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A Monitoring Model For Understanding The Regulatory Depletion Effect

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ABSTRACT

A Monitoring Model For Understanding
The Regulatory Depletion Effect

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It has commonly been observed that a person's performance on a self-regulation activity is often impaired when he or she has already performed a prior task that requires substantial self-regulation, a phenomenon termed as the *regulatory depletion effect*. The prevailing explanation for this effect, as reported in the literature, is referred to as the resource depletion theory. According to this theory, self-regulation relies on a limited pool of resources. Because all acts of self-regulation draw on the same resource pool, its use in one task reduces the resources available to perform an immediately subsequent task, even if these tasks are seemingly unrelated.

Recent research has shown that the depletion effect is offset when depleted individuals are motivated to spend adequate resources on subsequent self-regulation. These studies suggest that the depletion effect might not be caused by a limitation in resource capacity. This dissertation proposes a monitoring model that posits that the depletion effect occurs because of a breakdown in the monitoring process among depleted individuals. Monitoring involves a comparison of individuals' behavior in relation to a salient standard with the goal of adjusting the behavior so as to minimize the discrepancy between current performance and the standard. The depletion caused by an initial self-regulation task prompts individuals to focus on the resources they are allocating to the subsequent self-regulation task and to thereby lose sight of their standard for comparison. The result of this monitoring breakdown is that unlike non-depleted individuals, depleted individuals act upon their current desire to quit prematurely on the subsequent task, which is manifested as a depletion effect.

The implication of this model is that prompting individuals to monitor their performance by comparing it with their standard enhances the likelihood of sustaining performance on the subsequent self-regulation task. This dissertation tests the monitoring model by introducing interventions thought to vary monitoring. Nine experiments are reported in which the depletion effect is moderated: (a) by the presentation of a cue that makes comparison of performance against a standard salient, (b) when individuals have a natural proclivity to self-monitor, and (c) when individuals are in positive affect.

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INTRODUCTION

It has commonly been observed that people often diminish their performance of a self-regulation task after having exerted great effort on a prior self-regulation activity. Consumers tend to engage in impulse shopping on days when they spend great effort controlling their emotions and thoughts (Vohs & Faber, 2007). Individuals who are trying to stop smoking to enhance their health commonly have difficulty maintaining healthy food consumption habits. And people who intend to regulate their drinking often indulge in excessive alcohol consumption after exerting efforts to self-regulate with respect to an unrelated activity (Muraven, Collins, & Nienhaus, 2002). The phenomenon in which individuals reduce control on a self-regulatory task after using significant resources to self-regulate during an immediately preceding task is referred to as the *regulatory depletion effect* (Muraven, Tice, & Baumeister, 1998).

The regulatory depletion effect poses a self-regulation problem in which one fails to override the desired pattern of response after an initial exertion of self-control. Baumeister and his colleagues propose a resource-depletion theory to explain these depletion effects. This theory resembles the operation of self-control to the exercising of a muscle (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven et al., 1998; Muraven & Baumeister, 2000). When a muscle becomes fatigued, the level of exertion it can expend declines. Similarly, the self has a limited resource capacity that is consumed in the performance of volitional regulatory activities. Because all acts of self-regulation are thought to draw on the same resource pool, use of such resources in one task reduces those available for the performance of an immediately proceeding second task, even if these tasks are seemingly unrelated. This results in a depletion effect: compared with people who have not exerted self-control, those who have engaged in self-control exhibit reduced

performance on a contiguously presented second task. The term “depletion effect” was created in the spirit of the resource-depletion theory.

Further, there is emerging evidence that the depletion effect may not be caused by a limitation in self-regulatory resources. It has been found that individuals who have exerted self-regulatory resources in an initial self-control task were able to maintain their subsequent self-control performance without replenishing the resources. For example, giving participants a monetary incentive for better performance eliminated the depletion effect that was observed in the absence of this incentive (Baumeister et al., 2005: Experiment 5).

These findings raise the question why, despite the availability of sufficient self-regulatory resources, people vary in their ability to maintain self-regulation. This dissertation proposes a monitoring model to account for the regulatory depletion effect. The goal in introducing this model is to enhance understanding of the regulatory depletion effect, and more specifically, to identify conditions under which people are likely to allocate sufficient resources to offset the self-regulation failure that is manifested in the regulatory depletion effect.

The dissertation consists of three chapters. Chapter I reviews literature on regulatory depletion and self-regulation; proposes a monitoring model to account for the regulatory depletion effect; and reviews literature on self-monitoring and positive affect, two factors thought to moderate the depletion effect. Chapter II presents nine experiments that test the monitoring model. Experiments 1 and 2 show that a regulatory depletion effect can be eliminated when participants are prompted to monitor their performance against a standard that accurately depicts the effort expended. Experiments 3 and 4 demonstrate that individual differences in self-monitoring moderate the regulatory depletion effect. Experiments 5 through 9 examine how positive affect influences the regulatory depletion effect by influencing the monitoring that is

undertaken. Chapter III reviews the experiments' results, discusses the theoretical contributions and managerial implications of this research, and suggests directions for future research.

CHAPTER I

LITERATURE REVIEW: REGULATORY DEPLETION, MONITORING, AND SEFLF-REGULATION

The Regulatory Depletion Effect

A substantial number of studies reported in the literature have documented the regulatory depletion effect (e.g., Baumeister et al., 1998; Baumeister et al., 2005; Muraven et al., 1998; Muraven et al., 2002; Schmeichel et al., 2003; Vohs & Schmeichel, 2003). These studies typically implement a two-task procedure in which participants initially are asked to engage in a task that requires either effortful self-regulation (depletion condition) or very little regulation (non-depletion condition). This variation in the initial self-regulatory task is followed by an unrelated resource-demanding task that also requires self-regulation. For example, in one study, participants took part initially in a food-tasting task (Baumeister et al., 1998; Study 1). Those in the depletion condition were required to refrain from eating chocolate chip cookies when performing the initial task, whereas this restriction was not imposed on those in the non-depletion control condition. Subsequently, all participants worked on an unsolvable puzzle. The initial task for the participants in the depletion condition and the puzzle task both involve effortful self-regulation because they require participants to override their initial or default responses (i.e., reaching for the chocolate chip cookies, and quitting the attempt to solve the difficult puzzle). The findings revealed that participants who were asked to refrain from eating the cookies exhibited less persistence in attempting to solve the subsequent puzzle than those who did not have to exert a high degree of self-control when performing the initial task.

In another experiment, participants were asked to list their thoughts for a duration of six

minutes. Half the participants were asked to suppress the thoughts of a white bear while writing down their thoughts. The other half were allowed to write down any thoughts, including the white bear (Vohs & Faber, 2007). The thought suppression task has been found to be a mental exercise requiring effortful self-regulation (Wegner, 1989). After completing the thought-listing task, all participants were paid for their efforts. They then were provided the opportunity to purchase a series of products using the money they had been paid. Because participants were not aware, until after completion the study, of the opportunity to purchase products, their eventual purchases were unplanned. The findings revealed that participants who had to suppress their thoughts of a white bear during the six-minute thought-listing bought more items than those who were allowed to express any thoughts in the initial task. These results replicate the depletion effect: participants depleted by the thought study were less able than non-depleted participants to resist making an impulse purchase.

Similar findings have been reported, regardless whether the initial self-regulatory task required attentional control (e.g., Stroop task, or watching a video without paying attention to the distracting lines at the bottom of the screen), cognitive control (e.g., crossing off the letter ‘e’ in a text presentation when certain conditions were imposed), emotional control (e.g., suppressing emotions when watching a humorous video), behavioral control (e.g., reading a boring article out loud with amplified facial expression and multiple hand gestures), or a combination of cognitive and emotional control (e.g., thinking about death). The depletion effect also has been observed regardless whether the second task involved persistence (e.g., working on unsolvable anagrams, watching a boring movie and quitting passively or actively, squeezing a handgrip, playing a boring and difficult game) or regulating impulses (e.g., resisting temptation of unhealthy but delicious food or drink) (e.g., Baumeister et al., 1998; Galliet et al., 2006; Muraven et al., 1998;

Vohs et al., 2005: Vohs & Faber, 2007).

Testimony to the robustness of the depletion effect is the fact that it has been found in a diverse array of social domains. These include social exclusion, aggression mortality salience, alcohol consumption, stereotyping, intellectual performance, impulse purchasing, self-representation, overeating by dieters, and resisting persuasion (e.g., Baumeister, DeWall, Ciarocco, & Twenge, 2005; DeWall, Baumeister, Stillman, & Gailliot, 2007; Gailliot, Schmeichel, & Baumeister, 2006; Muraven et al., 2002; Richeson & Shelton, 2003; Schmeichel, Vohs, & Baumeister, 2003; Vohs & Faber, 2007; Vohs, Baumeister, & Ciarocco, 2005; Vohs & Heatherton, 2000; Wheeler, Brinol, & Hermann, 2007).

Resource Depletion Theory

The prevailing explanation for the regulatory depletion effect is the resource-depletion theory (Muraven & Baumeister, 2000). This theory is based on the premise that a reduction in the amount of self-regulatory resources causes impaired performance on the subsequent self-control act (Baumeister et al., 1998; Muraven et al., 1998; Muraven & Baumeister, 2000). Baumeister and his colleagues use the metaphor of a muscle to describe the resource depletion theory. Because self-regulatory resources are comparable to the physical resources of the muscle, once individuals exert substantial resources on self-regulation, they may be left with inadequate resources to successfully perform the subsequent self-regulation act; that is, individuals exhibit depletion because they run out of the resources needed to sustain self-control.

Evidence supporting the resource depletion theory has been provided by a large number of empirical studies. In these studies, the initial task and the subsequent task were usually carried out in seemingly different domains. For example, in the study described earlier, participants were

first asked not to eat chocolate chips, followed by a request that they engage in a task requiring the solving of a puzzle (Baumeister et al., 1998; Experiment 1). The first task pertains to consumption, while the second task is an intellectual activity. The finding that persistence in solving the puzzle was undermined by the need to suppress the desire to eat chocolate chip cookies is explained by the notion that self-regulation tasks draw resources from a single pool. Because both tasks require self-regulation in overcoming certain incipient urges or impulses, both consume self-regulatory resources. Similar arguments supporting the resource depletion theory have been made in other studies demonstrating the depletion effect which use different sets of seemingly unrelated regulatory tasks.

Recent work in resource depletion theory suggests that self-control relies on glucose as a limited energy source (Gailliot, DeWall, Baumeister, Maner, & Plant, in press). A series of experiments provide evidence that glucose is involved in self-regulatory resource exertion. In these studies, it is shown that individuals who had performed an initial self-control act (e.g., Stroop task, thought suppression, emotion regulation, and attention control) reduced their glucose compared with those who had not exerted self-control in the initial task. They further found that lower levels of glucose predicted poorer performance on a subsequent self-control task (Gailliot et al., in press: Experiments 1- 8).

The resource depletion theory also proposes ways in which the depletion effect might be offset. The contention is that self-control can be strengthened by repeated practice because self-control resource, like the strength of a muscle, can be replenished and increased after repeated practice. Support for this prediction is reported in a longitudinal study where participants were given self-regulatory regimens for a period of two weeks that included improving postures and maintaining a food consumption diary (Muraven et al., 1999).

Individuals who practiced posture improvement and those who maintained an eating diary demonstrated an enhanced capacity for self-regulation on an unrelated task, as compared with participants who did not practice self-control. The resource depletion theory also suggests that self-control in depletion could be enhanced by replenishing glucose after an initial exertion of self-control. Consistent with the argument that self-regulatory resources are related to the level of glucose, studies show that individuals who took a glucose drink between the initial and subsequent tasks did not exhibit a depletion effect. Notably, the performance on the subsequent task did not differ between those who performed a depleting or non-depleting initial task (Gailliot et al., in press: Experiments 7-11).

In sum, resource depletion theory suggests that regulatory depletion effect occurs because of a lack of the resources necessary to engage in successful self-regulation. Thus, overcoming the regulatory depletion effect requires practice to increase the performance of self-regulatory activity, or replenishment of the resources by means of rest or consumption of resource-enhancing nutrients.

Moderation of the Regulatory Depletion Effect

Despite a substantial demonstration of the depletion effect and empirical support for the resource depletion theory, there is emerging evidence that this effect may not necessarily be caused by a limitation in resource availability. Recent research has indicated that the depletion effect can be overcome when no resources are replenished. Some studies following the typical two-task procedure have shown that depleted individuals are able to overcome the effects of regulatory depletion when the task prompts high motivation. For example, in one experiment, participants initially performed either a depleting or non-depleting task. They then were asked to

perform a frustrating task that requires self-control to overcome the desire of quitting. Before beginning the frustrating task, half of the participants were told that performing this task would improve their skills on an important game; for the remainder, this information was omitted. The results showed that participants who believed that practicing would improve their skills did not exhibit the depletion effect: depleted participants were just as persistent in their approach to the frustrating task as non-depleted participants (Muraven & Slessareva, 2003: Experiment 2). In contrast, those who were not informed of the benefits of practice exhibited the depletion effect.

Baumeister et al. (2005) provides another example of how the depletion effect might be overcome in everyday social contexts. Their study was based on the premise that being socially excluded or rejected consumes self-regulatory resources and therefore impairs subsequent self-regulation. Specifically, participants who were provided false feedback that they would be lonely and rejected in their future lives, as contrasted with participants who were told they would be socially accepted, performed worse in a dichotic listening task in which they were required to ignore the material spoken in one ear so as to be able to screen the list of words presented to the other ear (Baumeister et al., 2005: Experiment 5). Interestingly, in the same experiment, the authors found that when socially excluded participants were given a monetary incentive, they were able to maintain their performance of the dichotic listening task at the same level as those who were not socially excluded.

Other investigations document that the depletion effect can be eliminated by motivating performance. Along these lines, high motivation induced by the suggestion that a task requiring persistence was of substantial importance eliminated the depletion effect observed in the absence of this motivation (Muraven & Slessareva, 2003: Experiment 1). Asking participants to perform

the persistence task in front of a mirror also was successful in eliminating the depletion effect (Baumeister et al., 2005: Experiment 6).

There also is evidence that depletion may occur because of participants' naïve theories regarding the effect of self-regulation on subsequent activity. Muraven, Shmueli, and Burkley (2006) suggest that certain situations may motivate individuals to conserve their regulatory resources in some situations. They found that depleted individuals performed even more poorly on a second self-control task if they expected that they would need to exert resources in the future task after completing the second task. These results suggest that when individuals exhibit poor self-regulation performance in certain situations, it is not because they lack the adequate resources to perform the specific self-regulation task. Rather, it may due to a naïve theory on their part that exerting substantial self-regulatory resources on the task at hand will leave them with limited resources to perform another task later. Hence, they strive to conserve their resources for use in future tasks.

The effect of naïve theory on the regulatory depletion is directly tested in Martijn, Tenbult, Merckelbach, Dreezens, and de Vries (2002). Martijin and his colleagues suggest that individuals have the expectation that after performing a depleting task, they will be more tired and therefore perform a subsequent task more poorly than if they had not performed the initial depleting task. They suggested that the depletion effect may not be caused by a lack of sufficient self-regulatory resources, but that people simply behave consistently with such a belief. The study demonstrated that providing participants with the expectation that performing an initially depleting task would enhance performance on a subsequent persistence task resulted in greater persistence than that found among those who were not given this expectation and performed either a depleting or a less arduous initial task.

There also is evidence that individual differences in self-construal can affect the depletion effect. Seeley and Gardner (2003) found that individuals high in their chronic other-orientation (e.g., individuals with a dominant interdependent self-view; those from a collectivist cultural background) did not exhibit the depletion effect that was observed in individuals low in chronic other-orientation. Although Seeley and Gardner argue that people high in other-orientation may have been engaged in self-regulation more often in everyday life and thus build up more self-regulatory resources over time, it also is plausible that in relation to those low in other-orientation, individuals with a dominant other-orientation are more willing to expend available resources on subsequent self-control behaviors despite the initial depletion.

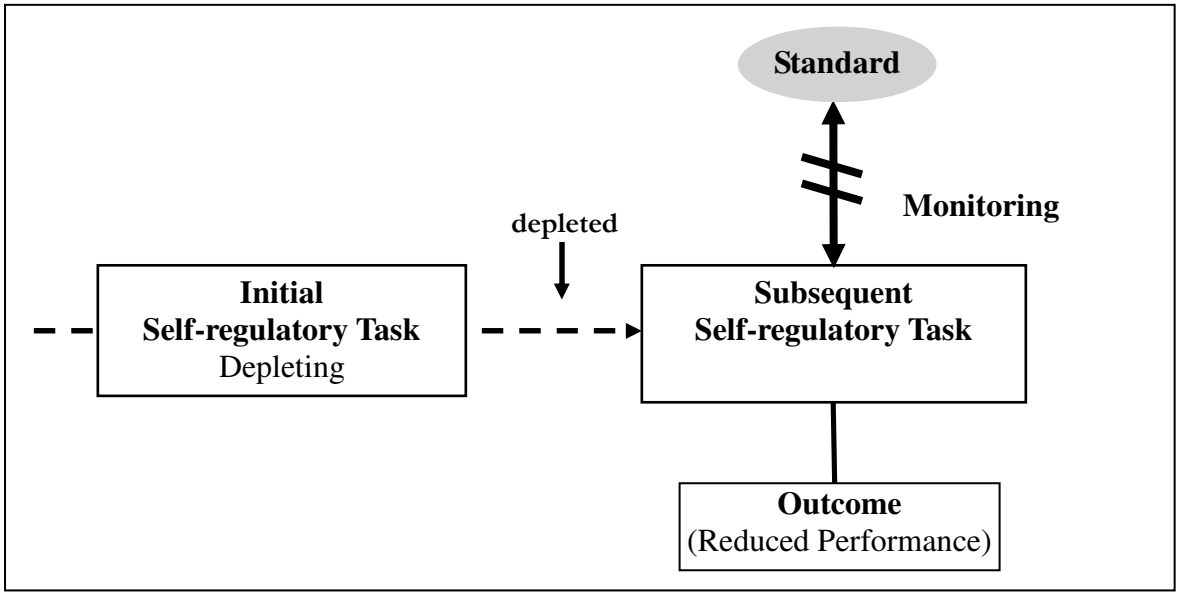
A Monitoring Model for The Regulatory Depletion Effect

The findings that individuals can overcome the depletion effect when resources are not replenished suggest that there are motivational components to consecutive self-regulation. After exerting resources on the initial self-regulatory activity, individuals often fail to spend the resources that they have remaining on their subsequent self-regulatory activity. For example, they may want to conserve their resources or are not willing to maintain their normal standard of resource exertion. The resource depletion theory and existing literature have not adequately examined the process underlying the success or failure of maintaining self-regulation in resource depletion, which is the aim of the current research.

To explain the depletion effect, the present research proposes a *monitoring model* by which the process underlying this effect can be understood (see Figure 1). According to this model, monitoring entails a process that involves comparing people's behavior in relation to a salient standard with the goal of adjusting the behavior so as to minimize the discrepancy

between current performance and the standard (Carver, 2004; Carver & Scheier, 1998). The monitoring model interprets the regulatory depletion effect in terms of the failure of depleted individuals to sustain the monitoring process. The depletion caused by an initial self-regulatory task prompts individuals to focus on the resources they are allocating to the persistence task and to lose sight of their standard of comparison. This failure to monitor results in a premature quitting of the subsequent self-regulatory task that is manifested as a regulatory depletion effect.

Figure 1: Monitoring Model for the Regulatory Depletion Effect



Previous literature on self-regulation has occasionally used the terms *standard* and *goal* interchangeably despite their slight difference in connotation (e.g., Carver & Scheier, 1998). The term 'goal' often refers to an abstract notion of the end state, whereas the term 'standard' is more concrete in the sense that it refers to the specific quality of performance perceived as necessary to attain the goal. Because the regulatory depletion effect is concerned with the failure to spend

adequate resources on self-regulation activity, the term ‘standard’ is chosen in the current model to specify the amount of resources that individuals deem appropriate in a specific social environment.

The monitoring process involved in self-regulation is adapted from Carver and Scheier’s (1998) notion of self-regulation. Carver and Scheier characterize self-regulation as a feedback-based control process in which individuals act to reduce the discrepancy between their present quality of action and their goals. This process involves monitoring behaviors by comparing the current state with standard and making adjustments to minimize the discrepancy with the standard. This depiction of self-regulation is endorsed by Baumeister and his co-investigators: “Effective self-regulation requires a certain degree of self-awareness to supervise the process of monitoring and changing the self…It is difficult to alter the self to bring it into line with goals and standards if one cannot be aware of where the self stands in relation to those standards” (Baumeister et al., 2005: p. 601).

Carver and Scheier’s (1998) depiction of self-regulation can be used to describe how individuals who feel depleted by an initial act of self-control might act in response to a subsequent activity. As shown in Figure 1, the monitoring model proposes that in a regulatory depletion paradigm, when individuals perform a self-regulatory activity (subsequent self-regulatory task) after having exerted resources on a previous self-regulation act (initial self-regulatory task), the initial exertion of self-regulatory resources alters individuals’ focus and therefore suspends the monitoring process. That is, depleted individuals focus on their effortful feeling of resource exertion and lose the focus on the standard for their resource exertion. Consequently, depleted individuals act on their impulse to stop regulating their behavior.

Compared with non-depleted individuals, who normally monitor their self-regulatory behavior, depleted individuals diminish their performance of the subsequent self-regulatory task.

A recent study conducted by Vohs and Schmeichel (2003) provides a starting point for understanding why individuals may fail to monitor their self-regulatory activity after initially exerting self-control. Vohs and Schmeichel (2003) replicated the finding that performing an arduous initial self-regulatory task resulted in diminished performance on a subsequent persistence task. More importantly, they documented that this effect was mediated by the perception of the amount of time spent in performing the persistence task: Participants who were initially depleted estimated that they had spent more time performing the persistence task than those who were not initially depleted, when in fact the opposite was true.

Vohs and Schmeichel (2003) explain their results by making a critical observation about the effect of performing an initial self-regulatory task on individuals' focus while engaging in a persistence task. They suggest that performing a resource-depleting self-regulatory task prompts a focus on the amount of time spent in task performance, which results in an elongation in the perception of time. Elongation refers to the subjective experience that "each moment is drawn out so that the present feels longer than it would normally" (Vohs & Schmeichel, 2003: p. 219). Their finding that participants who performed a depleting initial task overestimated their persistence on the subsequent task to a greater extent than did those who engaged in a non-depleting initial task provides evidence that depletion stimulates a sense of elongation. Further, it is contended that elongation in the perception of time increases the perception of fatigue and prompts a focus on current feelings and impulses that leads to losing sight of distal goals. As stated by Vohs and Schmeichel (2003), "When one is depleted, durations seem longer,

and the present becomes prolonged; current impulses overshadow goal-oriented responses …" (p. 219).

The contention that depletion results in a focus on the perceived resource allocation rather than goal-oriented responses is consistent with the notion of "goal neglect" proposed by Duncan and his colleagues. Goal neglect is defined as a temporary disregard of a goal that is retrievable when people are queried about it directly (Duncan, 1990; 1993). Duncan suggests that individuals may neglect their goal in contexts lacking strong external cues for goal-oriented action. Evidence for this view was documented in studies showing that patients with prefrontal cortex damage, individuals with low intelligence and individuals performing dual tasks often fail to meet the target task goals in environments without strong action prompts (Duncan, Burgess, & Emslie, 1995; Duncan, Emslie, Williams, Johnson, & Freer, 1996).

Evidence for the goal neglect notion is also found in work examining how working memory capacity influences the performance on the Stroop task (Kane & Engle, 2003). The finding is that a limited working memory capacity is associated with goal neglect. The Stroop task requires selective attention, external control, and executive behavioral control (Stroop, 1935; MacLeod, 1991). In the Stroop task, participants need to indicate the font colors in which the target words or word-like stimuli are printed. Color-naming becomes slower and less accurate when the color and the meaning of the word are incongruent (e.g., the word *RED* printed in blue) than when the color and word match (e.g., the word *RED* printed in red), or the word is unrelated to the color (e.g., *XX* printed in blue). When very limited numbers of congruent trials are included in the test, repeated practice in the color-word incongruent trials helps individuals to maintain the goal of "ignoring the word and paying attention to the color." However, when a large number of congruent trials are included, the Stroop task encouraged the neglect of the goal. The authors

suggest that goal neglect is more likely to occur under the circumstances of limited working memory capacity. Consistent with their argument, Kane and Engle (2003) found that individuals with low working memory capacity made more mistakes when a large number of congruent trials were included in the Stroop task than did individuals with more substantial working memory capacity. Goal neglect also has been observed under circumstances in which individuals have to maintain a secondary memory load (Robert, Hager, & Heron, 1994), or are distracted by competing stimuli (De Jong, Berendsen, & Cools, 1999).

These findings suggest that depleted individuals are likely to disregard the task goal and focus instead on thoughts about how tired they are. At the same time, the observation that individuals are able to articulate their target goals when asked directly indicates that these goals are temporarily neglected rather than not represented in memory. When goals are neglected, the standards to which individuals normally adhere for the achievement of these goals are no longer salient.

In essence, the monitoring model interprets the depletion effect in terms of a breakdown in the monitoring process, wherein depleted individuals focus on their resource allocation to the self-regulatory task. Such a focus leads to an elongation in their perception of that allocation, a neglect of their standards for the performance of such tasks, and a reliance on the current feeling of fatigue associated with the performance of the task that is manifested by a premature cessation of the task. The result is a regulatory depletion effect. The implication of this model is that prompting individuals to monitor by comparing their performance with their standard is likely to sustain their performance on the subsequent self-regulation task. Because individuals' goals and standards are thought to be neglected rather than not represented in memory (Duncan, 1990), one way to stimulate this comparison among depleted individuals is to make the consideration of a

standard salient. This cue is not expected to affect the performance of non-depleted individuals, who are thought to engage in monitoring spontaneously.

The viability of the monitoring model is suggested by the fact that it can account for the recent demonstrations documenting conditions under which the regulatory depletion effect is eliminated. As described earlier, this outcome occurs when persistence is motivated by a monetary incentive, an important issue, or the belief that persistence would improve performance. All of these inductions are likely to enhance the salience of a target goal (e.g., getting more money, showing concern for the important issue, having excellent performance for an important game later), prompt individuals to engage in a comparison of their activity to their standard for achieving the goal, and thus help them to maintain their performance despite of the initial depletion (Baumeister et al., 2005; Muraven et al., 1999; Muraven & Slessareva, 2003).

Similarly, the demonstration that having people monitor their posture for several weeks enhanced depleted individuals' persistence in an unrelated self-control task can be interpreted as evidence that creating a monitoring mindset encouraged the comparison of performance against a standard, and thus eliminated the regulatory depletion effect that would otherwise occur (Muraven et al., 1999). Seeley and Gardner's (2003) finding that individuals with a dominant other-orientation (e.g., people influenced by Eastern Asian culture) were less likely to exhibit a depletion effect can be explained by the fact that these individuals are socially motivated to consistently monitor their behavior in order to meet the standard appropriate to the social situation, as compared with individuals possessing a less dominant other-orientation (e.g., people influenced by Western culture). The demonstration in which a depletion task is performed in front of a mirror eliminated the depletion effect can be explained by noting that a mirror has been shown to enhance the extent to which individuals compare their performance to their standard

(Scheier & Carver, 1983). With respect to the finding that drinking glucose water eliminated the depletion effect, it is possible that replenishment with a nutrient drink enabled individuals to think more clearly about the standard and maintain the monitoring. These observations suggest that the monitoring model offers a plausible account for the regulatory depletion effect and its elimination.

Alternative Explanations For The Regulatory Depletion Effect

Despite theoretical support and viability for the proposition that the monitoring breakdown acts as the mechanism underlying the depletion effect, there are several alternative explanations that could have contributed to the failure to allocate sufficient resources to subsequent self-regulation. The first possibility is that initial depletion may lead individuals to lower the standard for performance of the subsequent self-regulation activity. Depleted individuals may still be engaged in monitoring; however, because they monitor their resource exertion against a lower standard than non-depleted people, they exhibited reduced performance on the second task. Prior research on expectancy theory suggests that a lowering of standards is possible under conditions of repeated self-regulation. According to the expectancy theory proposed by Martijn and his colleagues (Martijn, Alberts, & de Vries, 2006; Martijn et al., 2002), people possess a naïve theory or expectancy that acts of self-control require substantial effort. Thus, when individuals have exerted substantial effort on a prior self-regulation task, they approach the second task with the expectation that they will feel extremely tired by spending great effort on this task. It is possible that the expectation of feeling fatigued by continuous exertion of resources prompts individuals who wish to avoid extreme fatigue to reduce the standard for effort exertion.

In the current research, the lowering standard explanation is tested in the following ways. The perception of individuals as to whether they reduce their performance on the second task as a consequence of the depleting initial task is measured. If the lowering standard explanation is true, depleted individuals will be more likely than non-depleted individuals to agree that they lower their performance on the second task as a consequence of performing the first task. The monitoring breakdown explanation (i.e., neglecting the standard) will make the same prediction, because the neglect of standard also results from a feeling of fatigue in connection with the initial task. It is likely that individuals who neglect the standard nevertheless recognize that fatigue accounts for their failure to keep up with their normal level of self-control. However, if the lowering standard explanation is true, the intervention that prompts the elimination of the depletion effect should increase the lowered standard and hence make depleted individuals less likely to endorse the statement that their reduced performance results from performance of the first task. In contrast, if the monitoring breakdown explanation is true, the intervention that leads to the offset of the depletion effect should have no obvious impact on individuals' evaluation of whether they coast or not on the second task as a result of performing the effortful initial task.

The second alternative explanation relates to the notion of norms of reciprocity. According to this view, research participants come to the experiment session with an implicit sense of the total amount of effort that they would like to contribute to the researcher as the obligation. Hence, when they feel depleted upon completing the first task, they may think that they have done enough for the obligation and are not willing to spend effort on the second task according to the standard to which they normally will adhere. Baumeister and his colleagues (1998) have discussed this possibility, and have argued that this explanation cannot account for

the finding in their Experiments. In that experiment, the second task was to watch a boring movie. Participants were told that if they wanted to stop watching the movie, they needed to actively press a button. Baumeister and his colleagues found that depleted participants were less likely to elicit an active response and hence continued to watch the boring movie longer than non-depleted participants (Baumeister et al., 1998: Experiment 4). In the current research, norms of reciprocity [also] cannot explain the results of some experiments. I will discuss about this theory in the context of those experiments.

The third alternative explanation is related to the notion of elongation in time or effort. The monitoring model proposes that an elongation leads to focusing on the current feeling and thus neglecting the standard for monitoring. However, it could alternatively be posited that elongation may lead individuals to believe they have reached their standard when they actually have not. That is, depleted individuals may still be engaged in monitoring against the standard at the level to which they normally adhere. However, because they overestimate the amount of time or effort being exerted, they prematurely stop the act when they feel the standard has been met. It is indeed difficult to disentangle the overestimation explanation and the monitoring breakdown explanation because elongation could lead both to the perception of having reached the standard and of disregarding the goal and standard. Both explanations can account for the results of some experiments reported in the current research. But the monitoring breakdown explanation aligns more persuasively with results pertaining to the intervention directly concerned with the inclination to monitor. I will discuss the viability of the two explanations in the experiments.

Self-Monitoring and Regulatory Depletion

The monitoring model implies that an individual's proclivity to monitor his or her resource allocation against some standard should affect whether a regulatory depletion effect will occur. In his seminal research on individual differences in monitoring, Snyder identified the characteristics that distinguish those who exhibit adeptness in self-monitoring from those who do not (Snyder, 1974; 1979; Snyder, Berscheid, & Glick, 1983; Snyder & Monson, 1975). *High self-monitors* are attuned to the demands of the social situation and adept at regulating their expressive behavior. They are sensitive to social comparison information focusing on what the situation demands and how they can be that person (Snyder, 1974: p. 102). In contrast, the behavior of *low self-monitors* suggests that they have relatively little concern for the situational appropriateness of their behavior and accordingly are less likely to regulate their expressive behavior. The behavior of low self-monitors is guided by their inner attitudes and affective states rather than the demands imposed by the situation. They focus on who they are and they attempt to represent that person in their behavior.

Evidence for the difference between high and low self-monitors' in regulating expressive behaviors according to social requirement is reported in numerous investigations. Prior research has examined how self-monitoring affects behaviors related to self-representation and impression management in various domains, including interpersonal relationships and consumer behaviors. For example, Snyder et al. (1983) found that in contrast with low self-monitors, high self-monitors tend to choose friends who can facilitate the construction of their own situationally appropriate appearances as activity partners. Similarly, studies have shown that high self-monitors judge consumer products in terms of whether this product can cultivate their social image, whereas low self-monitors judge consumer products by whether the product can perform the intended function. For example, Snyder and DeBono (1985) found that high self-monitors

responded more favorably to image-oriented advertisements, whereas low self-monitoring individuals responded more favorably towards product-quality-oriented advertisements. DeBono and Rubin (1995) found that high self-monitors evaluated cheese on the basis of its origin (France versus Kansas), and low self-monitors evaluated cheese as a function of how it tasted.

Research also has found that high and low self-monitors differ in making attributions for their own emotional state. Graziano and Bryant (1998) argued that high self-monitors are less responsive than are low self-monitors to their own emotional reactions and more responsive to situational cues in evaluating their emotions. Their studies show that in emotion-provoking situations, high self-monitors are more likely to make situational attributions for their own emotional states than are low self-monitors.

Recently, Inzlicht, Aronson, Good, and McKay (2006) found self-monitoring affects individuals' resilience to the stresses posed by threatening intellectual environments. Research on token has found that simply being an outnumbered group will activate the stereotype threat that impairs intellectual performance. Although high self-monitors may feel more threatened by an environmental stress because they care more about making good impression than low self-monitors, high self-monitors actually are better at coping with the environment stress. Specifically, this research found that unlike low self-monitors, who react to negative stereotypes with decreased performance, high self-monitors actually enhanced their performance in the environment with negative stereotypes. The authors explain the enhanced performance among high self-monitors in terms of their sensitivity to the environment demand and hence the improved ability to respond to environmental threat with appropriate strategies. They argue that because high self-monitors habitually manage their impressions, it is easier for them to handle self-presentational concerns when encountering potential stress from the environment than it is

for low self-monitors. In contrast, low self-monitors tend to focus on their inner feelings. When they are under stereotype threat, they closely attend to their feeling of being negatively stereotyped which ironically undermines their performance.

The characterization of self-monitoring provides a basis for predicting that low but not high self-monitors will exhibit a regulatory depletion effect. High self-monitors are sensitive to the standard of performance triggered by the situational demands. Hence, they are expected to be engaged in comparing their performance to that standard rather than focusing on their feelings about the resource demands imposed by the persistence task. As a result, they are unlikely to elongate the time spent on the persistence task and are likely to persist irrespective of the demands imposed by the initial task. In contrast, low self-monitors are likely to focus on their inner feeling as a result of performing the initial self-control task. When they have performed a depleting initial task, they will focus on the feeling of depletion and thus elongate the perception of the resources spent on the persistence task. As Vohs and Schmeichel (2003) have suggested, elongation will lead individuals to current impulses and thereby cause them to lose focus on the goals. Therefore, low self-monitors are likely to follow the desire of quitting exerting effort on self-control rather than continue exerting resources in order to meet the standard of performance. As a consequence, low self-monitors are expected to exhibit less persistence upon depletion than are high self-monitors.

Positive Affect and Regulatory Depletion

The monitoring model suggests that the depletion effect can occur because people fail to monitor their performance against a standard and instead focus on the effort they are exerting. Thus, interventions that broaden the consideration of inputs to include individuals' standards

should diminish or eliminate the depletion effect. Positive affect is a transitory favorable feeling that is found to broaden the scope of inputs that individuals consider in making a decision (Fredrickson, 1998; Isen, Daubman, & Nowicki, 1987). There is substantial evidence that positive affect increases the amount and variety of materials that are brought to (Isen & Daubman, 1984; Isen et al., 1987; Isen, Johnson, Mertz, & Robinson, 1985; Kahn & Isen, 1993; Lee & Sternthal, 1999; Murray, Surjan, Hirt, & Surjan, 1990). The impact of positive affect on cognition has been documented in behaviors such as creativity-problem solving, categorization, and information integration.

Prior research has found that positive affect enhances creativity. For example, Isen et al. (1987) demonstrated that positive affect facilitates performance on a task requiring recognition that an object could serve multiple goals. In one experiment, participants were presented with a box of tacks, a candle and a book of matches and were asked to attach the candle to the wall in such a way that the candle would burn without dripping wax on the table or floor (Isen et al., 1987: Studies 1 and 2). Each participant was given ten minutes to solve the problem. The results indicated that participants who were primed to have a positive affect thought of significantly more solutions than did participants in the neutral-affect control condition. Similarly, Isen et al. (1985) found that individuals experiencing positive affect named more unusual associations to neutral words than those in neutral mood. Isen and her colleagues argued that positive affect enhanced performance on these creativity problems because it broadened individuals' consideration of task-relevant information.

Consistent with this contention, positive affect has been found to prompt flexible categorizations. Because positive affect broadens cognitive scope, individuals in positive mood (versus those in a less positive mood) often have a greater ability to see the similarity among

items that do not typically share the same category membership. Isen and Daubman (1984: Study 3) found that respondents experiencing positive affect, compared with those in the neutral mood, sorted a set of fourteen color chips into fewer categories because they included more items as belonging to the same category. Kahn and Isen (1993) found that positive affect prompts respondents to categorize nontypical items as belonging to a predefined product category (e.g., purse as a member of the category of "clothing"). Roehm and Sternthal (2001) found that positive affect enhances a person's ability to compare objects within different categories. And, Murray et al. (1990) found that in relation to those in other mood states, individuals in a positive mood formed broader categories when focusing on the similarities among exemplars and narrower categories when focusing on differences among exemplars, suggesting that positive affect could enhance an individual's flexibility with respect to the cognitive process.

Positive affect also has been demonstrated to facilitate information integration (Estada, Isen, & Young, 1997). In a field study, doctors were prompted to experience either a positive or neutral affect and were then asked to make a medical diagnosis based on the patient's medical history. It was found that doctors in positive affect integrated patient case information and made a correct diagnosis more quickly, and they were less likely than doctors in a neutral mood to sustain an early diagnosis in the face of inconsistent data.

Along these lines, Isen and Reeves (2005) have suggested that positive affect facilitates the integration of the need to respond to both the intrinsic and extrinsic motivations. Thus, although positive affect can foster individuals' intrinsic motivation for activities with potential for interest and enjoyment, it does not come at the cost of completing uninteresting tasks that impose work responsibilities. Isen and Reeves' experiments support their proposition by demonstrating that when faced with a free choice between an interesting task and an

uninteresting task, (1) participants in positive affect spent more time engaging in the interesting task and less time engaging in the uninteresting task as compared with individuals in the control condition, and (2) when the uninteresting task was represented as "work to be done," participants in positive affect were equally persistent and accurate on performing the uninteresting task as those in the control condition. They also found that participants in positive affect still spent a substantial amount of time engaging in the interesting task when they did not shirk on the uninteresting but responsible activity. These findings suggest that in situations where there is a need to choose between fun and work, individuals in positive affect possess an enhanced ability to balance the two activities rather than enjoying the fun task at the cost of completing the boring work responsibility task.

Another line of research has suggested that positive affect promotes a top-down and more flexible form of reasoning (Pham, in press). For example, Bless, Schwarz, Clore, Golisano, and Rabe (1996) found that happy participants were more likely to rely on general knowledge structures than were individuals in sad or neutral mood. Participants in the experiments listened to a "going-out-for-dinner" story and then performed a recognition task in which they were presented one at a time with thirty items and asked to indicate whether each of the items had been included in the story they had just heard. Those experiencing positive affect were more likely to indicate typical items in a restaurant script as having been included in the story than those in the neutral and sad moods. Moreover, when participants performed a secondary task while listening to the story, those in the positive mood performed better on the secondary task than did those in neutral or sad mood. These findings suggest that individuals in positive affect, rather than reducing the amount of their information processing, are flexible in strategically

relying on a general knowledge structure in information processing. Such a strategy thereby enhances their performance in the dual-task situation.

Other studies indicate that positive mood promotes a reliance on stereotypes (Bodenhausen, Kramer, & Suesser,1994), previously formed global representation in response to persuasive messages (Bless, Mackie, & Schwarz, 1992), and judgmental heuristics such as ease of retrieval (Ruder & Bless, 2003). This set of research suggests that positive affect may prompt high level, goal-related information.

In line with this set of research, recently Fishbach and Labroo (2007) recently suggested that positive affect promotes a general tendency to adopt goal states. To test this view, Fishbach and Labroo asked participants to indicate their level of endorsement with statements that represented the adoption and rejection of goals. They found that participants in positive affect, compared with those having a negative affect, were more likely to agree with statements about adopting goals and less likely to agree with statements about rejecting goals. The researchers further argued that self-improvement (e.g., being good) and mood management (e.g., being happy) are two goals particularly salient for people with positive affect. Their studies showed that individuals in positive affect reacted to self-control tasks (e.g., donating to charity, physical endurance, seeking negative feedback, and engaging in a creative task) more flexibly in accordance with the salient goal activated than those in less positive affect. Specifically, when the self-improvement goal was salient, positive affect participants performed better on self-control tasks than participants in neutral or negative affect. In contrast, when the mood management goal is salient, participants in positive affect performed worse on self-control tasks than those in neutral or negative affect.

Evidence that positive affect influences the performance of tasks as a function of the specific goal salient to individuals also is reported in research regarding mood and stop rules. Martin, Ward, Achee, and Wyer (1993) suggest that mood serves as information influencing processes that determine the motivational implication. Specifically, individuals can interpret positive affect either as the sign of having attained the goal or the sign of enjoying the task. When the rule determining when to stop is defined as whether the individual has done enough, those in positive affect stopped putting effort in task pursuit earlier than those in negative affect. In contrast, when the rule to stop is whether the individual is enjoying the task, those in positive affect stopped pursuing the task later than those in negative affect.

These findings provide the basis for the prediction that positive affect will facilitate monitoring in self-regulation. Because individuals experiencing positive affect are likely to think broadly rather than confine their focus to the resources allocated to the persistence task, they are less likely to elongate the time that they have spent on the persistence task. Hence, they are unlikely to cease exerting effort on a subsequent self-regulation task following their initial desire to stop. Moreover, because positive affect facilitates the adoption of goals, this expansive thinking is likely to include information related to goals of performing self-control tasks. Consequently, positive affect is likely to stimulate individuals to compare the resources allocated to the persistence task with the performance standard invoked by their goal (i.e., what level of resources are sufficient for the attainment of the task goal?). The effect of this monitoring process on persistence would depend on the standard individuals have adopted to meet their goal for performing the persistence task.

CHAPTER II

MONITORING AND REGULATORY DEPLETION: THE MODERATING ROLE OF STANDARD SALIENCE, SELF-MONITORING, AND AFFECT

As discussed in the previous chapter, the monitoring model proposes that depletion effect occurs because of a breakdown in the monitoring process: Depleted individuals are distracted by the focus on the effort they are exerting, neglect a consideration of the standard for monitoring their performance, and fail to compare their self-regulatory activity with their standard. This explanation implies that prompting monitoring will help offset the depletion effect: Depleted individuals will continue to monitor their performance and thus exhibit the same persistence as that observed for non-depleted individuals. Moreover, this outcome is expected to occur without replenishing self-regulatory resources through rest or the consumption of energy-boosting products.

The dissertation provides tests of the monitoring account for the depletion effect. A series of experiments are conducted for this purpose. I adopt the two-task procedure developed by Baumeister and his colleagues for this purpose (Baumeister et al., 1998; Muraven et al., 1998). In each of these experiments, research participants initially were given either a self-regulatory task that consumed substantial resources (i.e., a depletion task), or a task that imposed more modest resource demands (i.e., a non-depletion task). This task was followed immediately by a second self-regulatory task that tested participants' persistence. The difference in time spent by participants in the non-depletion and depletion conditions spent performing the persistence task served as the indicator of whether a regulatory depletion effect had occurred. In all experiments,

the influence of participants' mood on their persistence was evaluated to ascertain whether this factor was implicated in regulatory depletion effects.

I chose persistence tasks to measure individuals' subsequent self-control for the following reasons. First, persistence tasks to test self-control have been widely employed in the literature (e.g., Baumeister et al., 1998; Muraven et al., 1998; Muraven & Baumeister, 2000; Vohs & Schmeichel, 2003). Second, persistence exemplifies the nature of controlled process in many everyday self-control behaviors (e.g., maintaining diet, resisting the temptation of playing when working hard). Third, it has been shown that persistence tasks are a sensitive indicator of self-control that is responsive to a wide variety of experimental manipulations introduced in a wide range of contexts.

Experiments 1 and 2 test the effect of providing a salient cue on the regulatory depletion effect. Experiments 3 and 4 examine the moderating role of individual differences in self-monitoring on the depletion effect. And Experiments 5 - 9 investigate how the situationally induced positive affect influences the depletion effect via the monitoring process.

EXPERIMENT 1:

PROVIDING ACCURATE FEEDBACK ABOUT RESOURCE ALLOCATION

In Experiment 1, I test whether prompting depleted individuals to monitor their performance on a persistence task will eliminate the depletion effect that was otherwise expected to occur. Vohs and Shmeichel's (2003) finding that depleted individuals' persistence was mediated by the time they perceived they had spent on the persistence task suggests a simple way

to enable depleted individuals to monitor accurately the effort they allocated to this task. This would entail informing participants about the amount of time they were spending on the performance of the persistence task. The prediction was that presenting this feedback would induce depleted participants to monitor their performance by comparing their persistence against their standard for such activities as a basis for deciding how long to persist at the task. In contrast, providing feedback was not expected to influence the persistence of non-depleted participants because they already were engaged in such monitoring. Formally stated, the monitoring model hypotheses are:

H1a: A depletion effect will occur for individuals in the absence of accurate feedback about their resource allocation to the persistence task: those who have performed a depleting initial task (depleted participants) will be less persistent on the subsequent task than those who have performed a non-depleting initial task (non-depleted participants).

H1b: The depletion effect will be eliminated for individuals who are provided with accurate feedback about resource allocation to the persistence task: depleted and non-depleted participants will not differ in their performance of the persistence task.

To test these hypotheses, Experiment 1 employed a 2 (initial self-regulation: depletion vs. non-depletion) x 2 (feedback: clock present vs. no clock) between-subject design. The dependent measure is the time actually spent by participants in persisting on the second self-regulatory task.

Method

Participants. Participating in this study were fifty undergraduate students composed of 28 women and 22 men from a Midwestern university. Each was paid ten dollars.

Procedure. Prior to performing the experimental procedures, all participants were asked to remove accessories, including their watches. They were told initially that they would perform a series of experimental tasks that would last one hour, but they were not made aware of how many tasks they would have to complete during the session. Each research participant was seated in front of a computer. They first were asked to complete a "cross-off-the-letter" task that has been used successfully to vary depletion (Baumeister et al., 1998: Experiment 4). Participants were presented with a page of meaningless text from a graduate level statistics textbook displayed on their computer screens. In the non-depletion condition, the task was to cross off all instances of the letter 'e.' Most participants were able to perform this task easily because it simply involved scanning the text for the target letter. In the depletion condition, participants were given the same text and asked to cross off all instances of the letter 'e' when the context in which the letter e appeared met several criteria (i.e., the letter 'e' was not adjacent to another vowel, and it was not one letter removed from another vowel). When these criteria were not met, the letter 'e' was not to be crossed off. This task required thinking about the criteria for crossing off the letter 'e' and inhibiting the impulse to cross off each letter 'e.' Thus, it was likely to consume substantial self-regulatory resources.

After finishing the cross-off-the-letter task, participants were asked to evaluate their mood on the BMI Scale (Mayer & Gaschke, 1988). This scale includes eight pleasant mood items (active, calm, caring, content, happy, lively, loving, and peppy) and eight unpleasant ones (drowsy, fed up, gloomy, grouchy, jittery, nervous, sad, and tired). Responses to these items were

anchored on seven-point scales ranging from 1 (*definitely do not feel*) to 7 (*definitely feel*).

This mood measure was followed by the persistence task. Participants were asked to solve a puzzle, which was a 4 x 4 matrix that had fifteen numbers ranging from one to fifteen. There was one free space at the bottom right of this matrix that allowed for movement of the adjacent numbers. The participants' task was to reorder these numbers so that the four rows represented a numerical progression from one to 15. The puzzle is described in detail at: http://mathworld.wolfram.com/15Puzzle.html.

For the practice trial, the numbers in the puzzle were arranged so that solving the puzzle was easy for all participants. The intent was to ensure that research participants understood the procedures involved in the task and that they would exhibit at least some persistence in the belief that the puzzle could be solved. Once participants demonstrated an ability to solve the practice puzzle, they were given instructions patterned after those used by Baumeister et al. (1998): "You can take as much time and as many trials as you want. You will not be judged on the number of trials or the time you will take. You will be judged on whether or not you solve the puzzle. If you wish to stop before solving the puzzle, click the 'next' button below." Unknown to the participants, the fifteen numbers in the puzzle were arranged in a way that made them impossible to reorder in the manner requested. Because this puzzle is unsolvable, participants had the latitude to decide how long to persist before giving up, which made the puzzle a task that required self-regulation.

Participants were then given the opportunity to solve the puzzle. For those in the clock present condition, the accumulated time participants had spent in trying to solve the puzzle was represented to the right of the puzzle and was updated every second. This information was not provided to participants in the no clock condition. Unknown to participants, a thirty-minute limit

was set for this task. That is, participants will see an instruction on the computer monitors asking them to stop working on the task when they persisted up to 30 minutes. The amount of time participants spent attempting to solve the puzzle served as the indicator of persistence. For those who persisted up to thirty minutes, their persistence time is thirty minutes.

When participants stopped working on the puzzle, they were administered some additional questions, including the manipulation check question that asked them, "How effortful was it to cross off all the instances of 'e'?" Responses to this question were anchored on a seven-point scale ranging from 1 (*not at all*) to 7 (*very much*) (Baumeister et al., 1998). Finally, participants were debriefed and thanked for their participation.

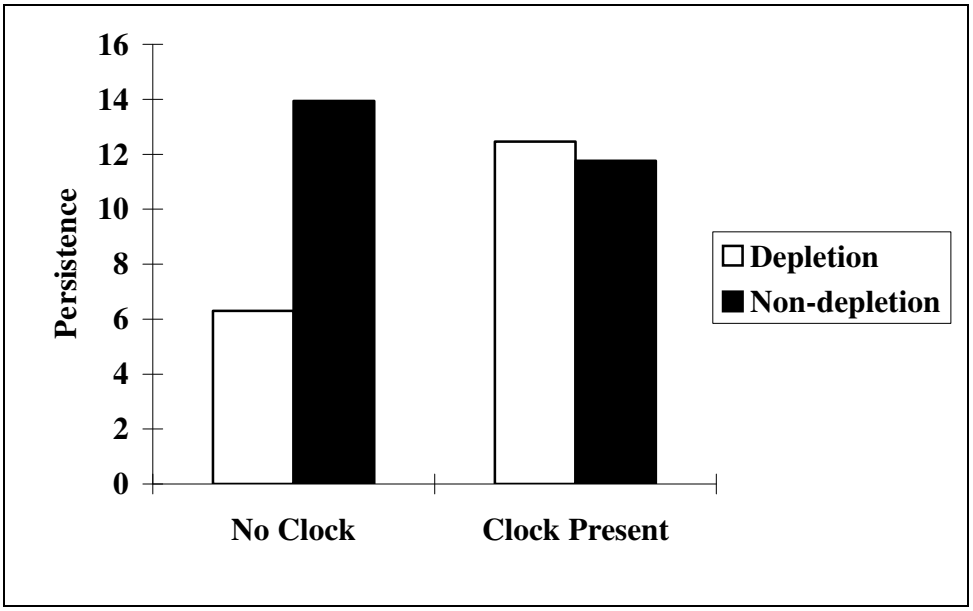
Results

Manipulation check. The adequacy of the experimental manipulations was examined first. A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (feedback: clock present vs. no clock) ANOVA indicated that only the main effect of initial self-regulation was significant: the initial self-regulatory task was perceived to be more effortful by participants in the depletion condition ($M = 5.41$, $SD = 2.04$) than it was by those in the non-depletion condition ($M = 3.70$, $SD = 1.39$), $F(1, 46) = 11.26$, $p < .01$. Neither the main effect of feedback nor the interaction effect between initial self-regulation and feedback was significant, $Fs < 1$. These results suggest that the initial depletion manipulation is successful.

Persistence. A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (feedback: clock present vs. no clock) ANOVA indicated that the main effect of the presence or absence of a clock was not significant, $F(1, 46) = 1.15$, $p = .29$, the main effect of the initial self-regulation condition was marginally significant, $F(1, 46) = 3.51$, $p = .07$, and the interaction between the

two variables shown in Figure 2 was significant, $F(1, 46) = 5.06$, $p < .03$. These outcomes were such that when the clock was absent, participants in the non-depletion condition persisted longer ($M = 13.94$, $SD = 8.00$) than those in the depletion condition ($M = 6.30$, $SD = 2.93$), $F(1, 46) = 8.55$, $p = .005$, replicating the regulatory depletion effect reported in the literature. In contrast, when the clock was present, there was no difference in persistence between those in the non-depletion ($M = 11.76$, $SD = 6.38$) and the depletion conditions ($M = 12.46$, $SD = 7.57$), $F < 1$. Moreover, these outcomes were such that when the cross-off-the-letter task was depleting, participants in the clock present condition persisted significantly longer than did those who were not informed about the time they had allocated to the persistence task, $F(1, 46) = 6.00$, $p < .02$. Hypothesis 1a and 1b were supported.

Figure 2: Persistence as a Function of Initial Self-regulation and Feedback (Experiment 1)



Mood. To assess whether participants' mood affected the regulatory depletion effect, I

composed a pleasant mood score by averaging the eight pleasant mood items (α = .89) and an unpleasant mood score by averaging the eight unpleasant mood items (α = .78) (Mayer & Gaschke, 1988). Examined first was the treatment effect on mood. Because mood was measured before the clock manipulation, I conducted a one-way ANOVA to test the effect of initial depletion on the pleasant mood score and the unpleasant mood score separately. Participants in the depletion condition (M = 3.30, SD = 1.14) and those in the non-depletion condition (M = 3.60, SD = 1.09) did not differ in their pleasant mood, $F(1, 48) = 1.57$, $p = .22$. However, participants in the depletion condition reported a more unpleasant mood (M = 3.30, SD = 1.05) than did those in the non-depletion condition (M = 2.72, SD = .95), $F(1, 48) = 4.11$, $p < .05$. This outcome raises the possibility that the regulatory depletion effect observed in this experiment was due to different levels of unpleasant mood induced by the depletion conditions.

To examine the role of unpleasant mood in explaining the regulatory depletion effect, I conducted a regression analysis in which the persistence on the puzzle task was regressed on the unpleasant mood score, feedback about the time spent on the persistence task, and the interaction between these factors. The results indicated that neither unpleasant mood nor feedback, nor the interaction between the two factors, significantly predicted persistence, $ts < 1$. These outcomes suggest that although initial depletion affected participants' unpleasant mood, unpleasant mood did not account for the persistence observed in Experiment 1. This result replicates findings regarding mood found in the literature (Baumeister et al., 1998; Muraven et al., 1998).

Discussion

Experiment 1 provides evidence for the regulatory depletion effect. More importantly, it suggests that this effect can be eliminated by making accessible accurate information about the

resource allocation to the persistence task. Under this condition, depleted participants did not exhibit the regulatory depletion effect that was observed in the absence of a standard. Non-depleted participants were unaffected when accurate information was made available about the time spent on the persistence task, presumably because they monitored their performance spontaneously.

These findings are consistent with the view suggested by the monitoring model that an elongation in the perception of the time spent on the persistence task and the attendant lack of comparison to the standard against which to assess persistence is an important determinant of the depletion effect. Consistent with this view, encouraging such comparison by providing a clock that accurately indicated the time spent performing the puzzle task increased persistence. However, it is uncertain what it was about the clock that enhanced persistence. It is plausible that this outcome is attributable to the presence of a clock *per se*, or to the presence of an accurate clock. Having a clock in sight may have served as a motivational prompt for participants in the depletion condition; thus, they persisted longer in performing the puzzle task than they did in the absence of this cue. Or, it might be the case that by presenting accurate information about persistence, the clock provided information about participants' resource allocation that they could make a comparison against their standard in determining how long to sustain their activity. To determine whether it was the clock or the information provided by the clock that was responsible for the elimination of the depletion effect, I varied the information shown on the clock in Experiment 2.

Another plausible explanation for these findings is offered by the expectancy theory proposed by Martijn and his colleagues (Martijn et al., 2006; Martijn et al., 2002). According to this view, people have the naïve theory or expectancy that acts of self-control require substantial

effort. Thus, they approach the second task with the expectation that their performance on this task would be impaired by the resource demands imposed by the initial task. As a result, their performance on the second task conforms to their expectancy. Martijin et al. (2006) tested the expectancy theory by manipulating participants' naïve theory about self-control. They found that consistent with their expectancy view, participants who were led to believe that people actually perform better in a subsequent task after exerting self-control in an initial task persisted longer than did non-depleted controls (Martijn et al., 2002: Study 1).

In the current experiment, the elimination of the depletion effect in the clock present condition may have been caused by a change in participants' expectations. Having an accurate clock in view might have challenged participants' expectation about feeling tired when performing the persistence task (e.g., "I've only been working for ten minutes. I am not tired yet. I will keep going!"). Experiment 2 examines the adequacy of the expectancy view by administering measures of participants' expectancies.

EXPERIMENT 2:

DOCUMENTING THE NATURE OF MONITORING PROCESS

The goal of Experiment 2 was to document further the nature of the monitoring process that I have introduced to account for the presence and absence of the regulatory depletion effect. This entailed replicating the procedures used in Experiment 1 to vary the resource demands imposed by the initial task and examining persistence on an unsolvable puzzle in the presence and absence of a clock. As in Experiment 1, the prediction is that a regulatory depletion effect

would be found in the absence of an accurate clock and eliminated in its presence. Experiment 2 also introduced a fast clock condition, which indicated that more time had elapsed than was actually the case. As was found for the accurate clock, the expectation is that for depleted participants, the clock would stimulate a comparison between their allocation to the persistence task and their standard for such activities. If participants made use of the information presented on the clock rather than used the presence of the clock *per se* as a cue, a fast clock was likely to lead to the premature belief that they had met their standard, which would result in a regulatory depletion effect. Non-depleted participants were not expected to be influenced by the clock because they were already monitoring their performance against their standard.

A 2 (initial self-regulation: depletion vs. non-depletion) x 3 (feedback: no clock vs. accurate clock vs. fast clock) between-subject design was used to test the robustness of H1a, H1b and the following hypothesis.

H2a: A depletion effect will occur for individuals who are given inaccurate feedback where they are led to believe that they have spent more time performing the persistence task than is actually the case: depleted participants will be less persistent on the subsequent task than non-depleted participants.

Experiment 2 also documented the mediating role of elongation in the monitoring process by having participants estimate the amount of time they had spent performing the persistence task. As Vohs and Shmeichel (2003) have suggested, elongation in time results from focusing on the effort involved in performing the persistence task and neglecting the consideration of the standard for performing such tasks. The measurement of both participants' estimates of the time

they had spent on the persistence task and the actual time spent enabled us to compute participants' elongation of time. Consistent with Vohs and Schmeichel (2003), I predict that this measure of elongation will mediate the effect of an initial task on persistence when no feedback about the time spent was provided. Time estimates in the clock conditions were not expected to be informative because participants might simply rely on the time shown on the clock when reporting their time estimates. Moreover, the measure of elongation was not expected to mediate the regulatory depletion effect in the accurate clock condition because in the absence of a depletion effect no elongation was anticipated. Thus:

H2b: Elongation in time will mediate the effect of initial depletion on persistence in the no clock condition, but not in the accurate clock or fast clock conditions.

In Experiment 2, participants' expectation about how the initial self-regulatory task would affect their performance on the persistence task also was measured. Administering this measure provided a means of testing the prediction derived from expectancy theory that the presence of a clock would change participants' expectancy about how tired they would feel after the initial depletion task and thereby affect their persistence in performing the second task. In addition, as discussed in Chapter 1, this measure will also help test whether the reduction of subsequent persistence is due to depleted individuals' lowering their standard for resource exertion on the second task.

Method

Participants. Participating in this study were 81 undergraduate students composed of 47

women and 34 men from a Midwestern university. Each was paid ten dollars.

Procedure. Each participant completed the experiment individually on a computer. As in Experiment 1, all participants completed the cross-off-the-letter task that varied the extent of their depletion and responded to the sixteen mood items from the BMI Scale. They then were asked to solve the same puzzle as that used in Experiment 1. Three experimental conditions were introduced at this point. In the two clock conditions, a clock positioned on the screen to the right of the puzzle provided feedback indicating the elapsed time spent on the puzzle. For those in the accurate clock condition, the feedback about time spent was veridical. In the fast clock condition, the time reported was four seconds faster than the actual time spent for every fifteen seconds that had elapsed. Thus, when participants saw the clock displaying "15 seconds," the actual time they had spent on the puzzle task was 11 seconds; when the clock showed that the time spent was "30 seconds," the actual time participants had spent on the puzzle was twenty-two seconds, and so on. In both clock conditions, the feedback about the time spent was not presented continuously as it had been in the previous experiment. Rather, it was updated every fifteen seconds. Elapsed time was presented in this manner to limit the chance that participants in the false feedback condition would detect the inaccuracy in the information they were presented. For participants in the control condition, no information about time was provided. As in the previous experiment, a time limit of thirty minutes was given to solve the puzzle. The amount of time participants spent attempting to solve the puzzle served as the indicator of persistence.

When participants stopped working on the puzzle, they were administered a series of questions. First, they were asked to estimate the amount of time that they thought they had spent on the puzzle task. As noted earlier, this measure was of particular interest in the no clock condition. Next, they completed the same manipulation check measure as was administered in

Experiment 1 regarding the effort exerted in performing the initial task. Finally, participants were asked to indicate their agreement with the following two statements: "After working hard on the cross off the 'e' task, I coasted a little on the puzzle task," and "I would have worked longer on the puzzle task if it were the only task I had to do." Responses to the two questions were reported on nine-point scales ranging from 1 (*strongly disagree*) to 9 (*strongly agree*). These two questions provided a means of assessing whether participants' expectations about the effect of the initial cross-off-the-letter task varied under different conditions and whether such expectancies influenced their resource allocation to the persistence task.

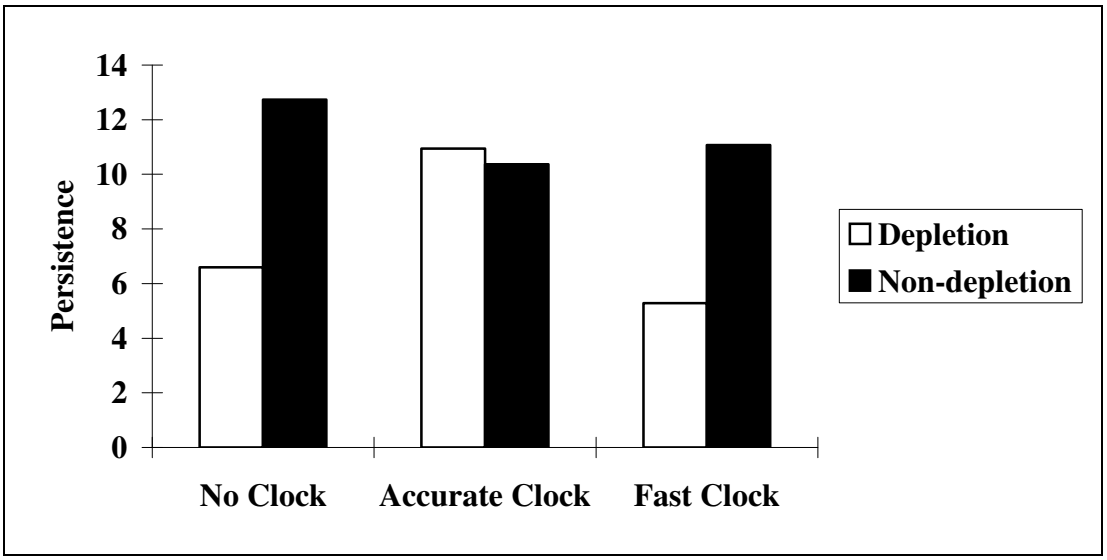
Results

Manipulation check. As in Experiment 1, the manipulation of initial self-regulation was examined first. A 2 (initial self-regulation: depletion vs. non-depletion) x 3 (feedback: no clock vs. accurate clock vs. fast clock) ANOVA indicated that neither the main effect of feedback about the time spent performing the persistence task, $F(2, 75) = 2.07$, $p = .13$, nor the interaction between initial self-regulation and feedback was significant, $F < 1$. However, the main effect of initial self-regulation was significant, $F(2, 75) = 4.73$, $p < .04$, such that participants in the depletion condition perceived the cross-off-the-letter task to be more effortful ($M = 4.95$, $SD = 2.63$) than did those in the non-depletion condition ($M = 3.83$, $SD = 1.79$). These results suggest that the manipulation of the resource demands imposed by the initial task was successful.

Persistence. An ANOVA indicated that the main effect of feedback about the amount of time spent on the puzzle task was not significant, $F(2, 75) = 1.37$, $p = .26$, whereas the main effect of the initial self-regulatory task was significant, $F(2, 75) = 9.35$, $p = .003$. More central to our theorizing, the interaction between these factors shown in figure 3 was significant, $F(2,75) =$

3.17, $p < .05$.

Figure 3: Persistence as a Function of Initial Self-regulation and Feedback (Experiment 2)



Contrasts were examined to assess the nature of this interaction. When no clock was present, a depletion effect was observed: those in the non-depletion condition (M = 12.73, SD = 6.08) persisted significantly longer on the puzzle task than did those in the depletion condition (M = 6.59, SD = 3.09), $F(1, 75) = 7.93$, $p < .01$. In contrast, when the clock provided accurate feedback about the time allocated to the persistence task, persistence in performing the puzzle task did not differ between participants in the depletion condition (M = 10.94, SD = 6.74) and those in the non-depletion condition (M = 10.37, SD = 4.83), $F < 1$. This latter outcome occurred because those in the accurate clock condition persisted longer than did those in the no clock condition when the initial self-regulatory task was depleting, $F(1, 75) = 4.14$, $p < .05$. These findings replicate the results reported in Experiment 1.

Of particular interest was the effect of feedback presented in the fast clock condition.

Here, a regulatory depletion effect was observed: participants in the depletion condition (M = 5.28, SD = 3.32) were significantly less persistent than those in the non-depletion condition (M = 11.07, SD = 7.27), $F(1, 75) = 7.24$, $p < .01$. Moreover, when the initial self-regulatory task was depleting, participants in the fast clock condition were less persistent than those in the accurate clock condition, $F(1, 75) = 6.70$, $p < .02$. These results support hypotheses 1a, 1b, and 2a.

Self-regulation and time estimation. To assess how self-regulation affected participants' estimate of the time they had spent on the persistence task, I followed the convention of using as the time estimate the ratio of participants' subjective estimation of time to the actual time spent (Block & Zakay, 1997; Vohs & Schmeichel, 2003). A ratio of one indicates accurate estimation of duration, a ratio greater than one indicates an overestimation, and a ratio less than one indicates an underestimation of duration. An ANOVA revealed that the main effect of the initial self-regulation, $F(2, 75) = 11.34$, $p < .001$, the main effect of feedback about time spent, $F(2, 75) = 17.92$, $p < .001$, and the interaction between these factors were significant, $F(2, 75) = 8.96$, $p < .001$.

To evaluate the nature of this interaction, I examined the time estimates within each of the feedback conditions. When the feedback about the time spent performing the persistence task was accurate, participants in the depletion condition (M = 1.00, SD = .19) and those in the non-depletion condition (M = .98, SD = .24) did not differ in their time estimates, $F < 1$. When no feedback was presented, participants' estimates about the time they had spent on the puzzle task were significantly longer when they were in the depletion condition (M = 1.63, SD = .51) than when they were in the non-depletion condition (M = .87, SD = .26), $F(1, 75) = 33.50$, $p < .001$. This outcome replicates Vohs and Schmeichel's (2003) observation of an elongation in the perception of time when participants were depleted. Finally, when the first task was depleting,

those in the no clock condition estimated the time spent to be significantly longer than did those in the accurate clock condition, $F(1, 75) = 49.02$, $p < .001$.

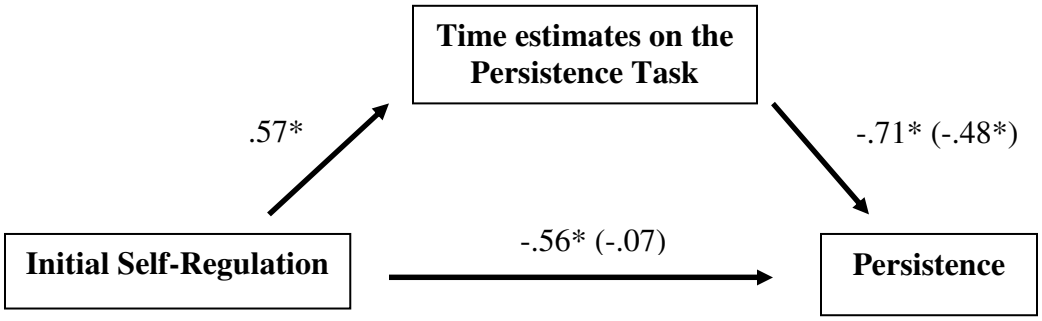
A pattern similar to the one observed in the no clock condition was found in the fast clock condition. Here, the time estimates in the depletion condition ($M = 1.51$, $SD = .46$) were longer than those in the non-depletion condition ($M = 1.34$, $SD = .29$), although the difference was only marginally significant, $F(1, 75) = 2.74$, $p = .07$. Moreover, in the non-depletion condition, participants' time estimates in the fast clock condition ($M = 1.34$) were significantly longer than those in the no clock condition ($M = .87$), $F(1, 75) = 28.64$, $p < .001$, and those in the accurate clock condition ($M = .98$), $F(1, 75) = 17.43$, $p < .001$). In the depletion condition, the time estimates in the fast clock condition ($M = 1.51$) were significantly longer than those in the accurate clock condition ($M = 1.00$), $F(1, 75) = 17.43$, $p < .001$, but were not different from those in the no clock condition ($M = 1.63$), $F(1, 75) = 1.59$, $p = .21$. Apparently, participants used the time indicated on the fast clock when asked to estimate the time they had spent, whether or not they were depleted by the initial self-regulatory task.

Time estimate as a mediator. To determine whether participants' elongation of time influences the regulatory depletion effect, I tested the mediational role of time estimates following the procedure proposed by Baron and Kenny (1986) on responses in the no clock condition (see figure 4).[1] First, I regressed participants' persistence on the puzzle task on the initial self-regulatory task. This analysis revealed a significant relationship between these variables, $\beta = -.55$, $t(24) = -3.24$, $p < .01$. As reported earlier, those in the depletion condition were significantly less persistent than those in the non-depletion condition. Next, I regressed participants' time estimates on the initial self-regulatory task. The results indicated that

[1] A mediation analysis is not reported for the accurate and fast clock conditions because the initial self-regulatory task did not affect time estimates in those two conditions. Estimates were based on the time posted on the clock.

participants' time estimation was predicted by whether this task was depleting or non-depleting, $\beta = .71$, $t(24) = 4.85$, $p < .01$: the greater the exertion required in performing the initial self-regulatory task, the longer was the perception of the time spent on the persistence task. Furthermore, a regression of persistence on participants' time estimates indicated a significant negative relationship between these variables, $\beta = -.74$, $t(24) = -5.32$, $p < .01$: greater estimates of the time spent on the persistence task were associated with less actual time spent. Finally, when both the initial self-regulatory task and the time estimates were used to predict persistence, time estimates were still significantly related to persistence, $\beta = -.69$, $t(23) = -3.47$, $p < .01$, but the relationship between the initial self-regulatory task condition and persistence was no longer significant, $\beta = -.07$, $t(23) = -.34$, $p = .73$. These results indicate that the time estimate mediated the relationship between the resources allocated to self-regulation during the initial task and persistence on the subsequent task. Hence, Hypothesis 2b was supported.

Figure 4: Mediation Model in the No Clock Condition (Experiment 2)



*$p < .01$

Mood. As in Experiment 1, a pleasant mood score was obtained by averaging the eight

pleasant mood items (α = .90), and an unpleasant mood score was obtained by averaging the eight unpleasant mood items (α = .75). One-way ANOVAs were performed on the pleasant mood score and the unpleasant mood score separately. Consistent with the results in Experiment 1, these analyses indicated that participants in the depletion condition (M = 3.37, SD = 1.16) and those in the non-depletion condition (M = 2.97, SD = 1.21) did not differ in their pleasant mood, $F(1, 79) = 2.20$, $p = .14$, and participants in the depletion condition reported a more unpleasant mood (M = 3.44, SD = 1.04) than those in the non-depletion condition did (M = 2.94, SD = .84), $F(1, 79) = 5.68$, $p = .02$.

Follow-up analyses were conducted to examine the possibility that the effects observed in this experiment could be attributed to a difference in unpleasant mood between depleted and non-depleted participants. Because the feedback about time spent on the persistence task moderates the depletion effect, I conducted a regression analysis in which persistence on the puzzle task was regressed on the unpleasant mood score, feedback, and the interaction between unpleasant mood score and feedback. The results indicated that neither of these factors nor the interaction between them had significant effects on persistence, $Fs < 1$. These outcomes suggest that although initial depletion affected participants' unpleasant mood, the presence or absence of the depletion effect was independent of the mood effect, replicating findings regarding mood found in Experiment 1 and in prior studies (Baumeister et al., 1998; Muraven et al., 1998).

Expectancy. A 2 (initial self-regulation: depletion vs. non-depletion) x 3 (feedback: accurate clock vs. fast clock vs. no clock) ANOVA was conducted to assess participants' expectancy about the impact of the initial self-regulatory task on their subsequent persistence. Those in the depletion condition reported greater agreement with the statement that they coasted a little on the puzzle task (M = 4.67, SD = 2.47) than did those in the non-depletion condition (M

= 3.19, *SD* = 2.17), $F(2, 75) = 7.84$, $p < .01$. But their agreement with this statement was not affected by the feedback about the amount of time spent ($F < 1$), or by the interaction between initial depletion and feedback ($F(2, 75) = 1.48$, $p = .23$). Along the same lines, participants in the depletion condition agreed more with the assertion that they would have worked longer on the puzzle if it were the only task (*M* = 6.72, *SD* = 2.43) than did those in the non-depletion condition (*M* = 5.55, *SD* = 2.84), $F(2,75) = 4.42$, $p < .04$. Again, their agreement with this assertion was not affected by feedback ($F < 1$), or the interaction between initial depletion and feedback, $F(2, 75) = 1.48$, $p = .23$.

Discussion

The findings reported in Experiment 2 provide additional evidence for the role of elongation in the monitoring process that produces and eliminates the regulatory depletion effect. When elongation is prompted by a depleting task, a regulatory depletion effect is observed. The finding that participants' time estimates in the no time feedback condition mediated the regulatory depletion effect provides additional evidence documenting the role of elongation in the monitoring process (Vohs & Schmeichel, 2003). When elongation is limited by the presence of a clock that accurately depicts persistence, the regulatory depletion effect is eliminated. This outcome was not due simply to the presence of the clock because a regulatory depletion effect was found in the presence of a fast clock. It appears that the clock serves a cue that not only prompts people to engage in monitoring of their performance against a standard, but also provides information that is used to determine when a standard has been reached. The accurate clock resulted in participants persisting until they had met their standard, whereas the fast clock

induced premature cessation of the persistence task because it led participants to believe that they had reached their standard when they had not.

Experiment 2 also indicates that participants exposed to a non-depleting task were not influenced by the presence of an accurate or a fast clock. Apparently, in the absence of depletion participants monitored their resource allocation in relation to their standard and thus persisted regardless of whether or not they were encouraged by a clock to engage in comparison. Indeed, for non-depleted respondents, persistence in the fast clock condition (M = 11.07) did not differ from that those the no clock condition (M = 12.73), or the accurate clock condition (M = 10.37), $Fs < 1$.

The results of Experiment 2 offer evidence relevant to the expectancy view. Our finding that depleted participants perceived that the initial depleting task reduced their resource allocation to the persistence task to a greater extent than did non-depleted individuals is consistent with Martijn et al.'s (2002) contention that individuals have a naïve theory relating resource allocation to self-regulation. The notion is that performing an initial act of self-control reduces the resources available to perform a second act of self-control and thus impairs performance of the second act. However, our results also indicate that presenting an accurate or a fast clock did not affect participants' expectancy about their resource allocation to the persistence task, suggesting that the effects observed in the clock conditions were unlikely to be attributable to a change in participants' expectations.

The results pertaining to the reported agreement with the two statements do not support the lowering standard explanation. According to this explanation, providing the accurate clock should have prompted individuals not to lower the standard and therefore maintain subsequent persistence at the same level of non-depletion individuals. If this is the case, depleted participants

in the accurate clock condition should not agree more with the two statements than non-depleted ones.

Thus, the monitoring account appears to offer a better explanation for the results of our first two studies than the plausible alternatives. Our results suggest that when individuals are depleted they can be induced to monitor their performance by the presence of a cue such as information about the time they have spent on the persistence task. As I have shown, participants' interpretation of such monitoring can lead to the same level of persistence (accurate clock) or less persistence (fast clock) than is exhibited by non-depleted participants. If these outcomes are attributable to a comparison of one's performance to some standard, it should be possible to document that people who differ in their proclivity to monitor their performance exhibit the same outcomes as I observed by varying the presence of feedback. This prediction is tested in Experiments 3 and 4 by examining the persistence of those varying in their tendency to engage in self-monitoring (Snyder, 1974).

EXPERIMENT 3:

SELF-MONITORING MODERATING THE DEPLETION EFFECT

As discussed in the previous chapter, individuals high in self-monitoring are responsive to the standard required by the situation. Therefore, they are likely to maintain the monitoring of their performance in comparison with the standard despite initial depletion. In contrast, those low in self-monitoring are less sensitive to the situational demand. Rather, they focus on their feelings of depletion, which would lead them to suspend the monitoring process and follow their

current impulse of quitting the effortful persistence task. Specifically, we have the following hypotheses:

H3a: A depletion effect will occur for individuals who are low in self-monitoring: depleted participants will be less persistent on the subsequent task than non-depleted participants.

H3b: The depletion effect will be offset for individuals who are high in self-monitoring: depleted and non-depleted participants will not differ in their performance on the persistence task.

A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (self-monitoring: high vs. low) between-subject design is employed in Experiment 3 to test these hypotheses. Self-monitoring was measured using the Self-Monitoring Scale developed by Snyder (1974).

Method

Participants. Participating in this study were fifty undergraduate students composed of 27 women and 23 men from a Midwestern university. Each was paid ten dollars.

Procedure. Each participant completed the same initial cross-off-the-letter task and the same unsolvable puzzle persistence task as were used in previous studies. After finishing the cross-off-the-letter task, participants evaluated their mood on the sixteen items from the BMI Scale. The amount of time participants spent in attempting to solve the puzzle served as the indicator of persistence. When participants had finished the puzzle, they were administered some additional questions and completed some filler tasks that took about ten minutes, including one

pertaining to the perceived effort required to perform the initial task, which was used in the previous studies as a check on the adequacy of the depletion manipulation. All participants then completed the 25-item Self-Monitoring Scale (Snyder, 1974). Response to each item was anchored on a true-false bipolar scale. High self-monitors are expected to endorse items such as "I would probably make a good actor," whereas low self-monitors are expected to endorse items such as "I find it hard to imitate the behavior of other people."

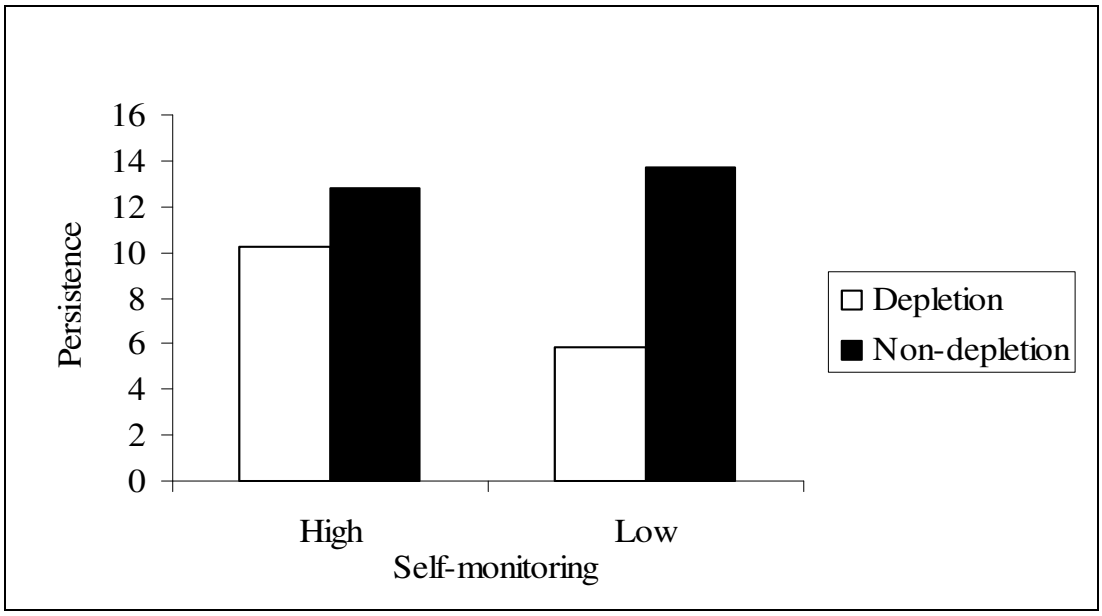
Results

Manipulation Check. Examined first was the adequacy of the manipulations. I submitted the perceived effort required to perform the cross-off-the-letter task to a regression analysis in which perceived effort was regressed on initial self-regulation (a dummy variable: 0 = non-depletion, 1 = depletion), self-monitoring (a continuous variable calculated on the basis of participants' response to each item of the self-monitoring scale), and the interaction of these two factors. The regression analysis indicated a significant main effect of initial self-regulation. The positive direction of this relationship suggests that participants in the depletion condition perceived that the initial task was more effortful than did those in the non-depletion condition, $\beta = .99$, $t(46) = 2.04$, $p < .05$. Neither the main effect of self-monitoring nor the interaction effect between initial self-regulation and self-monitoring was significant, $ts < 1$. These outcomes suggest that the cross-off-the-letter task was more depleting when it imposed complex decision rules than when such rules were not required, regardless of whether the participants were high or low in self-monitoring.

Persistence. A regression analysis was conducted to examine the treatment effects on persistence. Persistence was regressed on initial self-regulation, self-monitoring, and the

interaction of these two factors. The results indicated that the main effect of initial self-regulation was significant, $\beta = -1.54$, $t(46) = -3.15$, $p = .003$, whereas the main effect of self-monitoring was not significant, $\beta = -.09$, $t < 1$. More central to our interest, the interaction effect of the two factors was significant, $\beta = 1.05$, $t(46) = 2.12$, $p < .04$.

Figure 5: Persistence as a Function of Initial Self-regulation and Self-Monitoring (at +1 *SD* and -1 *SD* of the means of the self-monitoring score) (Experiment 3)



To examine the nature of the interaction, I conducted a simple slope test. Consistent with Aiken and West (1991), I designated low self-monitoring at one standard deviation below the mean and high self-monitoring one standard deviation above the mean, and then contrasted the difference between low and high self-monitors. The results, shown in figure 5, indicated that the initial level of depletion had a significant effect on the persistence of low self-monitors: They were less persistent in attempting to solve the puzzle when the initial task was depleting than

when it was non-depleting, $t(46) = -4.65$, $p < .001$. In contrast, the initial level of depletion did not significantly affect the persistence of high self-monitors, $t(46) = -1.49$, $p = .14$. These outcomes were such that when the initial task was depleting, high self-monitors were more persistent than low self-monitors, $t(46) = 2.15$, $p < .04$, whereas when the initial task was non-depleting, self-monitoring was not significantly associated with persistence, $t(46) = -.65$, $p = .52$. These outcomes support hypotheses 3a and 3b.

Research on the analysis of the self-monitoring scale has proposed three subscales that tap into different aspects of self-monitoring: acting, extraversion, and other-directness (Briggs, Cheek, & Buss, 1980). Acting subscale assesses the tendency of being good at and liking to speak and entertain. Other-Directedness subscale measures the willingness to change one's behavior to suit other people. Extraversion subscale evaluates extravert personality. To examine which aspects of self-monitoring contribute to the moderation of the depletion effect, three subscales scores were formed and submitted to the two-way ANOVA analyses. However, the analyses using each of the subscale scales did not produce significant results. It seems that each of the three aspects of the self-monitoring work together to enhance monitoring continuous self-regulation.

Mood. I again composed a pleasant mood score by averaging the eight pleasant mood items ($\alpha = .89$), and I developed an unpleasant mood score by averaging the eight unpleasant mood items ($\alpha = .75$). I regressed pleasant mood score on initial self-regulation, self-monitoring score, and the interaction between these factors. The results indicated a significant main effect of initial self-regulation ($\beta = -1.54$, $t(46) = -2.84$, $p < .01$), a significant main effect of self-monitoring ($\beta = -.39$, $t(46) = -2.47$, $p < .02$), and a significant interaction effect ($\beta = -1.30$, $t(46) = -2.38$, $p < .03$). Simple slope tests showed that initial depletion had a significant effect on the pleasant mood of low self-monitors, such that low self-monitors had a less pleasant mood

when the initial task was depleting than when it was non-depleting, $t(46) = -3.66$, $p < .001$. In contrast, initial depletion did not significantly affect the persistence of high self-monitors, $t(46) = .38$, $p = .71$. For unpleasant mood, neither initial self-regulation ($t(46) = 1.60$, $p = .12$), nor self-monitoring ($t < 1$), nor the interaction of the two factors was significantly related to persistence ($t(46) = -1.37$, $p = .18$). These results suggest that the presence or absence of a depletion effect might be mediated by participants' pleasant mood but not their unpleasant mood.

To examine this possibility, I regressed persistence on the pleasant mood score, self-monitoring, and the interaction between these factors. The results indicated that neither pleasant mood nor self-monitoring, nor the interaction between these factors, was significantly related to persistence, $ts < 1$. These outcomes suggested that it is unlikely that depletion effect I observed could be accounted for by participants' mood.

Discussion

Experiment 3 documents the presence of a regulatory depletion effect among those low in self-monitoring. Participants persisted less when the initial task was more depleting. Presumably this outcome occurred because low self-monitors relied on their own affective states, which prompted them to reduce their persistence after a depleting initial task. In contrast, high self-monitors were likely to be sensitive to the standard implied by the situation, which was invariant regardless of the resource demands imposed by the initial task. Thus, their persistence was not affected by the initial task.

If the regulatory depletion effect occurred among low self-monitors because they focused on the resource allocation demanded by the persistence task rather than by comparing their allocation against some standard, the effect might be eliminated by a prompt to monitor their

performance against a standard. As was suggested by the results of Experiment 2, accurate feedback about the time allocated to the persistence task is one device that stimulates monitoring and thus eliminates the regulatory depletion effect. Hence we predict that providing low self-monitors with an accurate indication of the time could prompt them to monitor their performance on the persistence task and therefore diminish or eliminate the regulatory depletion effect. On the other hand, high self-monitors, who spontaneously monitor their performance by making comparisons to their standards, were not expected to be influenced by such feedback. These predictions are tested in Experiment 4 by varying whether accurate feedback about the time spent performing the persistence task was made available to respondents.

EXPERIMENT 4:

INFLUENCING LOW SELF-MONITORS' PERSISTENCE

Experiment 4 employs a 2 (initial self-regulation: depletion vs. non-depletion) x 2 (self-monitoring: high vs. low) x 2 (feedback about time spent: accurate clock vs. no clock) between-subject design to test the following hypotheses.

H4a: For low self-monitors, a depletion effect will occur when they are not provided with accurate feedback about resource allocation to the persistence task, and this effect will be offset when they are provided with accurate feedback.

H4b: For high self-monitors, their performance on subsequent persistence tasks will not be affected either by the initial depletion or the presence or absence of an

accurate feedback about resource allocation to the persistence task.

Method

Participants. Participating in this study were 83 undergraduate students composed of 48 women and 35 men from a Midwestern university. Each was paid ten dollars.

Procedure. Each participant completed the study individually on a computer. The procedures were similar to those used in previous experiments. First, all participants were given either the easy or difficult cross-off-the-letter task and the sixteen mood items from the BMI Scale. Next, they attempted to complete the same (unsolvable) puzzle task that was used in previous studies. For those in the clock present condition, accurate information about the accumulated time participants had spent in trying to solve the puzzle was presented to the right of the puzzle and was updated on a continuous basis. This information was not provided to participants in the no clock condition.

After participants had completed their efforts to solve the puzzle, they were administered some additional questions that took about ten minutes to complete. These included a question about how effortful they found the initial self-regulatory task to be. Finally, they completed the Self-Monitoring Scale (Snyder, 1974).

Results

Manipulation check. A regression analysis was conducted to examine the effects of initial self-regulation, self-monitoring, and the interaction of these two factors on participants' perception of the effort required by the cross-off-the-letter task. The results indicated a significant main effect of initial self-regulation: participants in the depletion condition reported

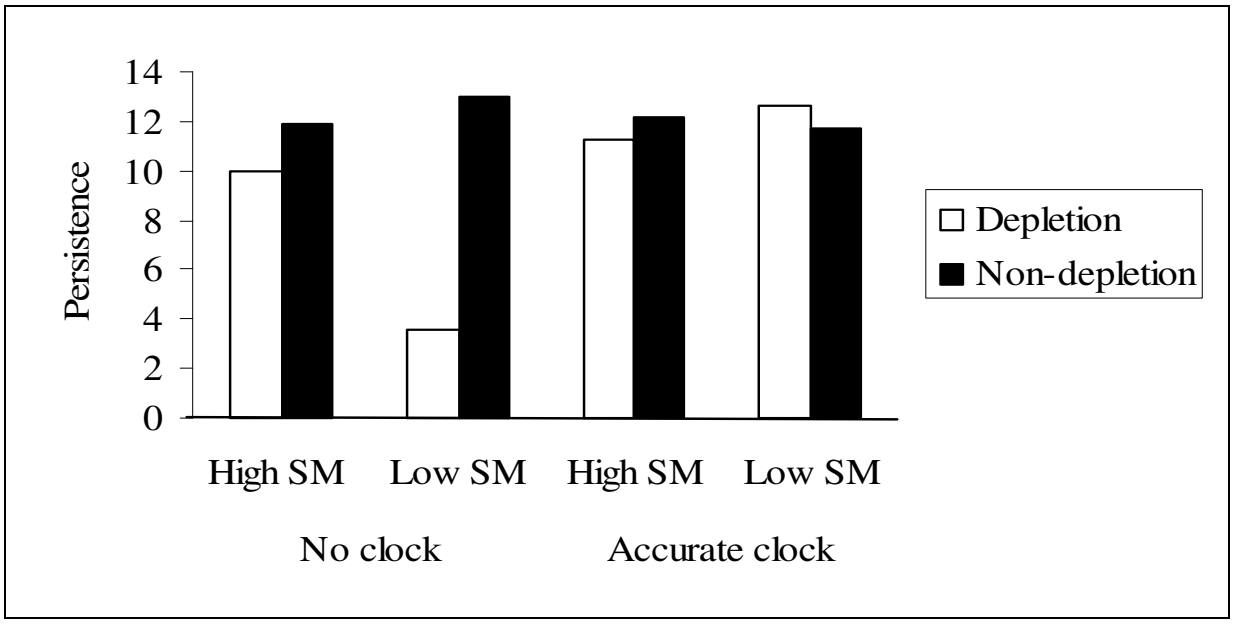
that the cross-off-the-letter task was more effortful than did those in the non-depletion condition, $\beta = .84$, $t(79) = 2.22$, $p < .04$. Neither the main effect of self-monitoring, $\beta = .07$, $t < 1$, nor the interaction effect between initial self-regulation and self-monitoring was significant, $\beta = -.50$, $t(79) = -1.32$, *ns*. These outcomes suggest that the manipulation of initial depletion by the cross-off-the-letter task was successful.

Persistence. To examine the treatment effects on persistence, we regressed the independent variables on the amount of time participants spent attempting to solve the puzzle. These factors included initial self-regulation, self-monitoring, feedback about the time spent performing the persistence task (a dummy variable: 0 = no clock; 1 = clock present), the interaction between initial self-regulation and self-monitoring, the interaction between initial self-regulation and feedback, the interaction between the self-monitoring and feedback, and the three-way interaction. This analysis indicated the presence of a significant main effect of initial self-regulation, $\beta = -1.62$, $t(75) = -2.99$, $p < .005$, a significant interaction between the initial self-regulation and self-monitoring, $\beta = 1.16$, $t(75) = 2.19$, $p < .04$, and a significant interaction between the initial self-regulation and feedback, $\beta = 1.68$, $t(75) = 2.55$, $p < .02$. The three-way interaction was marginally significant, $\beta = -1.25$, $t(75) = -1.94$, $p < .07$. Other effects were not significant, $ts < 1$.

To examine the nature of the possible three-way interaction, we conducted simple slope tests using the same one standard deviation as in Experiment 3 (See figure 6). The results indicated that initial depletion had a significant effect on the persistence of low self-monitors in the absence of a clock during the persistence task: Participants exhibited less persistence on the puzzle task when the initial task was depleting than when it was non-depleting ($t(75) = -3.83$, $p < .005$), replicating the finding reported in Study 3. However, initial depletion did not affect the

persistence of low self-monitors when an accurate clock was provided ($t < 1$), suggesting that the clock helped low self-monitors overcome the depletion effect. The results also indicated that initial depletion did not affect the persistence of high self-monitors regardless whether or not an accurate clock was present during the persistence task ($ts < 1$). These *post hoc* analyses suggest that the interaction between initial self-regulation and feedback is due primarily to the depletion of low self-monitors when the clock was absent. In contrast, high self-monitors appeared to compare their performance against a standard spontaneously, and did not exhibit the depletion effect in either feedback condition.

Figure 6: Persistence as a Function of Initial Self-regulation, Self-Monitoring (at +1 *SD* and -1 *SD* of the means of the self-monitoring score) and Feedback (Experiment 4)



Note: In the figure above, SM refers to "self-monitoring."

Mood. As in the previous experiments, we derived a pleasant mood score by averaging

the eight pleasant mood items (α = .91) and derived an unpleasant mood score by averaging the eight unpleasant mood items (α = .75). A regression analysis indicated that initial self-regulation had only a marginally significant effect on pleasant mood (β = -.71, $t(79)$ = -1.78, $p < .09$). A similar regression analysis for unpleasant mood indicated that initial self-regulation was significantly related to unpleasant mood (β = .76, $t(79)$ = 1.98, p = .051), and that self-monitoring had a marginally significant effect on unpleasant mood (β = .23, $t(79)$ = 1.74, $p < .10$). To examine whether the effects observed in this study could be due to differences in participants' mood across conditions, we regressed persistence on the pleasant mood score, self-monitoring, and the interaction between pleasant mood and self-monitoring. None of these factors was related significantly to persistence, *ns*. Similarly, we used the unpleasant mood score, self-monitoring, and the interaction between unpleasant mood and self-monitoring to predict persistence in a regression analysis. None of these factors predicted persistence, *ns*. These outcomes suggested that it is unlikely that mood accounts for the effects found in this experiment.

Discussion

Experiment 4 replicated the regulatory depletion effect observed previously for low self-monitors, and documented that the presence of a clock eliminated this effect. Apparently, the clock provided accurate feedback about the resource allocation to the persistence task that served as a standard for the resource allocation by low self-monitors. In contrast, the persistence of high self-monitors was not affected either by the initial self-regulation or by the presence or absence of a clock. These outcomes are consistent with the view that high self-monitors spontaneously invoked a standard that they deemed appropriate for the situation.

It is worth noting that self-monitoring assesses the propensity of individuals to engage in monitoring expressive behaviors. High self-monitors are more sensitive in monitoring their behavior against the standard invoked in the social environment than low self-monitors. Existing literature does not offer theoretical support for predicting that high self-monitors are more accurate in the passing of time or the amount of resources being exerted than low self-monitors. Hence, results from Experiments 3 and 4 are more congruent with the monitoring breakdown explanation (i.e., neglecting the comparison with the standard) than with the overestimation explanation (i.e., perceiving having reached the standard while in fact it has not been met).

Experiments 3 and 4 demonstrate that individual differences in self-monitoring moderate the depletion effect. In the next four experiments, I will examine how situationally-induced differences can influence the depletion effect because of their impact on the monitoring process. The situationally-manipulated factor is positive affect. As discussed in the previous chapter, positive affect can broaden one's scope of cognition and invoke top-down thinking. I also have mentioned that when individuals are depleted by an initial task, they tend to focus on feeling fatigued because of arduous resource exertion and thereby lose sight of the standard. Hence, we predict that depleted individuals experiencing positive affect will broaden their narrow focus, consider the standard for self-regulation, and engage in monitoring against the standard.

EXPERIMENT 5:

OVERCOMING THE DEPLETON EFFECT IN POSITIVE AFFECT

Experiment 5 is based on the premise that positive affect prompts individuals to engage

in the monitoring of their behavior through comparison to a relevant standard. Positive affect is a transitory favorable feeling that is thought to broaden the scope of inputs that individuals consider in making a decision (Estrata et al., 1997; Isen et al., 1987; Kahn & Isen, 1993). It is predicted that individuals experience positive affect, they are likely to consider the objective standards they perceive are applicable to this task rather than simply focus on the feeling of effortful resource exertion. Moreover, where no salient cue in the environment exists to which individuals can infer their goal and standard, they will likely follow their individual standard in order to meet the common goal in the experimental environment, and consequently perform reasonably well on this task. When this occurs, both depleted individuals and non-depleted individuals will be equally persistent with respect to the subsequent self-regulation task when they were in positive affect.

In Experiment 5, I again implement the two-task procedure typically used in the literature and the previous experiments. Affect is introduced when participants are engaged in the persistence task. A negative affect condition is used as a contrast for positive affect. Participants' persistence in performing the puzzle served as the dependent measure. Specifically, a 2 (initial self-regulation: depletion vs. non-depletion) x 2 (affect: negative vs. positive) between-subject design is employed to test the following hypothesis.

H5: A depletion effect will occur for individuals experiencing negative affect during the persistence task, and this effect will be offset for individuals experiencing positive affect during the persistence task.

Method

Participants. Participating in this study were twenty-seven undergraduate students composed of eighteen women and nine men from a Midwestern university. Each was paid ten dollars.

Procedure. The experimental procedure is similar to that used in the previous experiments. Each participant first completed the same initial cross-off-the-letter task, followed by the BMI Scale that measures their mood. All participants were then asked to complete the same unsolvable puzzle, which served as the persistence task. The amount of time participants spent in attempting to solve the puzzle served as the indicator of persistence.

Affect was varied using a facial feedback procedure when participants were working on the puzzle. There is evidence that the contraction of facial muscles into poses associated with the expression of an emotion can induce the subjective experience of the particular emotion (Adelman & Zajonc, 1989; Bodenhausen, Kramer, & Susser, 1994; Duclos, Laird, Schneider, Sexter, Stern, & Van Lighten, 1989; Ekman, Levenson, & Friesen, 1983; Sanna, Schwarz, & Small, 2002; Stepper & Strack, 1993). In this experiment, participants were told that they would work on a facial expression task concurrently with the puzzle task. This task was actually the affect manipulation. Participants were given a written instruction and picture of either the smiling or frowning expression. In the positive affect condition, they read the following instruction: "You should lift up the corners of your mouth, raise your cheeks, and make the eyes crease up as depicted in the photographs…it is important that you keep your face arranged in this way until we instruct you to stop." In the negative affect condition, participants read the following instruction: "You should contract your brow by moving your eyebrows toward the center of your forehead as depicted in the photographs… it is important that you keep your face arranged in this way until we instruct you to stop." (Sanna et al., 2002; Stepper & Strack, 1993)

Participants were arranged in which individuals sat facing the experimenter. This arrangement was chosen in order that it could be determined whether the requested facial expression was maintained during the performance of the persistence task. If participants were still working on the puzzle after thirty minutes, they were instructed to stop. After completing the puzzle task, participants responded to the same question as was asked in previous experiments to assess their perceived effort in performing the cross-off-the-letter task. Participants also reported their perceptions of the difficulty in frowning or smiling. Response to this question was anchored on a nine-point scale ranging from 1 (*not at all difficult*) to 9 (*extremely difficult*).

Results

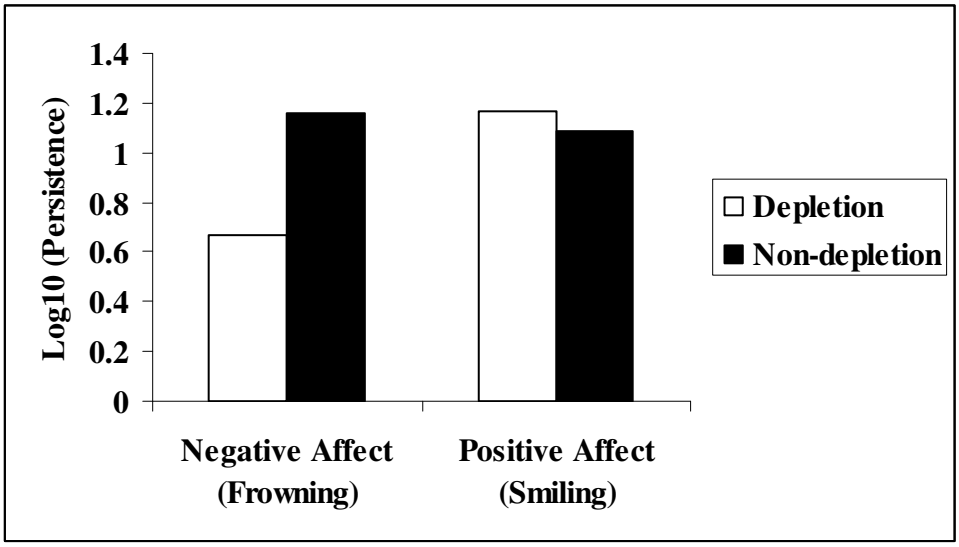
Manipulation checks. A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (affect: negative vs. positive) ANOVA indicated a significant main effect of initial self-regulation on the perceived effort required to perform the initial task. Participants in the depletion condition perceived that the effort required to perform the cross-off-the-letter task was greater ($M = 7.00$, $SD = 1.66$) than did those in the non-depletion condition ($M = 4.38$, $SD = 2.50$), $F\ (1, 23) = 8.67$, $p < .01$. Neither the main effect of affect nor the interaction between affect and initial self-regulation was significant, $Fs < 1$. This result suggests that the manipulation of initial self-regulation was successful.

A two-way ANOVA was performed to examine whether participants across conditions had different perceptions as to the difficulty of the frowning or smiling task. The results indicated no significant effects, $Fs < 1$, suggesting that participants did not perceive differences as to the difficulty in assuming a smiling versus frowning expression.

Persistence. The high variance in the amount of time participants spent on the puzzle task

resulted in a skewed distribution as to persistence. To stabilize this variance, we submitted participants' time estimates to the base 10 logarithm transformation, and used this value as the dependent variable (Fazio, 1990). A two-way ANOVA showed that the main effect of the initial self-regulation was marginally significant, $F(1, 23) = 3.59$, $p = .07$, the main effect of affect was marginally significant, $F(1, 23) = 3.89$, $p = .06$, and the interaction between depletion and affect was significant, $F(1, 23) = 6.84$, $p < .02$.

Figure 7: Persistence as a Function of Initial Self-regulation and Affect (Experiment 5)



As shown in Figure 7, simple contrasts revealed that participants with a negative affect persisted longer in the non-depletion condition ($M = 1.16$, $SD = .21$) than in the depletion condition ($M = .67$, $SD = .34$), $F(1, 23) = 9.05$, $p < .006$. This outcome replicates the depletion effect reported previously. In contrast, those in the positive affect condition exhibited similar persistence on the puzzle task whether the initial task involved non-depletion ($M = 1.09$, $SD = .23$) or depletion ($M = 1.17$, $SD = .26$), $F < 1$. In addition, when the cross-off-the-letter task

was depleting, those with positive affect persisted significantly longer than did participants with negative affect, $F(1, 23) = 11.25$, $p < .002$. In contrast, the cross-off-the-letter task was not depleting and the affect created by the facial expression manipulation did not have a significant effect on persistence, $F < 1$. These results are consistent with Hypothesis 5.

Mood. Participants' mood upon completing the initial self-regulation task was analyzed. As in the previous experiments, a pleasant mood score was obtained by averaging the eight pleasant mood items ($\alpha = .83$), and an unpleasant mood score was obtained by averaging the eight unpleasant mood items ($\alpha = .82$). ANOVAs indicated that differences in the pleasant mood between the non-depletion ($M = 3.38$, $SD = .93$) and depletion conditions ($M = 2.88$, $SD = 1.07$) were not significant, $F(1, 25) = 1.59$, *ns*. Similarly, the differences in unpleasant mood between the non-depletion ($M = 3.77$, $SD = 1.06$) and depletion conditions ($M = 3.93$, $SD = 1.30$) were not significant, $F < 1$. These results suggest that the initial self-regulation manipulation did not affect participants' mood.

Discussion

The findings of Experiment 5 suggest that the regulatory depletion effect observed for individuals experiencing negative affect was eliminated for those in positive mood during the performance of the persistence task. These results support the view that the concurrent introduction of positive affect prompts participants to monitor their persistence by comparing it with their individual standard and therefore enables them to sustain the same level of persistence regardless whether the initial task was depleting.

EXPERIMENT 6:

THE ROBUSTNESS OF OVERCOMING THE DEPLETION EFFECT IN POSITIVE AFFECT

Experiment 6 tests the robustness of our findings as to the influence of positive affect on persistence. A two-task procedure was again used. However, several changes in procedure were introduced. First, a neutral affect control condition rather than a negative affect condition was employed to contrast with the positive affect condition. This change was introduced to test whether the impact of affect on the depletion effect could be attributable to the fact that (a) negative affect reduces individuals' persistence when they are depleted by the initial task, or (b) positive affect enhances persistence. Second, the initial depletion was varied using a thought-listing task instead of using the cross-off-the-letter task used previously (Vohs & Schmeichel, 2003; Vohs & Faber, 2007). Third, unsolvable anagrams served as the persistence task in place of the unsolvable puzzle task (Baumeister et al., 1998; Muraven et al., 1998). A final change involved the manipulation of positive affect. To manipulate affect concurrently with the persistence task, the initial anagrams were composed of positive or neutral affect words. These were followed by unsolvable anagrams that served as the task on which persistence was measured.

Thus, Experiment 6 involved a design in which initial self-regulation (depletion vs. non-depletion) and affect (neutral vs. positive) were manipulated in the context of a between-subject design. Participants' persistence in performing anagrams served as the dependent measure. Formally stated, the prediction is:

H6: A depletion effect will occur for individuals who are in the control neutral affect condition, and it will be offset for individuals experiencing positive affect during the persistence task.

Method

Participants. Participating in this study were fifty-four undergraduate students composed of 32 women and 22 men from a Midwestern university. Each was paid ten dollars.

Procedure. Each participant first completed a thought-listing task that manipulated the initial self-regulation. They were told that this task was designed to examine how thoughts naturally occurred to people. To manipulate initial depletion, a procedure applied successfully in the literature was employed (Vohs & Faber, 2007; Vohs & Schmeichel, 2003; Wegner, Schneider, Carter, & White, 1987; Wegner, 1989). Participants in the depletion condition read the following instruction:

> "To help direct your thoughts on this study, you can think of anything with one exception: do not think of a white bear. If you think of a white bear or if a white bear image pops into your head when you are writing down your thoughts, please place a check mark in the margin of the paper beside the numbered thought you are working on each time this happens, and then resume writing your thoughts."

In the non-depletion condition, participants were given a similar instruction, except that they were told they could think of any thoughts, including those pertaining to a white bear. All participants were given six minutes in which to perform the thought-listing task. This was followed by the PANAS Scale that measured participants' moods (Watson, Clark, & Tellegen, 1988). This scale includes ten positive affect items (enthusiastic, interested, determined, excited, inspired, alert, active, strong, proud, attentive) and ten negative ones (scared, afraid, upset, distressed, jittery, nervous, ashamed, guilty, irritable, hostile). Responses to these items were

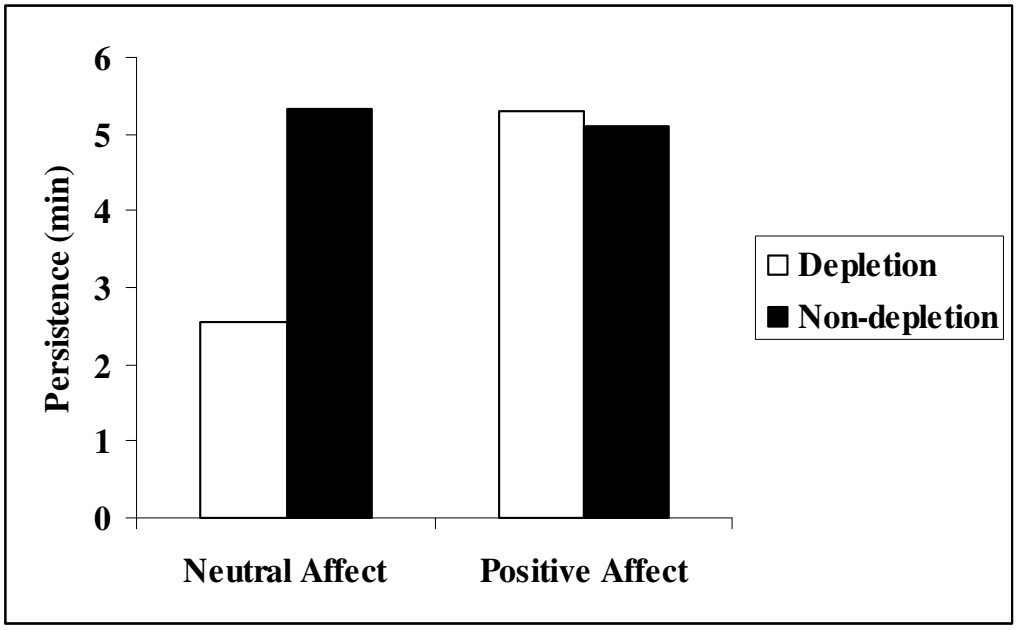
anchored on a five-point scale ranging from 1 (*not at all*) to 5 (*very much*). Afterwards, participants were administered the persistence task. In place of the puzzle task employed in previous experiments, participants performed an anagram task. They were shown the solution to a sample anagram and then asked to solve five additional anagrams. The first three anagrams were made sufficiently transparent so that all participants could solve them easily, whereas unknown to the participants, the other two anagrams were unsolvable. The first three solvable anagrams also induced the affect. In the positive affect conditions, the solutions to the three anagrams are positive-affect-related words (i.e., gdla (glad), plseaant (pleasant), deghlited (delighted)). In the neutral affect condition, the solutions to the three anagrams are affectively neutral words (i.e., netraul (neutral), aervage (average), and moederat (moderate)). Participants were asked to think about the solutions to the anagram to make sure they had arrived at the correct answers. The intent of this instruction was to enhance the elaboration of affect-related words and thus induce positive or neutral affect.

Participants were told that they would not be judged as to the time they spent on solving the anagrams or the number of trials and that they would be judged by whether they were able to solve the anagrams. They were further told that they could stop the task whenever they wished. As in the previous experiments, participants were asked to stop when they had persisted for thirty minutes. The amount of time spent on the anagram task served as the dependent variable. After completing the anagram task, participants reported how depleted they were after performing the thought-listing task on a nine-point scale ranging from 1 (*not at all depleted*) to 9 (*very depleted*).

Results

Manipulation checks. A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (affect: neutral vs. positive) ANOVA showed that there is a significant main effect of initial self-regulation: Participants in the depletion condition reported that they felt more depleted (M = 4.76, SD = 1.83) than did those in the non-depletion condition (M = 3.58, SD = 1.94), $F(1, 50)$ = 4.94, $p < .04$. Neither the main effect of affect nor the interaction between affect and initial self-regulation was significant, $Fs < 1$. This result suggests that the manipulation of initial self-regulation was successful.

Figure 8: Persistence as a Function of Initial Self-regulation and Affect (Experiment 6)



Persistence. A two-way ANOVA was performed to examine the experimental treatment effects on persistence. The results showed that the main effect of the initial self-regulation was marginally significant, $F(1, 50) = 3.58$, $p < .07$, the main effect of affect was marginally significant, $F(1, 50) = 3.50$, $p < .07$, and the interaction between depletion and affect was

significant, $F(1, 50) = 4.95$, $p < .04$. As shown in Figure 8, consistent with the predictions in Hypothesis 6, simple contrasts revealed that participants in the neutral affect condition persisted longer in the non-depletion condition ($M = 5.33$, $SD = 2.66$) than in the depletion condition ($M = 2.56$, $SD = 1.40$), $F(1, 50) = 8.71$, $p = .005$. In contrast, for those in the positive affect condition, persistence on the anagram task was similar for those in the non-depletion ($M = 5.09$, $SD = 2.71$) and depletion conditions ($M = 5.31$, $SD = 2.99$), $F < 1$. In addition, when the initial task was depleting, those in the positive affect condition persisted significantly longer than participants in the neutral affect condition, $F(1, 50) = 9.01$, $p = .004$. Hypothesis 6 was supported.

Mood. Participants' mood upon completing the initial self-regulation task was analyzed. A positive affect score was obtained by averaging the ten positive affect items ($\alpha = .89$), and a negative affect score was obtained by averaging the ten negative affect items ($\alpha = .70$). ANOVAs indicated that non-depleted and depleted participants did not differ in their positive affect scores, $F(1, 52) = 1.12$, nor did they differ in their negative affect scores, $F < 1$.

Discussion

Experiment 6 replicated the previous finding that experiencing positive affect during the persistence task prompts individuals to overcome the depletion effect observed among individuals in the neutral affect condition. These outcomes occurred despite the fact that this experiment employed different depletion and persistence tasks as well as a different manipulation of affect than that used in the previous study. This replication lends testimony to the robustness of the effects of positive affect on persistence.

One issue arising in Experiments 5 and 6 pertains to whether the increase in persistence among depleted individuals who experience positive affect is indeed due to an enhanced

monitoring of persistence against individuals' standards. It seems no less plausible that positive affect might simply have created a positive disposition that prompted substantial persistence. Or it might be that positive affect increases individuals' resources and thus enhances the persistence of depleted individuals who have the resource limitation. According to the mood-as-a-resource hypothesis, positive mood is thought to increase the ability to cope with self-relevant negative information. This is because positive affect may act as a psychological buffer against the affective costs of negative information (Aspinwall, 1998; Trope & Neter, 1994; Trope, Ferguson, & Raghunathan, 2000; Trope & Fishbach, 2000). In a self-regulatory task that requires persistence, positive affect may increase the resources and enhance the persistence of depleted individuals.

To address these rival explanations as to the effect of positive affect on persistence, the next two experiments examine situations where the two explanations make different predictions. According to the monitoring account, positive affect influences persistence as a function of the standard invoked in the task environment. Hence, persistence of individuals in positive affect will be a function of the variation of standard. In contrast, according to the mood-as-a-resource hypothesis, persistence of individuals in positive affect will always be enhanced independent of the standard invoked.

EXPERIMENT 7:

INIITAL TASK INVOKING DIFFERENT STANDARD

The discussion of the previous two experiments indicated a need to distinguish between monitoring and other views. Hence, Experiment 7 examines the situation in which the task

environment signals a salient standard. One type of standard for resource allocation that can be picked up in the two-task procedure is the level of resource allocation required by the initial task. In Experiments 5 and 6, positive affect was induced simultaneously during the subsequent persistence task. This may have focused individuals' thinking on their own standard for this type of task that they were locally attending to, which makes individuals less likely to anchor their performance on the standard of resource exertion set up by the initial task. Thus, in Experiment 6, positive affect is induced at the beginning of the experiment so that individuals in positive affect are more likely to pick up the standard for resource exertion on the initial task as the standard for persisting on the subsequent task.

The prediction that positive affect may prompt a monitoring against the standard set up by the initial task is based on the following reasons. Previous research has suggested that positive affect facilitates the adoption of goal state and enhances people's adherence to accessible goals (Fishbach & Labroo, in press). Hence, individuals in positive affect are less likely to neglect the standard for monitoring their behavior to strive for their goal. The question is "Which standard is invoked?" Research by Erez and Isen (2002) suggest that positive affect enhances people's perceived relationship between performance and expectation of reward. Although people generally expect to achieve a greater reward when they exert greater effort in performance, positive affect increases the expected reward when the performance is at a moderate level. Of course, when performance is extremely low or high, the relationship between effort and reward is so clear that individuals will have similar expectations regarding a reward for such effort exertion regardless whether they are in positive or less positive affect. In general, however, individuals' exertion of effort is not at the extreme levels. Hence, positive affect will increase individuals' sensitivity to the effort-reward relations in self-regulation.

According to Carver and Scheier's (1998) feedback-based self-regulation theory, individuals monitor their self-regulation behaviors by comparing their performance with the standard then salient to them. In a two-task procedure, when lacking obvious external cues, it is likely that individuals will infer from the amount of resource exertion on the first task what the standard is for the subsequent task. It is especially possible when the two tasks are considered as related or similar. Although the two tasks in the regulatory depletion paradigm are generally unrelated, positive affect will prompt individuals to relate them with each other. Previous literature has shown that positive affect promotes thinking of inter-concept relations (Isen, 1993; Lee & Sternthal, 1999; Rohem & Sternthal, 2003). For example, Rohem and Sternthal (2003) found that positive affect enhanced participants' ability to comprehend an analogy that compares items sharing underlying relational structure but not surface features. Along similar lines, researchers have found that individuals in positive affect are more likely to include atypical objects to a particular category based on the structural or functional attributes than individuals in the neutral mood (e.g., Isen & Daubman, 1984; Kahn & Isen, 1993).

Apply these findings in the context of the monitoring process, it is reasonable to propose that positive affect will prompt individuals to map the relations of two seemingly unrelated tasks and to apply similar standards of resource exertion to the two tasks. After finishing the first task, the resources demanded by the first task becomes salient. If at this point of time individuals are already in positive affect, it is likely that they will be sensitive to the resource demand of the first task and use it as the standard for resource exertion on the second task.

Therefore, based on the monitoring account, we should observe greater persistence under neutral affect when participants are not depleted than when they are, replicating the finding in the previous experiments. More importantly, non-depleted participants should exhibit greater

persistence when affect is neutral than when it is positive. In contrast, depleted participants should exhibit greater persistence when affect is positive than when it is neutral. These outcomes are predicted on the basis that the initial task sets up the standard for resource exertion to participants in positive affect. A depleting initial task signals a higher standard for resource exertion and a non-depleting initial task signals a lower standard. In contrast, according to the mood-as-a-resource hypothesis, individuals in positive affect should have an enhanced performance on the second task as compared with those in neutral affect without being influenced by the resource demand of the first task. Hence, Experiment 7 tests the following hypotheses in a 2 (initial self-regulation: depletion vs. non-depletion) x 2 (affect: neutral vs. positive) between-subject design.

H7a: When the initial task is depleting, participants experiencing positive affect will be more persistent on the second task than those in neutral affect.

H7b: When the initial task is non-depleting, participants experiencing positive affect will be less persistent on the second task than those in neutral affect.

Method

Participants. Participating in this study were fifty-two undergraduate students composed of thirty-five women and seventeen men from a Midwestern university. Each was paid ten dollars.

Procedure. Each participant completed the experimental tasks individually on a computer. Participants were first asked to complete a study that ostensibly assessed their skills in being socially empathetic. This task was used to manipulate affect. Participants read three excerpts of

stories, and reported their own thoughts that reflected the affect they perceived to be expressed in the story. In the positive affect condition, the stories communicated that people experience happy moments such as getting a desirable job offer or winning an important sports medal, whereas in the neutral affect condition, the stories described people who maintained a neutral disposition in occasions such as working at the company or driving in rush hour (Lee & Sternthal, 1999).

Following affect manipulation, participants were asked to complete the same cross-off-the-letter task as used in Experiments 1 through 5, followed by the BMIS Scale. Afterwards, all participants were asked to perform the same unsolvable puzzle as used in previous experiments. Again, the amount of time participants spent on the puzzle served as the indicator of persistence. Finally, participants completed a manipulation check question asking, "How effortful was it to cross off all the instances of 'e'?" Responses to this question were on a scale that ranged from 1 (*not at all*) to 7 (*very much*).

Results

Manipulation check. A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (affect: neutral vs. positive) ANOVA indicated only a significant main effect of initial self-regulation such that participants in the depletion condition perceived that greater effort was required to perform the cross-off-the-letter task ($M = 5.79$, $SD = 1.79$) than did those in the non-depletion condition ($M = 4.42$, $SD = 2.30$), $F(1, 49) = 5.79$, $p = .02$. Neither the main effect of affect ($F < 1$) nor the interaction between affect and initial self-regulation ($F(1, 48) = 1.79$, *ns*) was significant. This outcome suggests that the manipulation of the resources required to perform the initial task was successful. In addition, inducing positive affect did not affect participants' perception of the

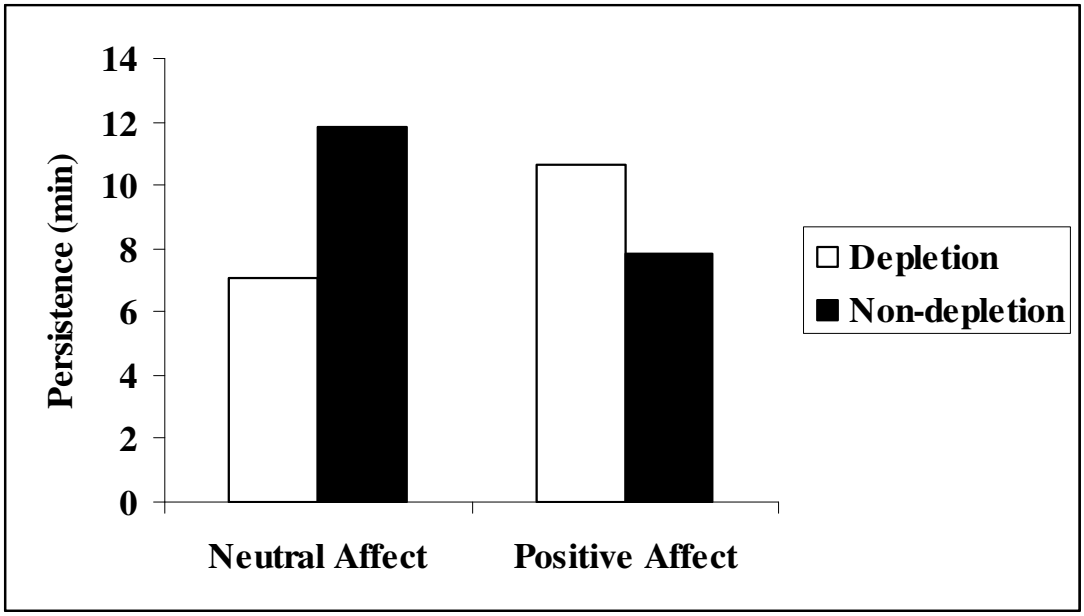
depletion imposed by the initial task.

Persistence. A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (affect: neutral vs. positive) ANOVA indicated that neither the main effect of initial self-regulation nor the main effect of affect was significant ($Fs < 1$). However, the interaction between these factors shown in Figure 9 was significant, $F(1, 48) = 8.19$, $p < .01$. Simple contrasts revealed the nature of the interaction. When affect was neutral, those in the depletion condition were less persistent ($M = 7.05$, $SD = 4.15$) than those in the non-depletion condition ($M = 11.84$, $SD = 6.55$), $F(1, 48) = 6.55$, $p < .02$, replicating the regulatory depletion effect reported in the literature and the experiments reported earlier. When affect was positive, those in the non-depletion condition ($M = 7.82$, $SD = 4.21$) seemed to be less persistent than were participants in the depletion conditions ($M = 10.61$, $SD = 3.91$). However, the difference was not significant, $F(1, 48) = 2.22$, $p < .15$. Importantly, when the initial task was non-depleting, participants exhibited greater persistence in the neutral affect ($M = 11. 84$) than in the positive affect condition ($M = 7.82$), $F(1, 48) = 4.28$, $p < .05$. In contrast, when the initial task was depleting, participants were more persistent in the positive affect ($M = 10.61$) than in neutral affect ($M = 7.05$), $F(1, 48) = 3.91$, $p = .054$. Hence, both hypotheses 7a and 7b were supported.

Mood. Again, participants' mood upon completing the initial self-regulation task was analyzed. A pleasant mood score was obtained by averaging the eight pleasant mood items ($\alpha = .91$), and an unpleasant mood score was obtained by averaging the eight unpleasant mood items ($\alpha = .83$). Two-way ANOVAs indicated that participants in the depletion condition felt less pleasant in their mood ($M = 2.98$, $SD = 1.00$) than did non-depletion participants ($M = 3.72$, $SD = .87$), $F(1, 48) = 7.47$, $p < .01$. Neither the affect manipulation nor the interaction between initial self-regulation and affect were significant, $Fs < 1$. The unpleasant mood score was not

significantly affected by the experimental treatments, *Fs* < 1. To test whether the self-reported mood affects subsequent self-regulation, a regression analysis was conducted. The results showed that the relationship between persistence and pleasant mood score was not significant, *t* < 1. These results suggest that the initial self-regulation manipulation did not affect participants' mood.

Figure 9: Persistence as a Function of Initial Self-regulation and Affect (Experiment 7)



Discussion

Experiment 7 replicates the finding that a regulatory depletion effect is found for individuals in neutral affect and the regulatory depletion effect is eliminated in the positive affect condition. Moreover, the results on participants' persistence when in the positive affect condition is consistent with the expectations of the monitoring model. It is found that compared with participants in neutral affect, those in positive affect exhibited higher persistence when the first

task was depleting and lower persistence when the first task is non-depleting. These results cannot be explained by the mood-as-a-resource hypothesis: If positive affect increases the resources, non-depleted participants in positive mood should not decrease their persistence as compared with non-depleted participants in neutral mood.

One concern about this experiment is that positive affect was manipulated before the initial depletion task. The intention of manipulating positive affect before the initial task was to encourage relational thinking and thus prompt a consideration of the resource demands imposed by the initial task as the standard for resource exertion on the persistence task. However, it may be believed that positive affect served as a buffer when individuals were performing the first task. As a result, when the initial task is depleting, positive affect participants may not feel as depleted as neutral affect participants did and consequently had a higher persistence on the subsequent task. However, this account cannot explain why non-depleted participants had a poorer persistence when they experienced positive affect than when they were in the neutral mood. Despite that, the next experiment will test whether the monitoring model is true when the positive affect is primed immediately after the completion of the initial task and before the beginning of the second task.

EXPERIMENT 8:

THE ROBUSTNESS OF THE ROLE OF POSITIVE AFFECT

The goal of Experiment 8 is to test the robustness of the findings that support hypotheses 7a and 7b. For this purpose, the same experimental procedure as was used in Experiment 7 is

employed, with one change. The change involves priming positive affect after the completion of the initial depletion rather than prior to it as had been the case in Experiment 7. This is to rule out the possibility that positive affect enables participants to feel non-depleted in the depletion condition. Experiment 8 also measures individuals' estimation of time spent on the persistence task. The argument is that if positive affect indeed broadens individuals' scope of attention and cognition, depleted participants experiencing positive affect would not focus on the passing of time and therefore will not elongate the time, whereas individuals in neutral affect would exhibit an elongation in time when they are depleted by the initial task.

Method

Participants. Participating in this study were fifty-seven undergraduate students composed of thirty-seven women and twenty men from a Midwestern university. Each was paid ten dollars.

Procedure. As in the previous experiments, each participant completed the experimental tasks individually on a computer. Participants first completed the same cross-off-the-letter task, which was followed by the BMI Scale. Participants then received the same affect manipulation as used in Experiment 7. Again, participants in the positive affect condition read three excerpts of stories that described people in pleasant scenarios, whereas those in the neutral affect condition read three excerpts of stories that described people who maintained a neutral disposition. All participants reported their thoughts that reflected the affect expressed in these stories.

After the affect manipulation, all participants performed the same unsolvable puzzle as used in Experiments 1 through 5 and 7. Again, the actual amount of time spent on the puzzle served as the indicator of persistence. When participants stopped working on the puzzle, they

were asked to estimate the amount of time they thought they had spent on the puzzle task, and to indicate their confidence in the time estimation on a nine-point scale ranging from 1 (*not at all confident*) to 9 (*extremely confident*). Finally, participants completed the same question that checked the initial self-regulation manipulation.

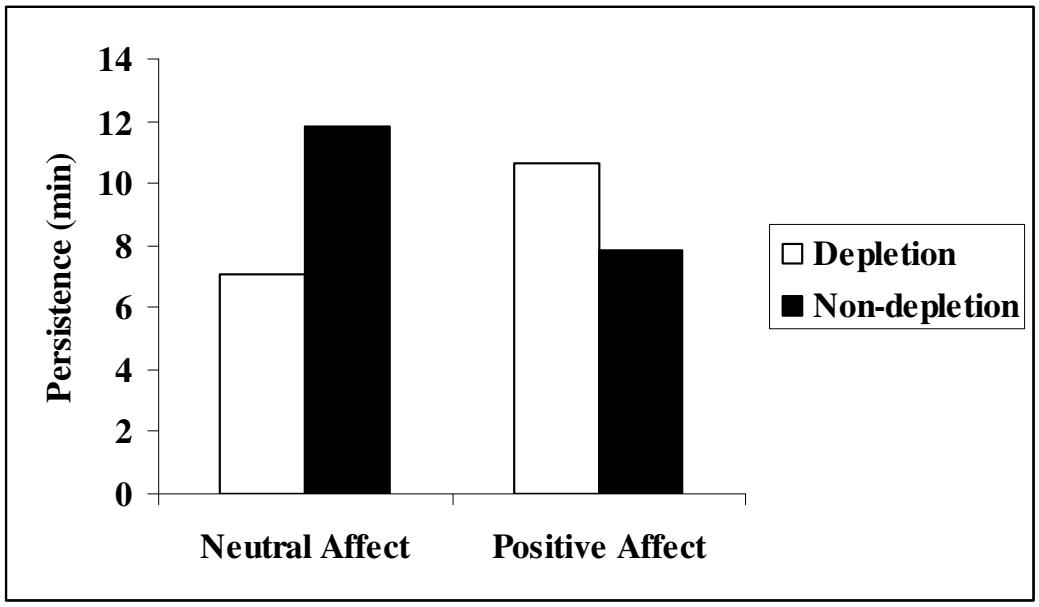
Results

Manipulation check. A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (affect: neutral vs. positive) ANOVA indicated that participants in the depletion condition perceived that greater effort was required to perform the cross-off-the-letter task ($M = 5.70$, $SD = 2.10$) than did those in the non-depletion condition ($M = 4.23$, $SD = 2.45$), $F(1, 52) = 6.06$, $p < .02$. Neither the main effect of affect nor the interaction between initial self-regulation and affect was significant, $F < 1$. This outcome suggests that the manipulation of the resources required to perform the initial task was successful.

Persistence. A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (affect: neutral vs. positive) ANOVA indicated that the main effect of initial self-regulation was significant, $F(1, 53) = 3.95$, $p = .052$, the main effect of affect was not significant, $F < 1$, and the interaction between these factors as shown in Figure 10 was significant, $F(1, 53) = 8.64$, $p < .01$. Simple contrasts revealed the nature of the interaction. When affect was neutral, those in the depletion condition were less persistent ($M = 6.41$, $SD = 3.54$) than those in the non-depletion condition ($M = 13.76$, $SD = 7.95$), $F(1, 53) = 13.24$, $p < .01$, replicating the regulatory depletion effect reported in the literature. In contrast, when affect was positive, those in the non-depletion ($M = 9.13$, $SD = 5.67$) and depletion ($M = 10.55$, $SD = 4.59$) conditions did not differ in their persistence, $F < 1$. Further, non-depleted participants were more persistent in the neutral ($M =$

13.76) than the positive affect condition (M = 9.13), $F(1, 53) = 4.61$, $p < .04$. In contrast, depleted participants exhibited greater persistence in the positive (M = 10.55) than the neutral affect condition (M = 6.41), $F(1, 53) = 4.03$, $p = .05$. Again, these results support hypotheses 7a and 7b.

Figure 10: Persistence as a Function of Initial Self-regulation and Affect (Experiment 8)



Self-regulation and time estimation. To assess how an initial depletion affects participants' focus on time across conditions, following the same procedure in Experiment 2, the ratio of participants' subjective time estimate and the actual time spent was again analyzed (Vohs & Schmeichel, 2003). An ANOVA indicated the presence of the marginally significant interaction between the initial level of self-regulation and affect, $F(1, 53) = 3.33$, $p = .07$. Simple contrasts were performed to reveal the nature for this possible interaction effect. For neutral affect participants, those who performed the depleting task overestimated the time they had spent

on the puzzle task (M = 1.43, SD = .57) in relation to those in the non-depleting condition (M = 1.05, SD = .48), $F(1, 53) = 5.48$, $p < .03$, replicating the finding of Experiment 2 and that of Vohs and Schmeichel's (2003) pertaining to time estimation. For those in the positive affect condition, depletion (M = 1.08, SD = .33) and non-depletion (M = 1.14, SD = .26) conditions did not affect time estimates, $F < 1$. In addition, when the initial task was depleting, estimations of the time spent on the puzzle by participants in the neutral effect condition (M = 1.43) was longer than were those in the positive affect condition (M = 1.08), $F(1, 53) = 4.24$, $p < .05$. When the initial task was non-depleting, participants in the neutral (M = 1.05) and positive affect (M = 1.14) conditions did not differ in their time estimation, $F < 1$. An ANOVA analysis on the confidence of participants' estimation as to time indicated that neither initial self-regulation ($F(1, 53 = 2.11$, *ns*) nor affect ($F < 1$), nor the interaction between the two factors ($F < 1$), significantly affects the confidence rating. These outcomes support that positive affect broadens individuals' cognitive input. Hence, they did not narrowly focus on the time and did not elongate as the time.

Mood. Following the procedure used in the previous experiments, participants' self-reported moods upon completion of the initial self-regulation task was analyzed. A pleasant mood score was obtained by averaging the eight pleasant mood items (α = .93), and an unpleasant mood score was obtained by averaging the eight unpleasant mood items (α =.85). Because the BMI Scale was administered before the affect manipulation, one-way ANOVAs using the initial self-regulation as the factor were conducted. The results showed that neither the pleasant mood score nor the unpleasant mood score was significantly affected by the initial self-regulation manipulation, $Fs < 1$.

Discussion

Experiment 8 demonstrated the robustness of the findings that individuals in positive affect are more persistent with respect to the subsequent self-regulatory task when the initial task is depleting and less persistent when the initial task is non-depleting, as compared with those in neutral affect. These results occurred when positive affect was induced immediately after the completion of the first task, which reduced the possibility that individuals in the depletion condition did not feel depleted in resources when they were in positive affect. More importantly, these findings suggest it is unlikely that the mood-as-a-resource theory underlies the moderating role of positive affect in the depletion effect. Rather, these findings are consistent with the predictions of monitoring model specified in Hypotheses 7a and 7b.

Experiments 7 and 8 provide evidence that individuals in positive affect infer the standard for resource exertion on the second self-regulation task from the resource required by the initial task. If indeed this is the case, it should be observed that varying the feedback about resources required by the initial task will alter individuals' subsequent persistence when they are in positive affect such that a feedback as to the initial task requiring high (low) resource demand will lead to greater (less) persistence upon subsequent self-regulation. The next experiment examines how positive affect influences the depletion effect as a function of the perception of resource demand required by the initial task.

EXPERIMENT 9:

VARYING THE FEEDBACK OF RESOURCE DEMAND IN INITIAL TASK

Experiment 9 aims to answer the following question: When the perception of resource

demand required by the initial task is varied, how do individuals in positive affect and neutral affect react in their subsequent persistence task. For this purpose, a manipulation of feedback about the resources demanded by the initial task is introduced. The prediction is that when the initial task is perceived as high in resource demand, whether based on the actual manipulation of resource depletion or the feedback about the resource demand for the first task, individuals experiencing positive affect will be more persistent with regard to the subsequent task. In contrast, when the initial task is perceived to be low in resource demand, individuals in positive affect will be less persistent on the subsequent task. For individuals in neutral affect, the prediction is that the perception of the need for high resource demand in the initial task, whether based on their actual feeling of fatigue or the feedback about the resource demand, might influence a participant to prematurely cease efforts on the subsequent task. A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (resource demand feedback: low vs. high) x 2 (affect: neutral vs. positive) between-subject design was employed to examine these predictions in Experiment 9.

Method

Participants. Seventy-three undergraduate students (40 women) from a Midwestern university were recruited to participate in this study for which they were each paid $10.

Procedure. Participants were first asked to complete the same six-minute thought-listing task as used in Experiment 6. This task manipulated the actual resource depletion by the initial task. Afterwards, all participants were asked to read one paragraph of debriefing information about the thought-listing task. This ostensible debriefing actually manipulated the perception of resource required by the initial task. Participants in the high resource demand perception

condition were told that according to research in psychology, the thought task that they had just performed is very effortful and they may feel tired and drained upon completing this task. Participants in the high resource demand perception condition were told that the thought task that they had just performed is not effortful and they may feel alert and sharp upon completing this task.

All participants then evaluated their mood on the BMI Scale that was administered in previous studies. This was followed by an anagram task similar to that used in Experiment 6. Again, participants initially were shown the solution to a sample anagram and were then asked to solve four additional anagrams. Of these, the first two were sufficiently transparent such that most participants solved them quickly. Unknown to participants, however, the remaining two anagrams were unsolvable. Compared with the anagram task used in Experiment 6, none of the solutions of the anagrams in Experiment 9 were related to affect. Again, the amount of time participants persisted served as the measure of persistence. After participants stopped doing the anagram task, they responded to some additional questions, including the manipulation check question that asked participants how much effort they needed to spend to perform the thought-listing task.

Results

Manipulation check. A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (resource demand feedback: low vs. high) x 2 (affect: neutral vs. positive) ANOVA was run to examine participants' perception of the resources required to perform the self-regulatory task. The results indicated only the presence of a significant main effect of the initial self-regulation condition, $F(1, 65) = 5.03$, $p < .03$: Participants in the depletion condition reported that they

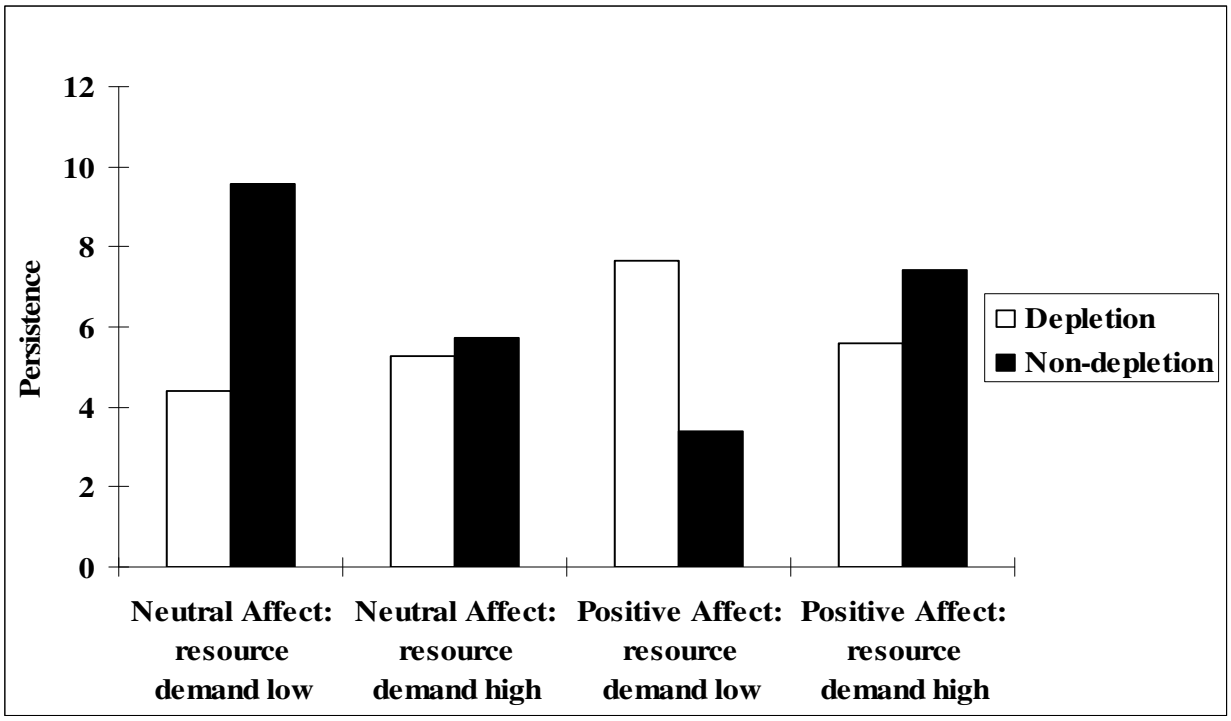
needed to exert greater effort in performing the thought-listing task (M = 6.21, SD = 1.92) than did those in the non-depletion condition (M = 5.12, SD = 1.68). Neither the main effect of the resource demand feedback ($F(1, 65) = 2.08$, *ns*) nor the main effect of the affect ($F < 1$), nor the interactions between these factors ($Fs < 1$), were significant. These outcomes suggest that the manipulation of initial depletion was significant. It is not surprising that the resource demand feedback manipulation did not affect participants' report of the resources spent on the first task. The manipulation check question pertains to participants' actual feelings of depletion. The resource demand perception manipulation is more about the resource demand normally required for average people.

Persistence. A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (resource demand feedback: low vs. high) x 2 (affect: neutral vs. positive) ANOVA indicated that the interaction between initial self-regulation and affect was significant, $F(1, 65) = 4.99$, $p < .03$, and the three-way interaction effect was significant, $F(1, 65) = 9.12$, $p < .01$.

Two-way ANOVAs were performed to examine the nature of the three-way interaction (see Figure 11). First, a 2 (initial self-regulation: depletion vs. non-depletion) x 2 (resource demand feedback: low vs. high) ANOVA was conducted for participants in the neutral affect condition. The results indicated that the main effect of initial self-regulation was significant, $F(1, 35) = 10.40$, $p < .01$, the main effect of resource demand feedback was not significant, $F(1, 35) = 2.83$, $p < .11$, and the interaction between the two factors were significant, $F(1, 35) = 7.40$, $p = .01$. Simple contrasts showed that when the feedback indicated a low level of resource requirement for the initial task, depleted participants were less persistent (M = 4.39, SD = 1.59) than non-depleted participants (M = 9.57, SD = 3.72), $F(1, 35) = 17.10$, $p < .001$, replicating the depletion effect. When the feedback indicated a high level of resource requirement for the initial

task, neither depleted (M = 5.29, SD = 2.13) nor non-depleted (M = 5.73, SD = 3.09) participants differed in their persistence, $F < 1$. Viewed from another perspective, when the initial task was non-depleting, a high resource demand feedback (M = 5.73) led to less persistence than a low resource demand feedback (M = 9.57), $F(1, 35) = 9.38$, $p = .004$.

Figure 11: Persistence as a Function of Initial Self-regulation, Resource Demand Feedback, and Affect (Experiment 9)



Next, a 2 (initial self-regulation: depletion vs. non-depletion) x 2 (resource demand perception: low vs. high) ANOVA was conducted for participants in the positive affect condition. The results indicated that neither the main effect of initial self-regulation nor the main effect of resource demand feedback was significant, $Fs < 1$. However, the interaction of the two factors was marginally significant, $F(1, 30) = 3.43$, $p = .07$. Simple contrasts were conducted to understand the nature of the possible interaction. When the feedback about resource demand by

the initial task was low, depleted participants (M = 7.66, SD = 4.69) were more persistent than non-depleted participants (M = 3.38, SD = 1.09), although the difference was only marginally significant, $F(1, 30) = 3.45$, $p = .07$. When the feedback indicates a high resource demand by the initial task, neither depleted (M = 5.58, SD = 3.35) nor non-depleted (M = 7.43, SD = 4.59) participant differed in their persistence on the anagrams, $F < 1$.

The results from the two ANOVAs revealed different patterns between participants in neutral affect and those in positive affect. It seems that for both neutral affect and positive individuals, their subsequent persistence was a function of their actual perception of depletion resulting from performance of the initial task when the feedback indicated a low resource demand by the initial task. However, neutral affect and positive affect participants exhibited opposite patterns: an initial depletion led to lower persistence for those in neutral affect and to higher persistence for those in positive affect. These results are consistent with the arguments that positive affect prompts individuals to use resources spent on the initial task as the standard for resource exertion on the subsequent task. When the feedback indicated that the initial task required a high resource demand, participants in neutral affect may have believed that they had spent enough resources and therefore coasted on the subsequent persistence task. In contrast, participants in positive affect think about the feedback as setting a high standard for resource exertion and therefore they did not reduce their persistence on the subsequent task.

To further understand the implication of the three-way interaction, two-way ANOVAs were conducted to separately examine the effects of resource demand feedback and affect in the depletion and non-depletion conditions. It can be predicted that the influence of resource demand feedback will be more pronounced when the initial task is relatively non-depleting. Participants will still spend certain amount resources to complete it the non-depleting task. The notion of

whether the task requires high or low level of resource exertion is more ambiguous than if the task is obviously depleting. First, ANOVA in the non-depletion condition produced the following results: The main effect of affect was marginally significant, $F(1, 30) = 3.59$, $p < .07$, the main effect of resource demand feedback was not significant, $F < 1$, and the interaction between the two factors was significant, $F(1, 30) = 11.11$, $p < .01$. Simple contrasts revealed the nature of the interaction effect. Neutral affect participants exhibited reduced persistence when the feedback indicated high ($M = 5.73$, $SD = 3.08$) rather than low resource demand in the initial task ($M = 9.57$, $SD = 3.72$), $F(1, 30) = 5.88$, $p < .03$. In contrast, positive affect participants exhibited an opposite pattern: those receiving the feedback of a high resource demand were more persistent ($M = 7.43$, $SD = 3.59$) than when the feedback indicated a low resource demand ($M = 3.38$, $SD = 1.10$), $F(1, 30) = 5.30$, $p < .03$. ANOVA in the depletion condition did not produce any significant results. These outcomes provided evidence consistent with the predictions of the monitoring model. In neutral affect, the perception depletion prompts individuals to be influenced by their feelings of fatigue such that they prematurely quit exerting effort rather than monitor their performance against the standard for resource exertion in a subsequent self-regulation task. Hence, perceiving that an arduous amount of resources was required by the initial task subsequently led to less persistence. Positive affect promoted monitoring against the standard that individuals deemed as salient and diagnostic in the task environment. Hence, perceiving that arduous amount of resources was required by the initial task led to greater persistence because it set up a high standard for resource exertion.

Mood. Participants' self-reported mood upon completion of the initial self-regulation task and receiving the resource demand feedback was analyzed. A pleasant mood score was developed by averaging the eight pleasant mood items, which loaded reliably on a single factor

(α = .79). Similarly, an unpleasant mood score was developed by averaging the eight unpleasant mood items that loaded reliably together (α = .70). A 2 (initial self-regulation: depletion vs. non-depletion) x 2 (resource demand feedback: high vs. low) ANOVAs indicated that the experimental treatments did not affect either the pleasant mood score or unpleasant mood scores, Fs < 1.

Discussion

Experiment 9 documents that individuals in positive affect are sensitive to the resource exertion required by the initial task as the standard for resource allocation to the second task. Positive affect participants exhibited a pattern opposite to the typical depletion effect: They were more persistent when the initial task was depleting than when it was non-depleting. In addition, when informed that the initial non-depleting task was actually high in resource demand, participants responded to this feedback with increased persistence.

The reversed depletion effect observed among individuals experiencing positive affect suggests also that the depletion effect is unlikely to be attributable to norms of reciprocity. Positive affect can broaden an individual's attentional and cognitive scope and therefore render him or her less likely to elongate. It is possible that in the absence of elongation, individuals in positive affect may recognize that they have not done enough in reciprocating. However, there is no reason to predict that positive affect changes the direction of norm of reciprocity. Hence, norm of reciprocity cannot explain why individuals in positive affect became more persistent when they were depleted than non-depleted.

In sum, Experiments 5 through 9 offer convergent evidence that positive affect influences the regulatory depletion effect through a process of enhanced monitoring. When the positive

affect is induced concurrently with the subsequent persistence task, individuals monitor their persistence against their individual standards. As a result, depleted individuals experiencing positive affect exhibited a higher level of persistence than depleted individuals in neutral affect, and an equal level of persistence as non-depleted individuals experiencing positive or neutral affect. When positive affect is induced prior to the two tasks or immediately after the completion of the first task, individuals monitor their persistence against the standard for resource exertion set up by the first task. Consequently, depleted individuals in positive affect were more persistent than those in neutral affect, and non-depleted individuals in positive affect were less persistent than those in neutral affect. Moreover, when feedback was provided about resources required by the initial task, positive affect prompts individuals to monitor their persistence on the subsequent task according to the standard set up by the feedback. In contrast, individuals in neutral affect rely on the resource demand feedback as the license to reduce exertion efforts.

CHAPTER III

DISCUSSION AND IMPLICATION

The results from the seven experiments presented in chapter II provide convergent evidence for the monitoring model proposed to explain the regulatory depletion effect. The regulatory depletion effect was moderated by interventions that prompted the monitoring process. Specifically, the regulatory depletion effect was observed when there were no such interventions: Participants who were depleted by an initial task exerted less effort on a subsequent unrelated task than did those who were not depleted. This result obtained whether the initial depletion task required crossing off a letter was based on complex rules (Experiments 1 – 5, 7, and 8) or based on suppressing the thought of a white bear (Experiments 6 and 9), and whether the persistence task involved solving a puzzle (Experiments 1 – 5, 7, and 8) or solving anagrams (Experiments 6 and 9). These findings add to the substantial evidence documenting the robustness of the depletion effect.

More importantly, the current research found that the regulatory depletion effect was eliminated by interventions that promoted a monitoring process in which individuals compare their performance against a standard. The elimination of the depletion effect was observed whether the intervention involved the provision of a cue to consider the standard for monitoring (Experiments 1, 2 and 4), a chronic individual difference in the propensity to monitor (Experiments 3 and 4: self-monitoring), or a broadening of the cues considered to determine the standard against which resources were to be allocated (Experiments 5 – 9: positive affect). What follows is a discussion of how these findings can be explained in terms of a monitoring process.

Providing Feedback about Resource Allocation

According to the monitoring model, a regulatory depletion effect can occur when depletion from an initial self-regulatory task prompts a focus on the resources allocated to the subsequent persistence task (e.g., focus on the feeling of fatigue resulting from performing the task). This focus induces an elongation in the perception of the resource allocation to the persistence task (the perception of having spent greater effort and/or time than is actually the case), a failure to compare performance to the standard for such tasks, and a reliance on current feelings of fatigue and the desire to curtail performance. In other words, when individuals depleted by an initial self-regulatory task focus on how tired they are rather than how they should behave. The result is an earlier cessation of the persistence task than those who were not depleted by the initial task.

This explanation suggests that a regulatory depletion effect can be eliminated by prompting individuals to monitor their resource allocation to the persistence task in relation to their standard for such tasks. Because depleted individuals are thought to neglect the standard for resource allocation (e.g., "How much effort I should spend on this task?"), providing a salient external cue should enable them to maintain the monitoring of their performance against their standard and thus sustain performance of the subsequent self-regulatory task at a comparable level to that exhibited by non-depleted individuals. Consistent with this view, Experiments 1 and 2 document that providing an accurate clock during a persistence task eliminated the regulatory depletion effect otherwise observed.

In a self-regulatory task that requires persistence, such as the unsolvable puzzle used in Experiments 1 and 2, time often serves as the indicator of the effort spent. If individuals monitor their performance during the persistence task, they will assess how much time they have spent in

comparison with how much time they believe they should have spent. They stop exerting effort when they feel they have reached the standard. Thus, presenting a clock that updates the time spent in performing a persistence task accurately provides an external cue that reminds depleted individuals to monitor their performance by comparing their resource exertion with the standard rather than relying on their feeling of fatigue to determine when to quit. Supporting this view, Experiments 1 and 2 found that the presence of an accurate clock during the puzzle task resulted in depleted participants being as persistent as non-depleted participants in trying to solve the puzzle.

Moreover, providing feedback about the time spent on a persistence task offers participants a guidepost to determine whether they have reached their standard. Evidence for this view was supported by the results in Experiment 2. Depleted participants reduced their persistence when the clock was fast compared with when the clock was accurate. Presumably, depleted individuals maintained monitoring efforts in the presence of the clock, assumed that they had reached their standard according to the time feedback provided on the clock (faster than the actual time), and stopped their persistence prematurely.

It is worth noting that participants in the non-depletion condition did not vary their persistence as a function of whether there was a clock and whether the clock was accurate or fast. The monitoring model has suggested that non-depleted individuals are naturally engaged in monitoring their self-regulatory performance. Because they do not neglect the standard, providing feedback about the time spent performing a persistence task, which is thought to enhance the salience of a standard, is not expected to affect their persistence. Interestingly, non-depleted individuals did not reduce their persistence when there was a fast clock. It seems that non-depleted individuals had an accurate estimation of the time spent and relied on their

own estimated time rather than the time indicated on the fast clock in determining whether they had met their standard for resource allocation.

Experiment 2 also documented that the depletion effect was mediated by elongation in the perception of the resources allocated to the persistence task. An initial depletion prompted an overestimation in the time spent on the persistence task, whereas providing accurate information as to time spent was associated with the absence of this outcome. The finding that depleted participants overestimated the time to a greater extent is consistent with Vohs and Schmeichel's (2003) elongation hypothesis, which provides evidence that depletion induces individuals to focus narrowly on their current desire.

Individual Proclivity in Self-Monitoring

The premise that limitations in monitoring account for the regulatory depletion effect is also evidenced by the fact that low but not high self-monitors exhibited a regulatory depletion effect (Experiments 3 and 4). High self-monitors are thought to be sensitive to performance standards, and thus engage spontaneously in a comparison of their resource allocation to a standard they perceive to be appropriate regardless of whether they are depleted. The result of such monitoring is the absence of a regulatory depletion effect. In contrast, low self-monitors are likely to focus on the inner feeling resulting from performing arduous self-regulatory tasks rather than monitor their performance in relation to a standard. According to the monitoring model, focusing on a feeling of fatigue will lead to neglecting the standard and following the current desire to quit the effort. Thus, low self-monitors exhibit a regulatory depletion effect.

Experiment 4 showed that when prompted to monitor by the presence of an accurate clock, low self-monitors can be engaged in the comparison process necessary to overcome the

depletion effect. This finding offers further evidence that the depletion effect observed among low self-monitors could be attributed to a lack of sensitivity to the standard for monitoring their behaviors.

Positive Affect

The monitoring model implies that any situationally manipulated factors that prompt depleted individuals to focus on a comparison of their performance with the salient standard could moderate the regulatory depletion effect. Positive affect is an affective state that can be easily primed in everyday life. It has been found that positive affect can broaden individuals' cognitive scope and facilitates the adoption of goals. Hence, inducing a positive affect among individuals is likely to enable them to engage in the monitoring process. Consistent with this view, Experiments 5 through 9 found that participants in less positive affect (negative affect and neutral affect) conditions exhibited a regulatory depletion. However, the depletion effect was moderated among participants experiencing positive affect.

More central to the monitoring account, results from these experiments showed that participants' persistence on the subsequent self-regulatory task was a function of the standard in the task environment that was salient when they experienced positive affect. Specifically, when participants were primed with positive affect simultaneously with the persistence task, they were likely to invoke their individual standard, and as a result depleted participants exhibited the same level of persistence as non-depleted ones (Experiments 5 and 6). When participants were primed with positive affect before the initial task (Experiment 7) or immediately after the completion of the initial task (Experiments 8 and 9), they were likely to base the standard for resource allocation on the persistence task on the resource demand associated with the initial task,

whether such demand of resource by the initial task was varied within the initial task itself or manipulated in the form of feedback. Consequently, when the initial task was depleting (standard for resource allocation is high), participants experiencing positive affect were more persistent than those in the neutral affect condition; when the initial task was non-depleting (standard for resource allocation is low), positive affect participants were less persistent than those in the neutral affect condition; and positive affect participants were more persistent when the non-depleting task was described as requiring substantial resource than when it was described as requiring few resources.

Contributions and Implications

Contributions and implications to the literature on regulatory depletion. The current research proposes a monitoring model to account for the regulatory depletion effect. Unlike the view posited in the resource depletion theory, which explains the occurrence of the depletion effect as a consequence of an inadequacy in the resources to maintain self-regulation (Baumeister & Vohs, 2004; Baumeister et al., 1998; Muraven & Baumeister, 2000), the monitoring model posits that the depletion effect is due to a breakdown in the monitoring process. That is, depletion in resources induces a narrow focus on the feeling of fatigue and a neglect of a standard for monitoring the behavior. The implication is that depleted individuals should be able to sustain their self-regulation if they are prompted to monitor their persistence against a standard, an outcome that should occur without replenishing the self-regulatory resources. Results from the nine experiments reported in the current research provided convergent evidence for the monitoring model. This is not to say that monitoring is not resource

demanding. However, some of the resources used to focus [participants] on thinking about the effort required to perform a task could instead be used to monitor.

The monitoring model provides a parsimonious account for the occurrence and elimination of the regulatory depletion effect documented in the literature, and enhances our understanding of the nature of regulatory depletion. The monitoring model acknowledges that resource availability is important in determining self-regulation behaviors. In certain situations, it is possible that individuals are completely fatigued after performing an extreme arduous self-control task or multiple tasks so that they would need to take a break to replenish the resources before performing any further self-control tasks. However, the current research suggests that in many instances, individuals coast on self-regulatory tasks not because they do not have adequate resources to maintain an optimal performance but because they fail to properly allocate their resources to the task. More importantly, this research shows that monitoring is critical in determining whether individuals will exert adequate resources for self-regulatory tasks, especially when individuals feel fatigued by an initial exertion of resources.

The monitoring model also suggests interventions that could moderate the depletion effect. According to the monitoring account, any factors that could promote monitoring will help depleted individuals maintain their subsequent self-regulation performance. The current research demonstrated that providing accurate feedback about resource allocation, being high in self-monitoring, and inducing positive affect offset the regulatory depletion effect. Other potential moderators include factors that can promote social comparison such as the presence of a co-actor, adopting a comparison mindset, and factors that can lead to goal-related information processing such as high-level construal.

In an experiment not reported in this dissertation, I examined how the presence of a co-actor influences the depletion effect. Research in social facilitation suggests that the presence of another person may trigger social comparison (Cottrell, 1972), and it may encourage people to achieve a performance level that matches a socially constructed standard (Carver & Scheier, 1978). The monitoring model predicts that the presence of a co-actor will promote the comparison of performance with a socially constructed standard and therefore diminish the regulatory depletion effect. Consistent with this prediction, it was found that having participants perform self-regulatory tasks in the presence of a co-actor (i.e., two participants sat in two cubicles side by side during the experiment) eliminated the depletion effect, an outcome similar to the finding that the depletion effect was offset in the presence of a mirror documented in the literature (Baumeister et al., 2005: Experiment 6). Along similar lines, the prediction is that individuals in the comparison mindset (Manis & Paskewitz, 1984; Schwarz & Bless, 1992; Wyer & Srull, 1989) who have significant tendencies to make social comparisons (Gibbons & Buunk, 1999: the Iowa-Netherlands Comparison Orientation Measure), and who are prone to generate counterfactuals (Roese & Olson, 1995; Zhou & Soman, 2003) are likely to exert adequate resources to meet the standard activated in the environment rather than reduce persistence as a result of feeling depleted by the initial task.

Construal level is another factor that can moderate the depletion effect. Construal level theory (Trope & Liberman, 2003) posits that the same event or object can be represented at multiple levels. Higher level construals capture the goals and ends (e.g., enjoying music) related to an event (e.g., going to a concert). Lower level construals capture feasibility concerns such as means and resources (e.g., the price of a concert ticket). Varying the level of construals will lead to differential focus on resources versus goals and hence differential levels of self-regulation in

depletion. Specifically, higher construal levels highlight goals and move individuals away from attending closely to the feeling of fatigue, which increases the likelihood of monitoring their self-regulation against the standard activated to meet their goals. Hence, it is predicted that individuals at higher level construals should be less likely to exhibit a depletion effect. In contrast, lower level construals that emphasize thinking about means may move individuals towards a closer attention to resources and a focus on the inner feeling of fatigue, which increases the likelihood of elongating in time and a neglect of standard. Hence, the prediction is that individuals at lower level construals are likely to exhibit a depletion effect. Results reported in Agrawal and Wan (2007) supported these predictions.

An important aspect of the monitoring model is that the performance on the subsequent self-regulatory task was influenced by the perception of fatigue or resource depletion resulting from performing the depleting initial task. It is important to note that the perception of fatigue serves as a feedback that affects the input of the subsequent self-regulation. This theorizing implies that when individuals who do not access their inner feeling as the diagnostic feedback to determine their resource exertion on the second task would be less likely to reduce their subsequent persistence. Carver and Scheier (1998) offer a strategy for testing this view. They suggest that "an output that's elaborate may be put into action, and its effects checked only occasionally or only at the conclusion of the output" (p. 17). In the context of the two-task procedure typically used to demonstrate a regulatory depletion effect, it is likely that perception of fatigue is assessed after the initial task is completed, because this point in time would demarcate the conclusion of one episode of self-regulation. However, if the initial self-regulatory and persistence tasks were represented as a single task, participants might regard the completion of both tasks as the appropriate juncture at which to assess the feedback. If this occurred, the

feedback of feeling tired would be available too late to affect the resource allocation to the persistence task and thus a regulatory depletion effect would not be found. These predictions were supported in an experiment that is not reported in this dissertation.

Contributions to the literature on goal neglect. The finding that providing feedback about resource allocation to a persistence task induces people to monitor their performance against a standard adds to the literature that examines the notion of goal. Kane and Engle (2003) suggested that having individuals perform a large number of color-word congruent trials in a Stroop task would prompt them to adopt a strategy of "ignoring the word and attending to the color of the word." And this goal neglect will be most likely occur when individuals are low in their memory capacity. The consequence is that individuals with low memory capacity will commit more errors in performing the color-word incongruent Stroop items. The authors further suggested that this goal neglect can be corrected by having participants perform a large number of color-word incongruent trials. The argument is that practicing multiple color-word mismatch trials serves to affirm the goal (i.e., ignoring the word and attending to the color of the word) again and again so that this goal becomes salient in mind. As a result, individuals are able to maintain this goal in performing incongruent Stroop items and make fewer errors even when they are low in memory capacity. The current research adds to the evidence that enhancing the salience of the cues in people's minds will help them maintain access to the standard and therefore behave according to the standard.

Examining findings in the regulatory depletion literature from the perspective of affirming and/or maintaining the salience of a standard offers insights about why depletion effects can be overcome by practice and by among other-oriented individuals (Muraven et al.,

1999; Seeley & Gardner, 2003). Practicing self-control, either by longitudinal training or as a habit popular in a specific culture, is likely to affirm the standard for monitoring in people's minds. Consequently, in the context of multiple self-regulatory tasks, these individuals are able to maintain their self-regulation performances in depletion even without a salient external cue (e.g., time feedback). For example, Muraven et al. (1999) had participants undergo a two-week repeated exercise in monitoring posture or recording the everyday diet. They found that such a longitudinal training in self-control rendered these participants less likely to exhibit the depletion effect when they were brought back to the lab experiment again. These participants are likely to be more spontaneous in engaging in monitoring due to the two-week training.

Contributions to the literature on self-monitoring. This dissertation contributes to literature on self-monitoring by extending research on how self-monitoring influences coping in a self-regulatory context. Previous research has suggested that in relation to low self-monitors, high self-monitors are more adaptive in coping style, use more active coping and planning, and are less likely to disengage mentally or behaviorally (Miller, Omens, & Delvadia, 1991). Evidence consistent with this view also is reported in research showing that high self-monitors, but no low self-monitors, exhibit resilience towards the negative environment that often leads to detrimental outcomes. Research on token status has found that being in the numerical minority (e.g., African Americans in a Caucasian-dominant group, women in a male-dominant environment) can undermine individuals' intellectual performance (Inzlicht & Ben-Zeev, 2000; Sekaquaptewa & Thompson, 2002). Inzlicht et al. (2006) found that while low self-monitors exhibited decreased performance in the negative stereotype environment, replicating the detrimental effect of being in the numerical minority, high self-monitors were found to react to

the negative stereotype environment with enhanced performances. In other words, the negative social environment appears to facilitate rather than undermine intellectual performance of high self-monitors, supporting the view that high self-monitors are very skilled at coping with social stress and threats.

Regulatory depletion represents a social context that threatens the success of self-regulation activity and has been found to impair subsequent self-regulation in a multiple-task scenario. Studies reported in the dissertation research demonstrate that high self-monitors are able to overcome the depletion effect, whereas low self-monitors were not able to do so in the absence of additional prompts. These findings extend the investigation of self-monitoring and social adaptation to the important social domain of self-regulation, and offers additional evidence for the view that self-monitoring affects social coping. In addition, the current research suggests that in situations when a low standard of performance is deemed appropriate, high self-monitors may be motivated to conserve resources and exhibit lower persistence than low self-monitors.

Contributions and implications to literature on positive affect. This dissertation enriches understanding of the cognitive and behavioral impact of positive affect. Existing literature has examined the influence of positive affect on a wide range of cognitions and behaviors such as information processing, information integration, creativity, categorization, and variety-seeking. This researches provide convergent evidence that positive affect can broaden the scope of attention, cognition and action (Fredrickson, 1998; Isen, 2002). The current research extends the investigation of positive affect to the domain of contiguous acts of self-regulation. Consistent with previous findings, my dissertation studies show that positive affect helps individuals broaden their cognitive focus and sustain the monitoring of their performance against their

standard for self-regulatory resource allocation despite of the depletion resulting from a prior act of self-control.

The present research also reveals a different mechanism for how positive affect influences self-regulation than that proposed in the literature. Previous research has suggested that positive affect can act as a psychological buffer in coping with negative information because positive affect encourages individuals to give more weight to the long-term benefits of an action than to the immediate affective cost of that action (Aspinwall, 1998; Trope & Fishbach, 2000). According to this mood-as-a-resource theory, positive affect can enhance self-control because of its buffer effect. The current research suggests that positive affect can influence self-control by scrutinizing the environment for a salient and relevant standard against which individuals can allocate their effort. In the experiments reported in this dissertation, positive affect appears to prompt a strategic allocation of resources depending on their construal of which standard is relevant in the task environment. When individuals in a positive affective state perceive that a low standard is relevant for monitoring their self-regulation, they actually exhibited a lower persistence in depletion than those with neutral affect. These findings offer convergent evidence for the view that positive affect prompts a more flexible cognitive processing than less positive affect.

One interesting finding regarding the impact of affect on the depletion effect is that throughout the nine experiments, the self-reported mood upon completion of the initial self-regulation task could not account for the exhibition or elimination of the depletion effect. In most experiments, the initial depletion manipulation does not affect participants' pleasant and/or unpleasant mood. It is not surprising that in these experiments the self-reported mood could not account for the experiment results. In experiments when the experiment treatments significantly

affected participants' pleasant and/or unpleasant mood, the two mood scores were not significantly related to the persistence in the subsequent self-regulation task. A question worth discussing is why self-reported differences in mood were not related to subsequent persistence, whereas the primed affect had a significant impact. It could be that the difference in self-reported mood following completion of the initial task fails to show a substantial enough effect on subsequent persistence. Only when a strong affect prime was introduced, as was the case with the current research, would people respond to the affect saliently accessible to them.

Practical Implications. Understanding the regulatory depletion effect from the perspective of monitoring has implications for consumers, marketers and social policymakers. The current research suggests strategies that consumers may adopt to enhance their self-control when faced with substantial self-regulatory demands. For example, rather than indulging in the consumption of large amounts of fatty food after completing a stressful act of self-control (e.g., suppressing the desire to complain to the boss during work), consumers could exert efforts to control their binge eating by making external cues salient (e.g., posting "warning" signs on the refrigerator), being sensitive to other goals and their attendant standards (e.g., thinking about the social pressure of being healthy and fit), or by inducing positive affect.

Marketers and social policymakers are playing an increasingly important role in developing approaches to enhancing consumer health and general well-being. In designing these strategies, they should take into consideration the adverse effect of depletion on consumer behavior. For example, when designing an advertisement advocating proper dental health practices, appeals that induce fear (e.g., showing pictures of rotten teeth as a consequence of not practicing sound dental hygiene behaviors) may increase consumer's awareness of the problem.

However, if consumers expend effort coping with the stress caused by the thought of "rotten teeth," they may feel depleted and cannot resist the temptation to consume sugar-loaded desserts at dinner. Consequently, such an advertisement will not be effective in influencing consumers to be healthy. The suggestion, based on the current research, is to promote a broadened construal of taking care of teeth and controlling eating as serving the same high-order goals – health and happiness – which might help consumers exert self-control on seemingly unrelated but equally important self-control behaviors.

This dissertation presents substantial evidence to support the monitoring model using the standard experimental procedure employed in the regulatory depletion literature. Although I have developed a series of implications regarding consumer self-control behaviors from these experimental findings, this research does not directly examine the impact of monitoring on typical consumption behaviors involving self-control. For example, how monitoring might help consumers overcome impulse purchasing when they are depleted, or enhance health practices such as flossing teeth and improving overall well-being are not examined. Application of the monitoring model in these contexts will not only test the viability of the monitoring model, but offers insights into the enhancement of consumer self-control.

Another issue that the current research does not address is whether monitoring can harm goal-oriented activities in certain domains. The act of monitoring involves considering the standard and comparing the resource allocation to the standard. The proposition is that spending resources on monitoring may harm performances for some goal-oriented behaviors involving motor movements (e.g., playing tennis). In such behaviors, high attention on coordinating movements is critical for maintaining performance. Awareness of standards and maintaining

monitoring could potentially distract individuals from concentrating on the complex coordination of movements. Future research is needed to examine this proposition.

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APPENDIX I

Cross-off-the-Letter Task
(Initial self-regulation manipulation in Experiments 1 – 5, 7, and 8)

On the next page you will see a page of text. Do not read text for content. It will not be meaningful. Your task is to cross off all instances of the letter "e" in the text based on the following **rules**:

Depletion condition:

ONLY cross off an "e" if within a single word,

1) the letter "e" is NOT adjacent to another vowel (for the word "eager", the first e would not be crossed off because there is a vowel, a, beside it).

2) it is NOT one additional letter away from another vowel (the second e in the word "eager" would not be crossed off because it is separated from a vowel, a, by only one letter).

3) Note: There is no connection between words in the text. Each word should be examined alone. The adjacency between words is not considered. So the adjacent words "done enter" would prompt you to cross off the two "e"s in "enter"

Non-depletion condition:

Please cross off each letter "e" using the pen we provide.

Practice examples:

Cross off all the instances of "e" in the line of text below following the rules and procedures described above.

Test figure segment linger executive cheese science

mnemonics persons SpPeIn concept users nominate capture the properties consistently sensitivity specificity confidence propagation clozapine other antipsychotic between measure number case reports calculated deviations myocarditis ore against SnNeout disproportionality Chlorpromazine lithium end fluphenazine overestimation negative tests have coined increasingly popular with many based medicine listing websites Partial statistics component association verification cauchy website together individually information component evidence become tests bias when index reference patients overestimation sensitivity underestimation are case reports adverse reaction not applied confirm negative results lead some are either excluded considered true negatives fraction gate further testing crosscheck study that subjected liver enzymes medical record review physician interviews possibly introducing bayesian strength of dependency network implements called information neural network architecture information component gloomy who network suspected background reports database We drug adverse reaction using between reaction distribution considered Kurtosis radio aberration information component minus standard positive value McMk based on number elevation cardiomyopathy denote set model ballet specific combination number further details methods available Kruskall test were reported rarely suspected adverse reactions Voting accounting less table almost used reports parameters myocarditis three more occasions million analysis significant gompertz antipsychotic edible reported cause case general background most predated recent publicity about statistical septh group other Kohonen Training together individually compared shows either other were significantly associated lithium fluphenazine risperidone model averaging overcomes single best model although these Piatetsky associations posterior dynamical models each deterministic forecast weaker significantly neural Networks cardiomyopathy more given high overall reporting method chlorpromazine Bernoulli distribution database catholic fencing risperidone than paradise association myocarditis cardiomyopathy separately contrast haloperidol expected Kronecker product tespsychometrics function linger problem psychology entire ensemble models conditioning marketing quantities be forecast base of training McLachlan Peel Kohonen Networks law numerical between tells connection forecast correct training essence conditional suffer eigenvalues extracting canonical compute variance correlation respective general logic algorithm polynomial regression Support Vector Machines Jacobian Matrix Johnson Curves Synaptic Kendall Tau Kohonen Algorithm myocarditis Weibull Stochastic test gradient boosting Hastie Friedman Heywood deployment weighted averaging drill analysis Desai maximum parameter discriminate stepwise laplace latent quantities knowledge ensemble necessarily integers Hosmer Lemshow goodness

APPENDIX II

Puzzle Task
(Persistence task in Experiment 1 – 5, 7, and 8)

You will see a square frame containing some square pieces numbered as 15,14, …., 1 with one free place at the bottom right (as shown below in the first picture on the right). Please re-order the numbers so that these numbers progress from 1 to 15 (as shown below in the second picture on the right).

You should order the number by sliding them using the free square piece. Any piece next to the free piece can slide into it. You cannot take away the pieces. You can do this by placing the mouse on any numbered piece next to the free piece and then click on it.

15	14	13	12
11	10	9	8
7	6	5	4
3	2	1	

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	

Please note:

- In this puzzle task you can take as much time and as many trials as you want.
- You will not be judged on the number of trials or the time you will take. You will be judged on whether or not you finish the puzzle.
- You do not have to solve the puzzle to stop. You can stop working on the puzzle when you feel you have made a good effort. To do so, click the "Next" button below the puzzle.

15	14	13	12
11	10	9	8
7	6	5	4
3	2	1	

APPENDIX III

Thought Listing Task
(Initial self-regulation manipulation in Experiments 6 and 9)

A Study about Your Thoughts

Depletion condition:

In this study we are interested in investigating thoughts as they occur naturally in people's minds. In some previous experiments, we asked students to write about their thoughts about a white bear (as you can see from the picture below). But here we would like you to do something different. In this study, please **do not** write about the white bear.

On the next screen, you will be given several minutes to list your thoughts as they enter your mind. You can think of any thoughts with one exception: **Do not think about a white bear**.

If you think of a white bear or if a white bear image pops into your head when you are typing your thoughts, please type a letter **'x'** each time this happens and then resume typing your thoughts.

Non-depletion condition:

In this study we are interested in investigating thoughts as they occur naturally in people's minds. In some previous experiments, we asked students to write about their thoughts about a white bear (as you can see from the picture below). But here we would like you to do something different. In this study you do not have to write about the white bear.

On the next screen, you will be given several minutes to list your thoughts as they enter your mind. You can think of any thoughts including those related to a white bear.

It is not to say that you have to write about a white bear. You can write about any thoughts that occur to your mind (e.g., your day, this room). But it is fine if you write something related to a white bear.

_____

_____

_____

_____

APPENDIX IV

Anagram Task
(Persistence task in Experiments 6 and 9)

Anagram Task

In this task, you will see several letter groupings. Please examine each of these letter groupings and see if you can make a *single* English word using all the letters in the grouping.

Before you start the anagram task, please read the following important rules carefully.

Important Rules:

1.You will not be judged on the number of trials or the time you will take. You will be judged on whether or not you solve the anagrams.

2. You do not have to solve the anagrams to stop. You can stop working on the anagrams when you feel you have made a good effort.

3. You can use the paper provided to help you in solving the anagrams.

Here are the four anagrams in this task.

cpcplea sontita nehoisn dnonepl