., 1992; Purdon & Clark, 2001; Roemer & Borkovec, 1994; Rutledge et al., 1993) with suppressing emotional thoughts. One possible explanation for this result is that although people attempting to suppress target thoughts may frequently need to locate new distracters on which to focus and thus target thoughts may intrude during breaks, as long as they focus their attention on distracters for some length of time, even though not long, the intrusion of target thoughts can remain at

a rate not higher than that experienced by people who were instructed to think about anything without restrictions.

No differences Among Conditions in Target Intrusions in Period 2

The present study found that initial suppression, distraction, and concentration did not lead to differential effects in the occurrence of target thoughts in the subsequent free-thinking period. In other words, no matter which thought control techniques (i.e., suppression, focused-distraction or concentration) subjects had previously employed, they did not experience significantly different levels of target thought intrusions in the subsequent period. The result is inconsistent with this study's hypothesis and the findings of prior research (e.g., Salkovskis & Campbell, 1994; Salkovskis & Reynolds, 1994; Wegner et al., 1987) that showed that the use of focused-distraction strategy may result in fewer target thought intrusions during the subsequent expression or free-thinking period than the suppression strategy.

One possible explanation for this result is that subjects in the three experimental conditions encountered the task of recording target thoughts (by pressing a counter) for the first time in the second period. It is possible that the task of thought-recording attracted the subjects' attention during this period since they were not given any specific task to accomplish (i.e., they were free to think about anything) other than recording target thoughts. The cues provided by the thought-recording task may have reminded subjects of the target thoughts, therefore masking the differential effects that might otherwise have been observed for thought-control conditions. In other studies (e.g., (Salkovskis & Campbell, 1994; Salkovskis & Reynolds, 1994; Wegner et al., 1987), subjects were asked to record the target thoughts (by pressing a counter or ringing a bell) during both the initial and subsequent periods of the experiment. Thus, subjects might

have become more accustomed to this technique and less attracted to the cues provided by this task in the second phase. Consequently, the differential effects of thought-control techniques were manifest. It is possible that if subjects had not been asked to record target thoughts during the second period, those in the focused-distraction and concentration conditions may not have thought about the traffic-accident story at such high level.

However, as mentioned previously, it is inappropriate for the present study to ask subjects to record target thoughts in the initial period because this study incorporated a concentration condition. Subjects in that condition should not be requested to do anything that might distract their attention from the concentration task (i.e., describing the kitchen where they grew up), in order to ensure the validity of the “concentration” manipulation. Future research that investigates the effects of the concentration strategy might consider obtaining data on target thought frequency through retrospective estimations for both periods to avoid the confounding effects of thought-recordings as well as supplementing this data with other possible indirect or physiological measures.

Absence of Rebound Effect

Inconsistent with the prediction and the findings in Wegner et al.’s (1987) study, the present study did not find the rebound effect of suppression. The hypothesis about the rebound effect is not a strong prediction, however, as findings of prior research on this topic are mixed. The result of the present study is in line with other research (e.g., Davies & Clark, 1998; Gaskell et al., 2001; Kelly & Kahn, 1994; Muris et al., 1993; Purdon & Clark, 2001; Roemer & Borkovec, 1994; Rutledge et al., 1993; Wegner & Gold, 1995) examining the suppression of distressing or personal thoughts, though inconsistent with the finding of Salkovskis and Campbell’s (1994) study. In fact, the counter-pressing data

in the present study showed a trend toward the reverse of the rebound effect. That is, subjects who had previously suppressed target thoughts during the initial period tended to experience fewer target thoughts in the subsequent free-thinking period than did the control group (during the initial period).

One explanation for this finding is that subjects in the suppression condition probably continued suppressing target thoughts in the subsequent-free-thinking period due to the carryover effect, that is, the residue of suppression attempts from the first period. This effect would thus reduce the occurrence of target thoughts; therefore, no rebound was found. However, our data did not support this hypothesis. First, even though the data showed that the suppression group did report some degree of suppression attempts in Period 2, the levels of suppression attempts that they reported ($M = 2.600$, $SD = 1.080$) did not differ from those of the control group in Period 1 ($M = 2.596$, $SD = 1.020$), $t(49) = .013$, $p = .990$. Moreover, the ratings of suppression attempts for Period 2 were found to be positively correlated with the frequency of target thoughts during this period ($r = .317$, $p = .001$, $N = 99$) and the number of target word completions at Time 2 ($r = .240$, $p = .016$, $N = 100$) for all conditions combined. Therefore, even if the suppression group exhibited higher attempts to suppress target thoughts in the second period, this should be associated with increased target thought intrusions and thus contributes to rather than inhibits the occurrence of the rebound effect.

Another possible explanation for the absence of rebound effects is related to the type of thoughts to be suppressed. The rebound effect was first proposed by Wegner et al.'s (1987) study which examined the suppression of a "white bear" thought. It is possible that this effect may not necessarily occur when different types of thoughts are suppressed; suppressing a simple image (such as a white bear) might not be the same as suppressing thoughts involving complex imagery or "verbal-linguistic thinking" (Roemer

& Borkovec, 1994). In fact, the lack of rebound effects found in the present study actually replicates the findings of Muris et al.'s (1992) study in which the same thought-elicited material, a traffic-accident story, was used. In their study, no rebound effect was found when subjects suppressed thoughts about the distressing story, while a rebound effect was observed when they suppressed thoughts about a non-emotional story. However, this does not necessarily mean that distressing thoughts are easier to suppress than neutral thoughts. In fact, the data in Muris et al.'s (1992) study showed that the rebound effect observed from suppressing neutral thoughts was probably due to the fact that the baseline intrusions of neutral target thoughts experienced by the control group were relatively low. Thus the rebound effect could be easier to detect. The reason for the low baseline of intrusions is probably that people are less likely to spontaneously think much about the non-impressive content (e.g., a neutral story) (Muris et al., 1992). However, when attempting to suppress these thoughts, suppression efforts might increase the saliency of this content and therefore heightened intrusions of these neutral thoughts (Muris et al., 1992). Probably due to the carryover effect from the previous suppression period, thinking much about certain thoughts may prime individuals' memories about this content, and thus people may also think relatively more about the target thoughts in the subsequent free-thinking period. Consequently, the rebound effect of suppressing-neutral thoughts was observed. On the other hand, Muris et al.'s (1992) data showed that the baseline intrusions of distressing target thoughts produced by the control group was relatively high, which may explain the absence of the rebound effect for the suppress-emotional thoughts condition. The reason for the high baseline of intrusions of emotional target thoughts is probably that subjects would be more compelled to think about the emotional thoughts because the content is more impressive. This likely produced a ceiling effect in the control condition (Muris et al., 1992). Probably because of this, the

difference between the suppression group and the control group was small and thus no rebound effects observed.

Nonetheless, it may be hard to conclude that a postsuppressional rebound would be less likely to occur when suppressing distressing thoughts than when suppressing neutral thoughts because still other studies (e.g., McNally & Ricciardi, 1996)) did not find this result. This is probably because thoughts vary widely in terms of contents, features, and sources even when they are of the same valence category. More research is needed to investigate the effects of type of thoughts through systematic variation of the features of the to-be-suppressed thoughts, so that the relationship between the type of thoughts suppressed and the rebound effect can be better clarified.

Another possible explanation is that the rebound effect was possibly harder to detect when employing “free-thinking” rather than “forced expression” as the Period 2 instruction. Merckelback et al. (1991) suggested that using “forced expression” as the instruction for Period 2 might lead subjects to focus on the target thoughts and thus heighten the rate of target thoughts during this period; therefore, the rebound effect would be more likely to be found with this design. However, due to the fact that those studies also use “forced expression” instructions for the control condition in the first period (serving as the baseline), the heightening effects in Period 2 due to “forced expression” might thus be counteracted. Moreover, since there are still other studies using the “forced expression” design that did not find the rebound effect for suppressing emotional thoughts (e.g., Kelly & Kahn, 1994, Roemer & Borkovec, 1994; Rutledge et al., 1993), this speculation is only tentative.

Overall, the present study did not find a postsuppressional rebound effect resulting from the suppression of thoughts about a distressing story. Therefore, the White

Bear phenomenon may only occur in some contexts in which certain factors are met. More research is needed to explore this issue in order to better describe this phenomenon.

Higher Anxiety Associated With the Suppression Condition During Period 1

As predicted, it was found in the present study that subjects in the suppression condition reported higher levels of anxiety than those in the concentration condition and also tended to report greater anxiety than those in the focused-distraction condition during the initial period. The pattern was similar after controlling for anxiety levels experienced prior to Period 1. That is, the anxiety level associated with the suppression condition was higher than that for the focused-distraction condition, and marginally higher than that for the concentration condition for the initial period. Given the data that showed that anxiety reported for Period 1 correlated positively with the frequency of target intrusions reported for the same period, it is not surprising to find that these results for anxiety approximately correspond with the pattern regarding the differences among conditions in target-thought intrusions. One explanation for this finding is that anxiety may have been the result of intrusions of target thoughts. That is, the more frequently that target thoughts occur, the more anxious one might feel. One reason for this relationship is that the traffic-accident story contains anxiety-provoking content, and thus thoughts of which might induce anxiety.

Another possible explanation is that suppression may strengthen discomfort and arousal in perceptions of the occurrence of to-be-suppressed thoughts, given that intrusions of target thoughts signal the failure of achieving the goal of suppression. This reasoning might be inferred from the finding in Merckelbach et al.'s (1991) study, which demonstrated that occurrences of target thoughts were more frequently accompanied with the electrodermal arousal for subjects who were instructed to initially suppress white bear

thoughts as compared with those who were told to first think about anything including the target thoughts. Moreover, Trinder and Salkovskis (1994) found that higher suppression efforts were associated with higher levels of perceived discomfort in relation to the occurrence of target thoughts, and levels of discomfort in turn correlated positively with anxiety for subjects instructed to suppress thoughts. On the other hand, in the present study subjects in the focused-distraction condition were instructed to direct their attention to an alternative distraction task; it is possible that their mood was contingent more on the context of the distraction task (describing their kitchen) and less on avoiding thinking about the target thoughts. Probably because of this, even when target thoughts occurred, the focused-distraction group might not have felt as anxious as the suppression group. For subjects in the concentration condition, who were not given any instruction to suppress thoughts, they should not have the above problems.

Another explanation might be that anxiety was induced from the difficulty of the task of suppression. It is possible that when people were told to suppress certain thoughts but without receiving instructions about the ways of achieving this, they may not know exactly how to do it and thus feel anxious about accomplishing the task. This might be especially evident in a context in which subjects were provided nothing to do but sitting in front of a desk. In contrast, subjects in the focused-distraction and concentration condition were instructed explicitly on how to achieve their task goal, and therefore reported feeling less anxiety than those in the suppression condition.

However, due to the fact that the difference between suppression and focused-distraction conditions is significant only after controlling for pre-Period 1 anxiety and the difference between suppression and concentration conditions is significant only before controlling for pre-Period 1 anxiety levels, this interpretation regarding the difference among conditions should be treated tentatively.

No Difference in Anxiety Levels Among Conditions During Period 2

During the second period, the present study found that anxiety levels did not differ significantly among conditions, and the pattern remained unchanged after controlling for anxiety levels experienced prior to Period 1. Since the data showed that anxiety levels were correlated positively with frequencies of target thought intrusions during Period 2 for all conditions combined, this result again matches the pattern observed for the frequency of target thought intrusions during Period 2 among the four conditions. One explanation for these findings is that, as suggested previously, anxiety might simply be induced from intrusions of unpleasant story-related thoughts. Therefore, when all conditions produced similar rates of target intrusions, anxiety levels were also similar among conditions. Another explanation for the positive relationship between anxiety and number of target intrusions might be that people who reported higher state anxiety might have higher trait anxiety. Therefore, when requested to do the target thought-recording task during the free-thinking period, people with higher trait-anxiety might be more likely to feel anxious and self-conscious. Because of this, they may be more vulnerable to cues provided by this task and consequently, would experience higher target thought intrusions.

Another possible reason for the positive relationship between anxiety and target-thought intrusions is that people who feel more anxious are probably more likely to think about anxiety-related thoughts. This is based on Bower's (1981) theory that emotions are like nodes connecting to other emotion-related events in the memory network, and emotional units can facilitate the retrieval of mood-congruent events in the network. Therefore, when subjects felt more anxious, they might have experienced more intrusions of thoughts about the traffic-accident story during the free-thinking period.

From the data of the present study, it is hard to determine the real underlying reasons that would explain the relationship between anxiety, suppression and target thought intrusion. Future research may employ qualitative methods such as personal interviews to probe how subjects feel when carrying out thought-control tasks so that the relationship between anxiety and thought-control can be better understood.

INDIVIDUAL-DIFFERENCE FACTORS AND OCCURRENCES OF TARGET THOUGHTS

Perceived distress toward the story

Consistent with the hypothesis, the present study found that perceived distress associated with the traffic-accident story was positively correlated with the number of target thought intrusions in Period 1 for all conditions combined. In other words, the more distressing the subjects perceived the traffic-accident story to be, the more frequently the subjects experienced intrusive thoughts about the story in the first period. These results support some previous studies (e.g., Davies & Clark, 1998; Harvey & Bryant, 1998; Roemer & Borkovec, 1994) that demonstrated that distressing thoughts tended to intrude more frequently than non-distressing thoughts. They are also in line with other studies (e.g., Parkinson & Rachman, 1981; Salkovskis & Harrison, 1984) that found that individuals reported increased difficulty dismissing thoughts as the level of unpleasantness associated with the thoughts increased.

Self-Efficacy For Thought Suppression

The present study found a negative relationship between self-efficacy for thought suppression and the frequency of target-thought intrusions (as measured through counter-

pressing) during the second period for all conditions combined. When examining these relationships for each condition, the negative relationship was significant only for the focused-distraction condition in Period 2 and marginally significant for the control condition in both periods. That is, for the focused-distraction and control condition, subjects who indicated higher self-efficacy for thought suppression reported fewer target thought intrusions during the free-thinking period. Moreover, the data also showed that higher self-efficacy was associated with lower attempts to suppress target thoughts in Period 2; lower suppression attempts were in turn associated with fewer intrusions of target thoughts for the focused-distraction condition in this period. These results together seem to suggest that people who reported higher ratings of self-efficacy for thought suppression were less likely to experience target thought intrusions during the free-thinking period subsequent to suppression/distraction, and thus exhibited lower spontaneous attempts to avoid these thoughts. This implies that the perception of higher self-efficacy for thought suppression might derive from one's observation of being less likely to dwell on previously-suppressed thoughts in the subsequent period rather than from being able to successfully avoid thoughts while suppression or distraction is applied. However, this reasoning is based primarily on the results of the focused-distraction condition. More research is needed to clarify these issues before firm conclusions can be drawn.

Prior Experience, Suppression tendency, and Suppression Attempt

The present study found that, for the suppression and focused-distraction condition combined ($n = 49$), a greater amount of prior experience with thought suppression was associated with more intrusions of target thoughts during the suppression period (Period 1) regardless of the reported success levels at prior

suppression. The finding of a positive relationship between these two variables is consistent with the hypothesis proposed for people whose experience with thought suppression was less successful. However, this is inconsistent with predictions for the group whose prior experience was more successful. One explanation for this unexpected finding is that people with more experience in successful thought suppression may be more likely to detect the occurrence of to-suppressed-thoughts, even if those thoughts are vague or fleeting; they may try to stop them as soon as they occur rather than after they have become more clear and fully engaging. Possibly because of this, subjects who reported having more experience in successfully suppressing thoughts may tend to report more target thought intrusions than those indicating less experience.

Another explanation is that a greater amount of experience with thought suppression might imply that one has a tendency to dwell on unwanted thoughts that others might naturally forget in a relatively shorter time, and therefore needs to suppress thoughts more frequently than others. Probably because of this, even when such subjects indicated a higher degree of success at prior thought suppression, their proclivity toward obsessional thinking might lead them to think more about target thoughts, especially when requested to suppress a novel thought in a new context. Some indirect evidence can be inferred from the results of this study that showed that the amount of suppression experience correlates positively with subjects' WBSI scores, which have been shown to relate positively to trait anxiety, depression, and obsessional thinking in prior research (Höping & de Jong-Meyer, 2003; Rassin & Diepstraten, 2003; Wegner & Zanakos, 1994). This may imply that people who indicated a greater amount of suppression experience are likely to feel more anxious or may be more vulnerable in relation to distressing events. And therefore, these people would probably feel more difficulty in stopping the thinking of unwanted thoughts regarding those events.

On the other hand, it is also possible that a greater amount of experience with thought suppression might represent a stronger tendency to suppress thoughts. And it is this suppression tendency that causes people to experience increased intrusions of unwanted thoughts. In other words, this view hypothesizes that there are individual differences in tendencies to suppress thoughts (Wegner & Zanakos, 1994). Those who exhibit higher suppression tendencies may experience increased intrusions of target thoughts, while those who exhibit lower suppression tendencies may not. This reasoning is in line with the finding that for the suppression group, a greater amount of suppression experience was associated with higher ratings of suppression and distraction attempts; greater suppression/distraction attempts were in turn associated with higher levels of target thoughts reported for both periods. Possibly because higher suppression/distraction attempts ironically led to increased unwanted thoughts, one's depression, anxiety or obsession also were thus intensified.

In sum, one perspective assumes that higher suppression attempts (efforts) are compelled by a greater number of unwanted thought intrusions, while such intrusions can be caused by obsessive or neurotic inclinations. The other view suggests that an increase in unwanted thought intrusions is caused by stronger suppression attempts, which in turn induce or worsen psychological syndromes. To the extent that suppression results in ironic effects (the immediate or delayed increase of the intrusion of to-be-suppressed thoughts), the latter view is plausible. The data of the present study seem not to strongly support this perspective, however, since no immediate increase in target thoughts or postsuppressional rebound was found for the use of the suppression technique, although this technique seems not to be as effective as the focused-distraction or concentration strategy in reducing unwanted thoughts. Nonetheless, more research is needed to examine the causal relationship between suppression efforts, suppression tendency, and the

occurrence of unwanted thoughts so that the underlying reasons for suppression effects can be understood more clearly.

LIMITATIONS

There are several limitations related to measurements, causal inferences, and generalizations in this study that must be acknowledged. These are discussed in detail below.

Limitations Related to Measurement

Subjects in the experimental conditions (i.e., suppression, distraction and concentration conditions) were not asked to record the occurrence of target thoughts during Period 1; therefore, the data regarding the frequency of target thoughts for the experimental conditions were obtained from retrospective estimations. One limitation of this method is that one cannot rule out the possible effect of forgetting in the data of retrospective estimations as researchers suggested that retrospective reports might rely on long-term memory (e.g., Dunlosky & Hertzog, 1998, 2001). Moreover, the comparisons of thought intrusions between the first and second periods for each experimental condition should be interpreted carefully, as they were obtained from different types of measures. However, as mentioned previously, if subjects in the experimental conditions had been asked to record target thoughts in the first period, the validity of manipulations of the concentration condition would have been compromised, as it would become more similar to the focused-distraction condition. On the other hand, the design of this study also makes it inappropriate to remove the thought-recording task from the control

condition during Period 1 to seemingly make the treatments more equivalent among four conditions during this period. That is because the investigation of the rebound effect was one of the main focuses in this study and this effect was assessed by comparing the second period for each experimental group with the first period for the control group. Since the experimental groups were asked to record target thoughts by pressing a counter during the second period, the control group should also record target thoughts during the first period to make the comparison more appropriate.

In order to minimize the problem of comparing data obtained from different types of measures, the control group was also asked to provide retrospective estimations of the frequency of target thoughts for Period 1 so that the comparisons between each experimental condition and the control condition for Period 1 might be more appropriate. In addition, the possible effect of forgetting in subjects' retrospective estimations was investigated by correlating the data obtained from the counter-pressing in Period 1 with the data obtained from retrospective estimations as the control group had been asked to provide both kinds of data. The result showed a very high correlation ($r = .810, p < .001$) between the data obtained from the two measures. In addition, the results revealed no significant difference between the means of frequency of target thoughts generated from the counter-pressings ($M = 7.38, SD = 4.25$) and retrospective estimations ($M = 7.60, SD = 5.47; t(25) = -.336, p = .739$) for the control group. This thus provides some evidence that the retrospective data may be approximately as valid as the data generated from the counter-pressing.

A second limitation related to measurement is that the task of recording target thoughts by pressing a counter may provide cues that might have reminded subjects of the target thoughts or directed subjects' flow of thinking toward the target thoughts; thus led to more target intrusions than it would otherwise be experienced. Nonetheless, in

order to obtain data on thought intrusions, it is necessary to use a certain thought recording method in the research. The thought recording method used in this study, the event marker, has been widely used in thought suppression studies (e.g., Harvey & Bryant, 1998; Kelly & Kahn, 1994; Markowitz & Borton, 2002; McNally & Ricciardi, 1996; Merckelbach et al., 1991; Muris et al., 1992; Rutledge, 1998; Rutledge, Hancock, & Rutledge, 1996; Salkovskis & Reynolds, 1994; Tolin, Abramowitz, Hamlin, Foa, & Synodi, 2002; Trinder & Salkovskis, 1994). This thus allows for the comparison of the results of this study with findings from prior research. This study employed “counter-pressing” as a way to record the occurrence of target thoughts as it is expected to be less obtrusive than other event-marker methods, such as ringing a bell (e.g., Brewin & Beaton, 2002; Rutledge et al., 1993; Wegner et al., 1987) or pressing a buzzer (e.g., Davies & Clark, 1998). Moreover, in order to minimize the effects of counter-pressings that might influence subjects’ thought direction, the counter was placed in a chair beside the subjects’ to reduce the possibility that subjects would always see it, while still keeping it within reach. Also, subjects were reminded of not to keep holding the counter in their hands so that cues originated from the sensations of holding a counter might be reduced. Previous research has also used thinking-aloud as a way to measure the duration or frequency of target thoughts. However, a study focused on examining thought intrusions should be vulnerable to internal and external cues. Therefore, a method such as thinking-aloud, which might provide cues from sounds and language and filter out thoughts that occur almost at the same time, was not adopted. To test whether the method of the event marker would heighten the occurrence of target thoughts, future research might compare the results obtained from groups using and not using the event marker method so that its effects on target intrusions can be better understood.

A third limitation related to measurement is the possible carryover effect of the experimental tasks and measures which might affect how subjects respond to items such as rating scales that assessed anxiety, self-efficacy for thought suppression, prior experience with thought suppression, and the suppression tendency. Therefore, the validity of these rating scales may probably be affected. However, it seems inappropriate to administer those rating scales at the beginning of the experiment (before Period 1) because by doing so, subjects may speculate about the purpose of the study (i.e., thought suppression), and thus the validity of the concentration manipulation would be compromised.

A fourth limitation is that the reliability and validity of measures used in this study would not be perfect. Especially for the measures consisting of only one or two items, reliability and validity are questionable. Before further validating those measures in future research, interpretation of the results deriving from these measures should be tentative and cautious.

Limitations Related to Causal Inferences

One limitation of this study is that the analyses regarding the relationships between individual factors, suppression/distraction attempts and target thought intrusions were correlational; it is thus not possible to determine the causal relationships among some of these variables. For example, this study found that higher anxiety levels were associated with higher target-thought intrusions. It is not clear whether anxiety increased the target thought intrusions or if the occurrence of target thoughts induced anxiety, if the relationship is reciprocal, or if both are influenced by the third factor. The same problem occurs in the interpretation of the relationship between the suppression/distraction attempts and the number of target thought intrusions. Therefore, the causal relationships

implied in the interpretation of the correlational results in this study should be taken as tentative in nature. More research is needed to provide the empirical evidence to clarify the causal directions among these variables.

Limitations Related to Generalization

One limitation related to generalization is that the context in which subjects carried out the thought suppression task was a little different from the real-life situation in which thought suppression occurs. In the present study, subjects in the suppression condition were seated in front of a desk and asked to suppress target thoughts in a room containing no other facilities or things to do, which seems less likely to occur in the context of daily life. The reason for keeping the room as free of stimulus as possible was to ensure the internal validity of the experimental manipulations, as was the case for most of the other studies in this field. However, it is not known whether the results obtained from a lab environment could fully represent the effects of thought control in daily life. Therefore, future research may need to investigate the effects of various contexts on thought control so that the theories of thought suppression generated from research can better describe the real-life phenomenon of thought control.

A second limitation related to generalization is that this study only examined the short-term effects of thought control; it is not known whether the results of this study can represent the long-term effects of thought control techniques. Also, it is difficult to capture the reality when the effects of these techniques are not constant across time. In the present study, the experimental period during which subjects carried out the thought-control or thought-monitoring task lasted for only six minutes. It is possible that the relatively higher frequency of target thought intrusions observed for the suppression condition in Period 1 is due to the fact that subjects could not find an effective strategy to

suppress the thoughts within such a short period of time. As Kelly and Khan (1994) speculated, individuals may be less likely to successfully suppress thoughts when they first try to do so; however, with practice, people may find strategies to suppress thoughts more effectively. Or, on the contrary, it is possible that during a long suppression period, an ironic effect might occur or become more evident. This can be seen in Trinder and Salkovskis' (1994) four-day study that found an immediate increase in target thought intrusions resulting from thought suppression, a result that most short-term studies did not find. Future research may need to examine the effects of thought-control over different time durations so that real-life thought control can be more thoroughly understood.

A third limitation is that the target thoughts examined in this study were elicited from reading a distressing story. Therefore, the findings of this study may not generalize to other contexts, in which thoughts of a different valence or from different sources (e.g., from subjects' personal lives or from viewing a film) are controlled. Future research should examine the effects of thought control techniques in relation to different types of thoughts so that the phenomenon of thought suppression can be more precisely described.

A fourth limitation is that participants in this study were all college students who took courses in the Department of Educational Psychology and participated in the study for course credit. The findings of this study therefore may not generalize to other populations. It is thus necessary for future research to attempt to replicate these results with different populations.

A fifth limitation is that the sample size for the group who had engaged in the thought-control related activities may be too small ($n = 14$) to sufficiently represent the population, though this is not one of emphasized findings in this study. Therefore, the findings derived from the comparison of the effects of having engaged in and those of

having not engaged in thought-control related activities on thought control should be interpreted cautiously, and need to be replicated with a larger sample size in future research in order to obtain more reliable and representative results.

CONCLUSIONS

Most people have the experience of intrusions of unwanted thoughts and have tried to get rid of them. The findings of prior research (Salkovskis & Campbell, 1994; Salkovskis & Reynolds, 1994; Wegner et al., 1987) and this study suggest that telling people to suppress thoughts by focusing on one alternative engaging task may be better advice for reducing unwanted thoughts at least for a short time than simply suggesting people not to think about unwanted thoughts. But the findings of this study further suggests that helping people frame their mind to become more approach-oriented, that is, concentrating entirely on achievement of an alternative goal without concerning about avoiding something may be an even better suggestion for reducing unwanted thoughts than telling people to use the focused-distraction strategy.

Another reason that makes the suppression strategy less recommended is that suppressing unwanted thoughts without focusing on an engaging distracter may tend to induce greater anxiety than avoiding unwanted thoughts through focus on a single distraction task or simply concentrating on achieving an alternative goal.

Although suppression may not be an effective strategy to reduce unwanted thoughts in comparison to the focused-distraction and concentration strategies, this study did not find that suppressing the distressing story-related thoughts would lead to an increase of these thoughts during the suppression period or to the postsuppressional rebound of target thoughts. Therefore, as suggested by some studies (Davies & Clark,

1998; Kelly & Kahn, 1994; Muris et al., 1992; Purdon & Clark, 2001; Roemer & Borkovec, 1994; Rutledge et al., 1993), the ironic effect of suppression may not occur in all contexts. The occurrence of this effect may rather be conditioned upon certain factors such as the type of thought to be suppressed or individual differences. It is possible that when people feel more distress in relation to to-be-suppressed content, thoughts of this content will intrude on one's mind more frequently, as the present study found that the perceived distress felt toward the target thoughts was associated positively with occurrence of these thoughts during the period when subjects attempted to control them.

The findings of this study suggest that if one wants to reduce unwanted intrusive thoughts, focusing on pursuing an alternative goal might be a better idea than putting emphasis on avoiding these thoughts. In daily life application, using the concentration strategy to control unwanted thoughts may involve persuading oneself to aim at achieving an alternative goal and not care about whether or not unwanted thoughts intrude. People may tell themselves that “even if unwanted thoughts occur, I do not need to feel bad; I will just go back to concentrate on the task I want to pursue.” In fact, this is the key difference between the application of concentration and focused-distraction strategies as the latter technique still involves the thinking: “I cannot think about this” whereas the former method does not. This kind of mind-set parallels some traditions of meditation that instruct people to focus on the methods of meditation (e.g., counting breaths or observing sensations), while they do not to judge or struggle with the intrusion of wandering thoughts. Rather, they can simply go back to focus on meditation once having been aware of those intrusions.

The findings of this study may also contribute to the advancement of knowledge in metacognition in the sense that the effects of self-monitoring may be conditional upon contexts and not always facilitate the attainment of the goal. When attempting a reduction

of unwanted thoughts, the self-monitoring process may help only when one has no intention of avoiding any particular thought process but is simply focused on approaching an alternative goal.

Moreover, the findings of this study may suggest practical implications for the enhancement of learning through advancement of student understandings of their own thought processes and by teaching them better self-control strategies. For example, when attending an important lecture, students may try to get rid of distracting thoughts (e.g., thoughts about football, a movie, etc.) by focusing on the goal of “I want to hear clearly every word the instructor says.”

Overall, the findings of this study suggest that if one wants to get rid of unwanted intrusive thoughts, framing one’s mind to approach an alternative goal might be a better idea than focusing on trying to avoid those thoughts.

Appendices

APPENDIX A THE REVISED SIX-ITEM SHORT-FORM OF THE STATE SCALE OF THE SPIELBERGER STATE ANXIETY INVENTORY (THE REVISED STAI-6)

A number of statements which people have used to describe themselves are given below. Read each statement and then circle the most appropriate number to the right of the statement to indicate how you feel right now, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Not at all	Somewhat	Moderately	Very much	Extremely
1. I feel calm	1	2	3	4	5
2. I am tense	1	2	3	4	5
3. I feel upset	1	2	3	4	5
4. I am relaxed	1	2	3	4	5
5. I feel content	1	2	3	4	5
6. I am worried	1	2	3	4	5

Please make sure that you have answered *all* the questions.

Please indicate how you felt in the previous six minutes during which you were carrying out the experimental task. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your feelings best.

	Not at all	Somewhat	Moderately	Very much	Extremely
1. I felt calm	1	2	3	4	5
2. I was tense	1	2	3	4	5
3. I felt upset	1	2	3	4	5
4. I was relaxed	1	2	3	4	5
5. I felt content	1	2	3	4	5
6. I was worried	1	2	3	4	5

Please make sure that you have answered *all* the questions.

APPENDIX B MEASURES OF INDIVIDUAL-DIFFERENCE FACTORS

☞ Please make each rating below by circling a number from 1 to 5.

- 1. Please indicate the degree to which you feel distressed about the traffic-accident story you just read.**

Not at all distressed	Slightly distressed	Moderately distressed	Very distressed	Extremely distressed
1	2	3	4	5

- 2. When you were reading this traffic-accident story, to what extent can you vividly imagine every detail described in the story?**

Not at all	A little bit	Moderately	Mostly	Very much
1	2	3	4	5

- 3. When you were reading this traffic-accident story, to what extent can you vividly imagine yourself in the situations described in the story?**

Not at all	A little bit	Moderately	Mostly	Very much
1	2	3	4	5

A. Please indicate the extent to which the following statements do or do not describe you. Make each rating below by circling a number from 1 to 5.

	Not at all true of me	Little true of me	Somewhat true of me	Mostly true of me	Very true of me
1. When I am watching TV, I usually do not hear what others (friends or family members) are talking about.	1	2	3	4	5
2. When I am watching TV, I usually do not sense how much time has elapsed.	1	2	3	4	5
3. When I am watching TV, my attention is fully immersed in the contents.	1	2	3	4	5
4. I can easily remember the visual images and details in the TV programs I watched a week ago.	1	2	3	4	5
5. I can easily form mental pictures of the figures and images shown in the TV programs.	1	2	3	4	5
6. When I am reading a novel or a story, I usually do not hear what others are talking about.	1	2	3	4	5
7. When I am reading a novel or a story, I usually do not sense how much time has elapsed.	1	2	3	4	5
8. When I am reading a novel or a story, my attention is fully immersed in the contents.	1	2	3	4	5
9. I can easily remember the contents of stories I have just read.	1	2	3	4	5
10. I can easily visualize the figures and images described in novels or stories when I am reading.	1	2	3	4	5
11. I can vividly form mental pictures of the familiar places I have been to.	1	2	3	4	5
12. I can vividly imagine the details described in novels or stories.	1	2	3	4	5

B. Please make each rating below by circling a number from 1 to 5 for each rating scale.

13. In daily life (before participating in this experiment), do you have experiences of trying not to think of an unwanted thought?

No experience at all	Little experience	Some experience	A lot of experience	An extreme amount of experience
1	2	3	4	5

14. How often do you use this strategy (of trying not to think of a thought) to deal with unwanted thoughts in your daily life?

Never	Seldom	Sometimes	Most of time	Every time
1	2	3	4	5

15. Based on your prior experience (before participating in this experiment), how good were you at stopping a thought by trying not to think of it?

Not at all successful	Rarely successful	Moderately successful	Mostly successful	Extremely successful
1	2	3	4	5

16. How successfully do you think that you can stop thinking about a thought (by trying not to think of it) if you need to do so in daily life?

Not at all successful	Rarely successful	Moderately successful	Mostly successful	Extremely successful
1	2	3	4	5

17. Have you engaged in any activities, training, or workshops (e.g., meditation, Yoga...etc) that may influence your ability to control your thoughts? (Circle one answer) Yes No

17a. If yes, what are those activities and how long have you engaged in these activities? Please specify:

Names of Activities/programs	Length of time of engagement (answered by hours, months or years)
_____	_____
_____	_____
_____	_____
_____	_____

Age: _____

Major: _____

For the following items, Please place “X” in the appropriate box.

Gender: Male Female

Classification: Freshman Sophomore Junior Senior Graduate
 Other (please specify)_____

Ethnicity : White Native American African American Hispanic
 Asian American Foreign (please specify)_____
 Other (please specify)_____

APPENDIX C THE WORD-COMPLETION TEST

Form 1

Please look at the word fragments and fill in letters to form words that first come to your mind. There are no right or wrong answers. Do not spend too much time on any one word-completion but give the answer that first comes to your mind.

gree_____ dri_____ ch_____

the_____ inter_____ ti_____

sa_____ pie_____ Sla_____

ya_____ sma_____ tab_____

blo_____ flou_____ oa_____

eag_____ cr_____ acc_____

wo_____ fa_____

tent_____ coa_____

Please look at the word fragments and fill in letters to form words that first come to your mind. There are no right or wrong answers. Do not spend too much time on any one word-completion but give the answer that first comes to your mind.

fol_____ sle_____ geo_____

bri_____ tra_____ inf_____

mis_____ ben_____ mus_____

cham_____ sp_____ scre_____

de_____ pin_____ mea_____

elec_____ fea_____ la_____

J_____ gra_____

prom_____ ca_____

APPENDIX D MEASURES OF THOUGHT INTRUSION FREQUENCY, ACCURACY OF THOUGHT-RECORDING, AND SUPPRESSION/DISTRACTION/CONCENTRATION ATTEMPTS

(For the Suppression Condition)

1. Please estimate as accurately as possible how many times thoughts about the traffic-accident story came to your mind in the **FIRST six minutes** during which you were trying to **NOT** think of the traffic-accident story.

_____ Times

☞ Please make each rating below by circling a number from 1 to 5.

2. Please indicate the extent to which you have pressed the counter each time to record the thoughts about the traffic-accident story when they arose.

Not at all	Seldom	Sometimes	Most of time	Every time
1	2	3	4	5

3. In the **FIRST six minutes** (the period of avoiding thoughts about the story), to what extent have you tried to not think about the traffic-accident story?

Not at all	Slightly hard	Moderately hard	Very hard	Extremely hard (with great effort)
1	2	3	4	5

4. In the **FIRST six minutes** (the period of avoiding thoughts about the story), to what extent have you tried to focus your attention on alternative thoughts or objects in order to not think about the traffic-accident story?

Not at all	Slightly hard	Moderately hard	Very hard	Extremely hard (with great effort)
1	2	3	4	5

5. In the **SECOND six minutes** (you were told to think about whatever you wanted in that period), to what extent have you tried to **not** think about the traffic-accident story?

Not at all	Slightly hard	Moderately hard	Very hard	Extremely hard (with great effort)
1	2	3	4	5

6. In the **SECOND six minutes** (you were told to think about whatever you wanted in that period), to what extent have you tried to focus your attention on alternative thoughts or objects in order to not think about the traffic-accident story?

Not at all	Slightly hard	Moderately hard	Very hard	Extremely hard (with great effort)
1	2	3	4	5

(For the Focused-Distraction Condition)

1. Please estimate as accurately as possible how many times thoughts about the traffic-accident story came to your mind in the FIRST six minutes during which you were trying to NOT think of the traffic-accident story by focusing on thinking about and describing the kitchen where you grew up.

_____ Times

☞ Please make each rating below by circling a number from 1 to 5.

2. Please indicate the extent to which you have pressed the counter each time to record the thoughts about the traffic-accident story when they arose.

Not at all	Seldom	Sometimes	Most of time	Every time
1	2	3	4	5

3. In the FIRST six minutes, to what extent have you tried to not think about the traffic accident story by focusing on thinking about and describing the kitchen where you grew up?

Not at all	Slightly hard	Moderately hard	Very hard	Extremely hard (with great effort)
1	2	3	4	5

4. In the SECOND six minutes (you were told to think about whatever you wanted in that period), to what extent have you tried to not think about the traffic-accident story?

Not at all	Slightly hard	Moderately hard	Very hard	Extremely hard (with great effort)
1	2	3	4	5

(For the Concentration Condition)

1. Please estimate as accurately as possible how many times thoughts about the traffic-accident story came to your mind in the FIRST six minutes during which you were trying to CONCENTRATE on thinking about and describing the kitchen where you grew up.

_____ Times

☞ Please make each rating below by circling a number from 1 to 5.

2. Please indicate the extent to which you have pressed the counter each time to record the thoughts about the traffic-accident story when they arose.

Not at all	Seldom	Sometimes	Most of time	Every time
1	2	3	4	5

3. In the FIRST six minutes (you were told to think about the kitchen in that period), to what extent have you tried to concentrate on thinking about and describing the kitchen where you grew up?

Not at all	Slightly hard	Moderately hard	Very hard	Extremely hard (with great effort)
1	2	3	4	5

4. In the SECOND six minutes (you were told to think about whatever you wanted in that period), to what extent have you tried to not think about the traffic-accident story?

Not at all	Slightly hard	Moderately hard	Very hard	Extremely hard (with great effort)
1	2	3	4	5

(For the Control Condition)

1. Please estimate as accurately as possible how many times thoughts about the traffic-accident story came to your mind in the FIRST six minutes during which you were free to think about anything.

_____ Times

☞ Please make each rating below by circling a number from 1 to 5.

2. Please indicate the extent to which you have pressed the counter each time to record the thoughts about the traffic-accident story when they arose.

Not at all	Seldom	Sometimes	Most of time	Every time
1	2	3	4	5

3. In the FIRST six minutes (you were told to think about whatever you wanted in that period), to what extent have you tried to not think about the traffic-accident story?

Not at all	Slightly hard	Moderately hard	Very hard	Extremely hard (with great effort)
1	2	3	4	5

4. In the SECOND six minutes (you were told to think about whatever you wanted during that period), to what extent have you tried to not think about the traffic-accident story?

Not at all	Slightly hard	Moderately hard	Very hard	Extremely hard (with great effort)
1	2	3	4	5

APPENDIX E THE THOUGHT-ELICITED MATERIAL

You have an important interview for a job. This particular job appears to be ideal in almost all respects. If you are able to get the job you will be receiving a terrific salary. In addition, you will be doing exactly the kind of work you most enjoy. Naturally, you are excited and find it difficult to fall asleep the night before the interview which is scheduled for 9:00 AM. Finally, you doze off at about 3:00 in the morning.

When you next open your eyes you slowly turn over in bed and glance at the clock. It's 8:30 AM! You forgot to set the alarm and now the interview is in 30 minutes! After hurriedly dressing you race to the car and speed off to your appointment. While driving you are aware that you are speeding but decide it's the only way you can get to the appointment on time. You look toward the upcoming intersection and see the light turn yellow. Although you are still a considerable distance from the intersection, you accelerate. As you approach the intersection the light turns red and you see a car beginning to cross. You hit the brakes but it's too late. You slam into the side of the car to the sound of screeching tires and smashing glass. The next thing you are aware of is a group of people standing over you. One of them tells you not to move, that help is on the way. As you turn your gaze away you see the driver of the other car with a small infant in her arms. You hear her cry out, "She's dead! She's dead! My baby is dead!"

Source: From "Depression and mental control: the resurgence of unwanted negative thoughts," by R. M. Wenzlaff, D. M. Wegner, & D. W. Roper, 1988, *Journal of Personality and Social Psychology*, 55, pp. 882-892.

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