Mechanisms of Self-Control Failure: Motivation and Limited Resources

Mark Muraven
Elisaveta Slessareva
University at Albany

Research has found that individuals who are lower in self-control strength because of previous self-control exertions perform more poorly on subsequent tests of self-control. The present studies suggest that this effect may be moderated by motivation. In particular, depletion and motivation jointly determine self-control performance. Individuals who were depleted and believed that the task would help others (Experiment 1) or believed that their efforts could benefit them (Experiment 2) performed better on a subsequent test of self-control than individuals who were depleted and lower in motivation. The results of Experiment 3 replicated these findings and suggested that depletion only affects performance on tasks that require self-control; tasks that are difficult but do not require self-control are immune to the effects of depletion. Hence, depleted individuals may compensate for their lack of self-control resources when sufficiently motivated. The results may help explain the nature of self-control strength.

Keywords: *self-control; motivation; depletion; recourses*

Self-control frequently fails despite the best intentions of the person. For example, quitting smoking is not a simple matter of wishing away an addiction. Smoking cessation requires a great deal of effort to fight the urge to smoke. Unfortunately, people often lose this battle and start smoking again. To better understand and prevent these self-control breakdowns, researchers need to know what causes these failures. In particular, are these failures of self-control produced by an inability to exert self-control, an unwillingness to put forth the effort to succeed, or some combination of factors?

Self-control is the overriding or inhibiting of automatic, habitual, or innate behaviors, urges, emotions, or desires that would otherwise interfere with goal-directed behavior (Barkley, 1997; Baumeister, Heatherton, & Tice, 1994; Kanfer & Karoly, 1972). People exert self-control because they want to follow a rule (either externally or internally determined) or delay gratification (Barkley, 1997; Hayes, 1989; Shallice & Burgess, 1993). Without self-control, the person would carry out his or her normal, typical, or automatic behavior or engage in immediate, short-term focused actions. For instance, without self-control, a person would give in to temptation, quit when frustrated, disobey difficult instructions, or otherwise follow his or her automatic, overlearned patterns of behavior (Bargh & Chartrand, 1999). Someone who typically smokes and wants to stop must exert self-control to break that habit. If the person does not exert self-control, he or she will behave automatically and smoke (Tiffany, 1990).

Self-control undoubtedly fails for a variety of reasons. For example, a dieter may decide that that milkshake ruined his diet so he loses nothing by bingeing (Herman & Mack, 1975), or bad news may make the recovering alcoholic decide that dealing with the negative mood is more important than remaining abstinent (Tice, Bratslavsky, & Baumeister, 2001). Individuals' self-control performance also may decline after exerting self-control because self-control draws on a resource or strength (self-control strength) that is limited and consumed in the process of exerting self-control (Muraven & Baumeister, 2000). More specifically, if a resource or strength is required for self-control, individuals who have more of it should perform better on tasks that require self-control than individuals lower in that strength. And if that strength is consumed in the process

Authors' Note: This research is based in part on the first author's doctoral dissertation. He would like to thank the members of his committee—Roy Baumeister, Dianne Tice, Tim Curran, and Jagdip Singh—for their guidance. Correspondence concerning this article should be addressed to Mark Muraven, Department of Psychology, University at Albany, Albany, NY 12222; e-mail: muraven@albany.edu.

PSPB, Vol. 29 No. 7, July 2003 894-906
DOI: 10.1177/0146167203253209

of self-control, individuals' level of self-control strength will be temporarily diminished (their strength is depleted) after an attempt at self-control. Thus, individuals who exert self-control will have less strength available for subsequent attempts at self-control. This suggests that individuals who exerted self-control should perform more poorly on subsequent tests of self-control as compared with individuals who did not exert self-control.

As predicted by the self-control strength model, research has found that self-control performance declines after the exertion of self-control. For example, individuals who controlled their thoughts were subsequently less able to suppress signs of amusement as compared with individuals who worked on multiplication problems (Muraven, Tice, & Baumeister, 1998, Experiment 3). The math problem and thought suppression tasks were equally frustrating, unpleasant, and difficult; the two conditions only differed in how much self-control they required. That is, one task was structured so that there was a need to override a thought, whereas the other condition was structured so that there was far less conflict and inhibition needed to reach the experimental goal. Individuals who depleted their self-control strength performed more poorly on subsequent tests of self-control. These findings have been replicated several times using a variety of self-control tasks (Baumeister, Bratslavsky, Muraven, & Tice, 1998; for a review, see Muraven & Baumeister, 2000; Muraven et al., 1998; Vohs & Heatherton, 2000). The results of these studies suggest that subsequent self-control performance is directly proportional to the amount of self-control the individual previously exerted (Muraven, Collins, & Nienhaus, 2002).

Whether depletion invariably leads to poorer self-control outcomes is less clear, however. For example, individuals can compensate for a lack of sleep through coffee and increased effort. Yet, most of us would prefer our airline pilot had a good night's sleep rather than be well caffeinated and highly motivated. The loss of some resources cannot be compensated for. A cognitive load or a shortfall in working memory is not easily overcome: Enormous incentives cannot help an untrained individual learn strangers' names while trying to remember a 10-digit sequence. Whether individuals can compensate for a loss of self-control strength is even more unclear. Despite extreme fatigue and stress after being shot down during a reconnaissance mission over Bosnia, Captain Scott O'Grady was able to lie motionless while Serbian search parties passed within feet of him—a self-control feat that people would find difficult under the best circumstances. On the other hand, during World War II, radar operators fatigued and missed enemy targets despite the deadly consequences of such inattention.

Thus, anecdotally, the evidence is mixed whether individuals can overcome depletion. We are left with several important questions. Can a depleted addict in the throes of withdrawal given his favorite drug resist the temptation to use the drug if there is a gun to his head? What if we replace the gun with the approval of a loved one? Will a depleted student always give up studying sooner than a nondepleted student, even if highly motivated? Prior research has found that individuals will mobilize their energy when the incentives to do so are sufficient but will fail to do so when the outcome is more uncertain or less important (Brehm & Self, 1989; Wright & Brehm, 1989). This research has not addressed self-control strength, however. Understanding whether individuals can compensate for a loss of self-control strength may provide insight into the nature of self-control strength.

We undertook three experiments to explore whether people can compensate for the loss of self-control resources if given sufficient incentive (either internal or external). If depleted individuals can compensate for the loss of self-control resources, then giving them an incentive to exert self-control should lead to better performance. If, on the other hand, resources alone determine self-control performance, then incentives to exert self-control should have little effect on depleted participants (e.g., fear of death cannot motivate a sentry to pay attention when he is mentally fatigued). Consistent with the compensation hypothesis, we predicted that depleted participants who were given little incentive to exert self-control should perform more poorly than depleted participants who were given greater incentives and more poorly than nondepleted participants. The amount of energy mobilized (motivation) should be a product of incentives; in particular, the attractiveness of the outcome and the perceived likelihood of success (Brehm & Self, 1989; Wright & Brehm, 1989). Tasks that are more attractive and attainable should increase effort; less attractive tasks or tasks when success seems remote should lead to diminished motivation. Depleted participants who were high in motivation may perform as well as nondepleted participants on a test of self-control, thus a focused contrast, rather than an interaction, should have the greatest power for detecting the differences we predict.

EXPERIMENT 1

Individuals may be more motivated when they believe the outcome is important, even if the end result does not benefit them directly (Batson, 1990). Thus, in Experiment 1, some of the participants were told that the experimental procedures might help answer important questions about memory that could eventually lead to better treatments for Alzheimer's disease. The other par-

ticipants were given the same instructions except that the experimenter made no mention of Alzheimer's disease or the potential benefits of the experiment. We reasoned that participants who thought that their efforts could be potentially important and contribute to the greater good would have a greater incentive to exert self-control than individuals who were not told of potential benefits to others.

If, indeed, individuals can compensate for the effects of prior exertion of self-control (i.e., depletion), we predicted that participants who thought that the task was unimportant and who were depleted should perform more poorly on a subsequent test of self-control than participants who thought that the task was important. More broadly, self-control performance should depend on the interaction of the individuals' incentives to exert self-control and their previous self-control exertions. Individuals who exerted self-control in the first part of the experiment should be in the same mood and no more aroused than individuals who exerted less self-control in the first part of the experiment. The depletion condition should not differ from the nondepletion condition in frustration, unpleasantness, or difficulty, either.

Method

Participants. A total of 43 (20 men and 23 women) undergraduate students attending the University at Albany participated in Experiment 1. Participants received partial course credit for their participation. Each participant was tested individually for a period of 1 hour.

Depletion phase. Participants were told that the purpose of the study was to investigate the relationship between cognitive ability and creativity and that during the course of the experiment they would be asked to perform a cognitive task (a thought suppression task or a memory task) and a creativity task that would involve working on two puzzles.

Participants were told that they were going to work on the cognitive task first. They were assigned to either the thought suppression or the memory condition. Participants in the thought suppression condition were asked to list any thoughts that came to their mind with the admonition that they should avoid thinking about a white bear. They were told that whenever they thought of a white bear, they should write that thought down. The experimenter emphasized that it was very important to immediately change their thoughts and to try very hard not to think of a white bear again. Participants in the memory condition were instructed to memorize a list of words provided to them by an experimenter. Although memorizing a list of words may require overriding some responses, memorizing should require far less inhibition than suppressing a thought. Participants were given 5 min to work on the memory or thought suppression task.

Participants then were administered a manipulation check to assess how difficult (e.g., "How difficult was the task?"), pleasant (e.g., "How unpleasant was the task"), and frustrating (e.g., "How frustrating was the task?") the previous task was. In addition, participants reported how much self-control the instructions required (e.g., "How much were you fighting against an urge while working on the task?"). Participants responded to these questions using a 30-point scale. To increase the reliability of the manipulation checks, each theoretically important construct was assessed using multiple questions. In addition, participants completed the Brief Mood Introspection Scale (BMIS) (Mayer & Gaschke, 1988). The BMIS is a well-validated and reliable instrument used to assess mood valence and arousal. Participants rated their current feelings on 16 adjectives (e.g., *happy, nervous*) on a 7-point scale. These 16 adjectives load on two mood factors: pleasantness-unpleasantness (valence) and arousal-calm (arousal). These mood factors have internal consistencies of .76 to .83 and well-established validity. The BMIS helped to show that possible variations between the groups on the second task could not be attributed to differences in mood induced by the first task.

Self-control measurement phase. During the second part of the experiment, participants were asked to work on two puzzles that were introduced as a creativity measure. This problem-solving task has been used in a number of experiments to measure self-control, operationalized as persistence in the face of frustration (Glass, Singer, & Friedman, 1969; Muraven et al., 1998). The problem-solving task involved participants tracing two (unsolvable) geometric figures without retracing the same line twice and without lifting a highlighter from the paper. Once the participant solved a practice puzzle, the experimenter gave him or her the two unsolvable puzzles.

Before the tracing task was introduced, some participants were provided with an additional cover story that emphasized the importance of the task. Those participants were told that the purpose of the study was to provide scientific evidence for the development of new therapies for patients with Alzheimer's disease. Participants in the other condition were told to try their best at the task but were not told that their results may be used to help persons with Alzheimer's disease.

After participants signaled their desire to stop working on the puzzles (eight participants were stopped because they exceeded the time limit of 45 min for the experiment: three from suppress thoughts/important condition, three from memory/important, and two from memory/unimportant condition; none from the thought suppress thoughts/unimportant condition worked past 45 min), they were administered a manipu-

lation check. They were asked multiple questions about their motivation to solve the puzzles (e.g., "How motivated were you to solve the puzzles?"). Finally, participants were thanked for their participation, debriefed about the purpose of the experiment, and dismissed. All participants were unaware that the puzzles were impossible and did not suspect that their performance on the first task may have affected how long they persisted on the second.

Results

Manipulation checks. Overall, the thought suppression and memory conditions did not differ significantly on frustration, difficulty, and unpleasantness, replicating the previous studies. More specifically, for how difficult participants found the first task (5 items, alpha = .76), the thought suppression ($M = 93.0$) and memory ($M = 98.5$) conditions did not differ, $t(41) = .63$, *ns*. The conditions did not differ in pleasantness (6 items, alpha = .61), $t(41) = 1.08$, *ns* (thought suppression, $M = 99.9$; memory, $M = 91.9$) or frustration, either (3 items, alpha = .67), $t(41) = .79$, *ns* (thought suppression, $M = 58.0$; memory, $M = 62.4$).

On the BMIS, participants in the thought suppression ($M = 5.80$) condition were in as pleasant a mood as participants in the memory ($M = 7.89$) condition, $t(41) = .57$, *ns*. Likewise, participants in the thought suppression ($M = 26.64$) condition were no more aroused than participants in the memory ($M = 27.84$) condition, $t(41) = .55$, *ns*. Participants in the thought suppression condition ($M = 17.24$) were just as likely as participants in the memory task ($M = 14.53$) to think that they did better than most people (1 item), $t(41) = 1.40$, *ns*. A power analysis suggests that we had sufficient power to detect an effect size of $d = .4$ (medium) approximately 70% of the time, which indicates that we should have been able to detect differences between conditions, had any existed. In short, the results suggest that the initial tasks did not differ in frustration, arousal, negative mood, or difficulty.

The thought suppression ($M = 111.47$) and memory task ($M = 83.38$) did differ in how much inhibition and control over their selves participants reported exerting, $t(41) = 2.24$, $p < .05$ (6 items, alpha = .92). That is, participants who were expected to be depleted did report exerting more self-control than participants who were not expected to be depleted.

The manipulation checks administered after the puzzles (dependent measure) indicated that participants who thought that the task could potentially help people with Alzheimer's were more motivated than participants who did not receive that instruction. In particular, participants in the important condition ($M = 18.88$) reported being more motivated than participants in the unimportant condition ($M = 9.50$), $t(41) = 3.12$, $p < .01$ (3 items, alpha = .68). This manipulation gave participants an incentive to exert self-control.

Dependent measure. A focused contrast indicated that participants in the unimportant condition who had to suppress their thoughts quit working on the puzzles much sooner than participants in the other three conditions, $F(1, 39) = 4.36$, $p < .05$ (see Figure 1). As predicted, depleted participants given little incentive to exert self-control performed the worst on a test of self-control. When the eight participants who had to be stopped were removed from the analysis, the focused contrast remained significant, $F(1, 31) = 4.49$, $p < .05$.[1] Likewise, the analyses remained significant when the time spent on the puzzles was transformed to a more normal distribution.

Individual *t* tests showed that participants who suppressed their thoughts in the first part of the experiment quit working much sooner when they believed the puzzles were unimportant ($M = 20.5$ s) than when they believed the puzzles were important ($M = 31.2$ s), $t(41) = 1.96$, $p < .05$. When the task was important, the memory ($M = 27.1$ s) and thought suppression ($M = 31.2$ s) conditions did not differ, $t(41) = .68$, *ns*. Of interest, depleted individuals appear to be more sensitive to potential rewards of the situation than nondepleted individuals, an effect we found across all three experiments. When the task was unimportant, participants who suppressed their thoughts quit much sooner than participants who did the memory task, $t(41) = 1.91$, $p < .06$, which basically replicates the depletion effect demonstrated in previous experiments (e.g., Muraven et al., 1998).

Discussion

Experiment 1 demonstrated that self-control performance is a product of individuals' motivation to exert self-control and their prior exertions of self-control. In particular, people who are more depleted (i.e., exerted self-control in the first part of the experiment) and who were not given an incentive to exert self-control performed more poorly on a measure of self-control than individuals who are depleted and who were given an incentive and more poorly than individuals who are less depleted. People can compensate for depletion if their motivation is great enough.

The findings of Experiment 1 suggest that depletion of self-control strength does not prevent the subsequent exertion of self-control. Individuals can still exert self-control when they are depleted, providing they are sufficiently motivated. In other words, in this experiment, self-control broke down not because of a lack of resources but instead because of a lack of resources and a lack of motivation. Also, the lack of a main effect for motivation and the similar performance of depleted and

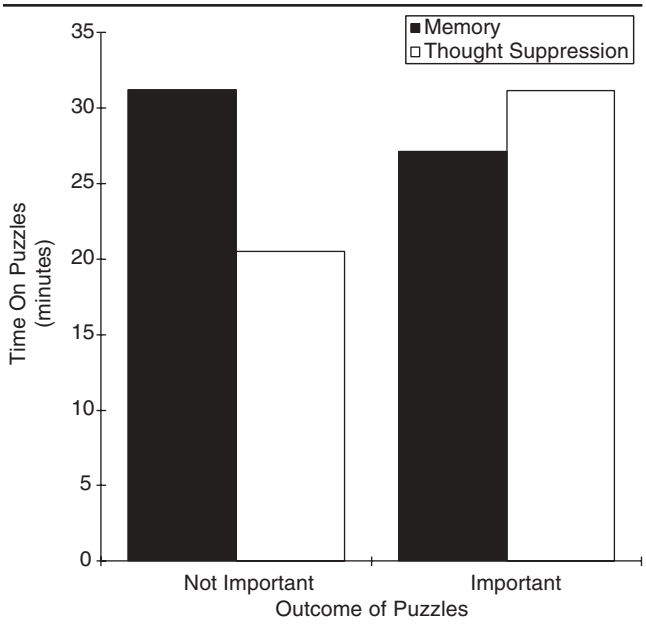

Figure 1 Time spent working on impossible puzzles depends on first task and importance of the puzzles.

nondepleted individuals in the high-motivation condition suggest that depleted individuals are more responsive to rewards than nondepleted individuals. There also may an absolute ceiling in how much effort participants are willing to put forth on (relatively) inconsequential self-control tasks. Motivation may be a critical feature in self-control performance. If that conclusion is supported in subsequent experiments, this finding has important implications for why depletion leads to poorer self-control performance.

Experiment 1 is noteworthy because we assessed whether participants had to inhibit their behavior. The results indicated that participants who had to suppress their thoughts exerted more self-control than participants who had to memorize a list of words. That is not to say that memorizing words (or any other task) does not require inhibiting an impulse, only that in comparison to suppressing a thought, memorizing words required less self-control. Determining whether someone is exerting self-control is difficult (see Wegner & Pennebaker, 1993). Although experiments on self-control are typically designed to maximize the type of response conflicts that require self-control (e.g., suppressing a thought), assessing participants' own experience helps to buttress the argument that participants in the thought suppression condition were exerting self-control, whereas participants in the memory condition were not.

In addition, Experiment 1 is significant for its use of multiple items in the manipulation check. This extensive manipulation check should have increased our ability to discern differences between conditions. Despite this increase in power, the conditions did not differ in mood, frustration, arousal, difficulty, or unpleasantness, which is consistent with other studies on the aftereffects of exerting self-control. Moreover, a power analysis suggested that we should have had enough power to find statistically significant differences had they existed. We therefore suggest that the depletion and nondepletion conditions did not differ in frustration, unpleasantness, or other variables.

Similar to Experiment 1, Experiment 2 was designed to investigate whether individuals can compensate for depletion. That is, when motivated, do individuals who previously exerted self-control perform at the same level as individuals who did not previously exert self-control? Experiment 2 used a different manipulation of motivation as well as different self-control tasks to examine the generalizability of this effect and to examine potential alternative explanations.

EXPERIMENT 2

People who perceive that success on a task is difficult or unlikely may be less motivated (Brehm & Self, 1989; Vroom, 1964; Wright & Brehm, 1989). Indeed, research has found that motivation diminishes when the chance of success seems remote (e.g., Wright, Brehm, & Bushman, 1989). Hence, individuals may perform extremely poorly on a test of self-control when they feel that exerting self-control is unlikely to make a difference in the eventual outcome. For example, a student may believe that making sacrifices, such as resisting the temptation to party, may lead to a better grade. If the student's instructor has a reputation for being an unfair or arbitrary grader, however, the student may come to believe that studying is irrelevant to the outcome. In that case, the student may be likely to forego the library. The situation has been structured so that it undermines the student's motivation to exert self-control. Expectations that self-control is unlikely to succeed should reduce the motivation to exert self-control. Moreover, we suggest that if the student happens to be depleted, he may be especially unlikely to go to the library, as compared to a more rested student or a depleted student who is more motivated. The outcome of a self-control task depends on both motivation and self-control demands; individuals low in motivation and low in self-control strength are the most likely to fail at self-control.

In Experiment 2, participants were asked to practice a frustrating task. Overcoming frustration requires self-control. Individuals whose self-control strength has been depleted tend to quit frustrating tasks sooner than individuals whose strength was not depleted (Baumeister et al., 1998; Muraven, 1998). Some of the participants

were told that practicing might make a difference in their eventual performance on the game. Other participants believed that practicing would have little impact on their final outcome. In other words, they believed that the chance of success was remote, which should reduce the amount of effort mobilized (Brehm & Self, 1989; Vroom, 1964; Wright & Brehm, 1989). Participants who are lower in motivation should perform more poorly on a test of self-control than participants higher in motivation. This motivation should interact with the previous self-control efforts to predict their self-control performance on this frustrating task. In particular, participants who are depleted and working on what they believe is a valueless task should quit the frustrating task much sooner than depleted participants working on a potentially useful and beneficial task and sooner than nondepleted participants.

Method

Participants. Eighty-two undergraduate students (46 men and 36 women) attending Case Western Reserve University were recruited for Experiment 2. They received partial course credit in return for their participation. Each individual testing session lasted about 30 min.

Depletion phase. The experimenter explained to participants that they were taking part in an experiment concerning how mental organization affects performance. For the first task, participants made a short speech on how they would spend an ideal day that the experimenter recorded. Participants in the no instruction condition did not exert a great deal of self-control; they spoke freely into the microphone. Participants in the speech control condition had to exert more self-control relative to the no instruction condition. More specifically, participants in the speech control were instructed to avoid saying *um* or *er* during their speech. The use of such speech fillers is relatively automatic and common (see Christenfeld & Creager, 1996); therefore, suppressing these fillers should require a great deal of self-control to override the habit of using them. Participants in the speech control condition therefore should be more depleted than participants in the no instruction condition.

Self-control measurement phase. Participants then played a frustrating game that involved rolling a ball around a maze by tilting the playing surface while avoiding holes in the path. Pretesting indicated that the game was very frustrating and participants quickly tired of playing and wished to quit. Previous research has shown that people low in self-control tend to quit frustrating tasks sooner (Baumeister et al., 1998; Glass et al., 1969; Muraven, 1998). Hence, how long participants played the game was a measure of their self-control ability.

The experimenter told participants that they would have a chance to practice the game before being tested on it. Participants were told to ring a bell to indicate that they were done practicing. As the experimenter was leaving the room for this practice session, he gave participants the motivational instructions. Participants in the worthless practice condition were warned that the game is very difficult and practice has little effect on final performance. Participants in the beneficial practice condition were told that although the game is very difficult, with practice, their performance might improve. Thus, participants in the worthless practice condition believed that practicing was unlikely to help them, whereas participants in the beneficial practice condition anticipated a task that could potentially help them succeed.

The experimenter then left the room and surreptitiously timed how long participants practiced the game. When participants rang the bell to indicate that they were done practicing (all participants stopped within 20 min; the experimenter did not terminate practice for any participant), the experimenter returned to the room and administered a series of manipulation checks. Participants were then debriefed. No participant reported being aware of the hypothesis, and participants did not suspect that how long they were practicing the task was being measured. Participants were similarly unaware that the first task may have influenced how long they worked on the second task.

Results

Manipulation checks. Using a 25-point scale, participants rated the speech control task as equally difficult ($M = 12.4$) as the no instruction task ($M = 12.7$), $t(80) = .83$, *ns*. Likewise, participants reported exerting the same amount of effort on the speech control ($M = 12.9$) and no instruction tasks ($M = 12.0$), $t(80) = .631$, *ns*. Participants also reported that the speech control task ($M = 13.1$) was as unpleasant as the no instruction task ($M = 13.4$), $t(80) = .175$, *ns*. Finally, participants liked the speech control task ($M = 12.4$) and the no instruction task ($M = 11.0$) equally, $t(80) = 1.16$, *ns*. The depletion task did not differ from the nondepletion task except the depletion task was designed to require the overriding of an urge or behavior, whereas the nondepletion task did not.

Dependent measure. As we predicted, participants in the speech control (depletion) condition who were told that practicing the frustrating game would not improve their performance performed more poorly than participants in the other three conditions. As illustrated in Figure 2, a focused contrast indicated that participants in the

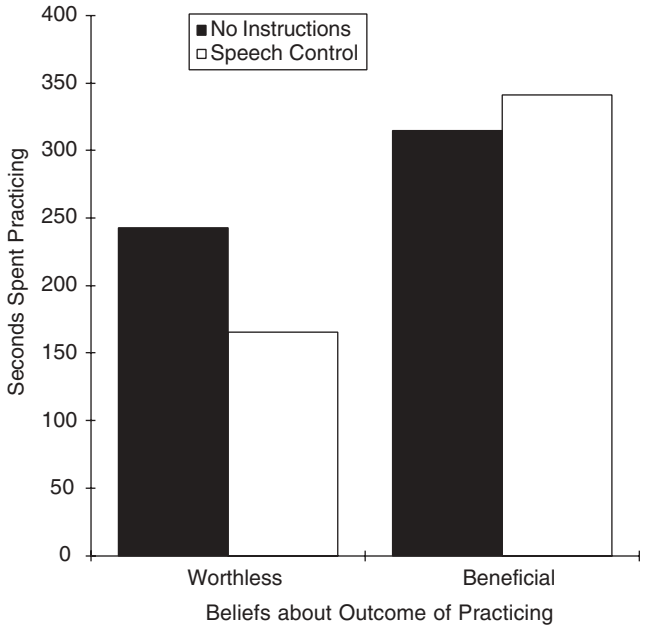

Figure 2 Time spent practicing a frustrating task depends on first task and expectations of the outcome of practicing.

speech control (depletion) condition who were told that practicing does not help improve performance quit practicing sooner than did participants in the speech control condition who were told that practicing does lead to better performance and sooner than participants in the no instruction condition, $F(1, 78) = 5.39$, $p < .025$.[2]

Individual *t* tests indicated that among participants in the speech control condition, those who thought that practice could lead to improved performance worked on the frustrating task longer than those who thought that practicing had little effect on final performance, $t(39) = 2.95$, $p < .01$. Also, for the beneficial practice condition, the initial task (speech control, $M = 341$ s; no instruction condition, $M = 315$ s) did not differ, $t(39) = .33$, *ns*, but initial task did matter in the worthless practice condition (speech control, $M = 165$ s; no instruction, $M = 242$ s), $t(39) = 1.98$, $p < .05$. When low in motivation, individuals' previous self-control demands matter, but when higher in motivation, individuals' previous self-control demands do not predict performance. We found the same effect in Experiment 1. Self-control performance (time spent on the frustrating game) is a product of motivation and previous self-control demands. We also ran these analyses using an inverse square root transformation of the time spent practicing because we were concerned that such practice data might be skewed. The focused contrast remained significant, $F(1, 78) = 5.45$, $p < .01$, as well as the individual *t* tests. In short, participants who had to exert self-control in the first part of the experiment and who believed that practice was unlikely to help quit practicing the frustrating task sooner than participants who did not exert self-control initially and sooner than participants who believed that practicing could help their performance.

Discussion

The results of Experiment 2 are consistent with the results of Experiment 1. Depleted participants who believed that practicing the self-control task was worthless performed more poorly than depleted participants who believed the task could be beneficial. Motivation and prior exertion of self-control jointly determined performance so that depleted individuals low in motivation performed much more poorly than anyone else. In summary, if sufficiently motivated, depleted individuals may compensate for their loss of self-control strength. Participants do not fail at self-control because they do not have the necessary resources; they fail at self-control because they compensate their loss of resources.

Both Experiments 1 and 2 suggest that motivation and prior self-control demands interact to determine subsequent self-control performance. Experiment 3 was designed to extend these findings by examining depleted individuals' performance on tasks that require self-control relative to their performance on tasks that do not require self-control. That is, does depletion reduce motivation on all tasks or are the effects of depletion specific to tasks that require self-control? The answer to that question may provide insight into the nature of self-control strength as well as help demonstrate the specificity of self-control resources.

EXPERIMENT 3

In Experiment 3, participants were paid based on their self-control performance. Participants who are paid more money for exerting self-control should be more motivated to engage in self-control than participants who are paid less. In fact, incentives often do lead to better self-control on various tests of self-control, such as the cold-pressor task (Baker & Kirsch, 1991), cold-climate chamber tolerance (Johnson & Cabanac, 1983), and isometric exercise persistence (Cabanac, 1986). In short, money is a good incentive that can motivate individuals to exert more self-control. Paying participants therefore affords a strong test of whether depleted individuals can overcome depletion when their motivation is high or whether depletion leads to poorer self-control performance regardless of the ultimate outcome. If, as we expect, depletion contributes to but is not the ultimate cause of self-control failure, then depleted individuals who are paid to exert self-control should perform just as well as nondepleted individuals.

There is a second question about the role of motivation in self-control that needs to be answered, however. Perhaps depleted individuals are just lower in motivation overall. That is, does depletion matter at all? Previous studies have taken significant steps to consider alternative explanations; for instance, individuals who are low in self-control strength will work longer on a task if quitting requires self-control (Baumeister et al., 1998, Experiment 4). Despite these findings, one could argue that the exertion of self-control leads to negative moods or frustration (Leith & Baumeister, 1996; Tice et al., 2001), loss of self-efficacy (Bandura, 1997), learned helplessness (Seligman, 1975), or some other phenomenon that results in poorer performance. One way to test these alternative explanations for the results is to examine depleted individuals' performance on a task that does not require self-control. The self-control strength model predicts that the prior exertion of self-control should affect performance on a task that requires self-control but should have no effect on a task that does not require self-control. Furthermore, if indeed individuals can compensate for the effects of depletion, then motivation and depletion should interact to predict performance on a task that requires self-control, but the interaction should not be significant for a task that does not require self-control. The effects of depletion should be specific to self-control tasks.

To test the specificity of self-control strength to self-control tasks, participants consumed either a good-tasting or bad-tasting beverage in Experiment 3. Drinking a good-tasting beverage does not require overriding strong, conflicting impulses and therefore should not require much self-control. On the other hand, drinking a bad-tasting beverage requires much more self-control because the participant must override the natural desire to stop performing an aversive action. Depletion should reduce how much bad-tasting beverage participants consume, especially when they are low in motivation, but should have no effect on how much good-tasting beverage they consume.

In summary, depleted participants who are poorly paid for drinking a bad-tasting beverage should consume less than depleted participants who are well paid for drinking a bad-tasting beverage and less than nondepleted participants. Depleted participants who are well paid for drinking a bad-tasting beverage should consume as much as nondepleted participants. Depleted participants should consume the same amount of good-tasting beverage as nondepleted participants, however. More simply, the interaction between pay and depletion should be significant for participants who consumed a bad-tasting beverage but not for participants who consumed a good-tasting beverage.

Method

Participants. Ninety-seven (53 men and 44 women) undergraduate students attending Case Western Reserve University were recruited for Experiment 3. They received partial course credit in return for their participation. Each individual testing session lasted about 30 min.

Depletion phase. The experimenter told participants that they were taking part in an experiment looking at how moods affect information processing. Participants watched a 5-min video clip of a Robin Williams comedy routine while their facial expressions were recorded. Participants in the no instruction condition did not have to override a behavior; they simply watched the video. On the other hand, participants in the suppress reaction condition were instructed to hide their emotional expressions (i.e., laughing or smiling) while watching the video. Regulating and inhibiting one's emotional reactions should require self-control. Pretesting and prior research (Muraven et al., 1998, Experiment 3) have found that this clip is extremely funny and that suppressing one's desire to laugh does require self-control. Therefore, participants in the suppress reaction condition should be lower in self-control strength than participants in the no instruction condition.

Self-control measurement phase. Following the depletion task, participants were allowed to consume as much orange-flavored Kool-Aid (a powdered instant drink mix) as they wanted. Participants in the sweet beverage condition drank Kool-Aid that was prepared normally, with a cup of sugar added to the water. Participants in the bitter beverage condition drank Kool-Aid that contained a cup of vinegar rather than sugar. The bad-tasting beverage was rather bitter and unpleasant, although participants should have been able to tolerate it and even drink it if they exerted enough self-control to override the normal desire not to consume bitter concoctions. The experimenter recorded how much Kool-Aid participants consumed.

Participants in the high-pay condition were given 25 cents for every ounce of beverage they consumed. Participants in the low-pay condition were given 1 cent for every ounce they consumed. Participants in the high-pay condition were given a greater incentive to drink and therefore should be more motivated to consume the beverage than participants in the low-pay condition.

After participants indicated that they had enough Kool-Aid, the experimenter administered a manipulation check to examine differences in mood, motivation, and liking of the task. Participants were then paid and debriefed. Participants indicated no awareness of the experimental hypothesis, and they did not suspect that

the first task might have influenced their performance on the second task.

Results

Manipulation checks. Using a 25-point scale, participants in the high-pay condition reported being more motivated ($M = 18.50$) to drink the beverage than participants in the low-pay condition ($M = 13.33$), $t(95) = 4.97$, $p < .0001$. Also, participants in the high-pay condition ($M = 15.24$) indicated that they worked harder at consuming the beverage than participants in the low-pay condition ($M = 11.91$), $t(95) = 2.29$, $p < .025$. The pay manipulation influenced how much effort participants were willing to put forth.

Not surprisingly, participants rated the bitter beverage as more unpleasant ($M = 5.17$) than the sweet beverage ($M = 17.14$), $t(95) = 12.47$, $p < .0001$. However, participants reported that drinking the bitter beverage ($M = 15.04$) took as much effort as drinking the sweet beverage ($M = 13.10$), $t(95) = 1.48$, *ns*. This is consistent with previous research that has found that self-control tasks are not necessarily more effortful than tasks that do not require self-control (e.g., Muraven et al., 1998). Effortfulness is not a good measure of the amount of self-control required. Instead, one must look to the amount of overriding or inhibiting required. Drinking a bad-tasting beverage should therefore require more self-control than drinking a good-tasting one (consuming a good-tasting beverage will require self-control only if the person tries to override or exceed biological limits for liquid capacity, which was highly unlikely in the present experiment).

Dependent measure. The amount participants consumed was first analyzed in a 2 (taste) × 2 (first task) × 2 (pay) ANOVA. Understandably, there was a main effect for taste, $F(1, 89) = 43.13$, $p < .0001$. Participants who drank the bitter beverage consumed less than participants who drank the sweet beverage. The main effect for first task, $F(1, 89) = .12$, *ns*, and pay, $F(1, 89) = 2.13$, *ns*, was not significant, and neither were the two-way interactions between pay and taste, $F(1, 89) = .001$, *ns*; pay and first task, $F(1, 89) = .178$, *ns*; and taste and first task, $F(1, 89) = .134$, *ns*. The three-way interaction between taste, first task, and pay was significant, $F(1, 89) = 5.51$, $p < .025$. To facilitate comprehension, we examined the simple interaction effects (First Task × Pay) for each level of taste.

For the bitter beverage, there was a significant interaction between first task and pay, $F(1, 42) = 4.34$, $p < .05$, as shown in Figure 3. More important, consistent with the hypothesis that depleted individuals who are low in motivation will drink the least, a focused contrast suggested that participants in the suppress reaction, low-pay condition consumed less than participants in any other condition (although the difference was marginally significant), $F(1, 42) = 3.22$, $p < .08$.

Simple effects tests indicated that participants in the suppress reaction (depletion) condition who were well paid ($M = 21.8$) consumed more than participants in the suppress reaction condition who were poorly paid ($M = 9.09$), $t(20) = 2.19$, $p < .05$. Participants could apparently compensate for depletion if sufficiently motivated. When poorly paid, participants who had to suppress their reaction to the film consumed the same amount as did participants in the no instruction condition ($M = 17.5$), $t(20) = 1.44$, *ns*. Participants in the suppress reaction condition who were well paid consumed as much as participants in the high-pay, no instruction (no depletion) condition ($M = 13.4$), $t(20) = 1.51$, *ns*, and as much as participants in the low-pay, no instruction condition, $t(20) = .75$, *ns*. Although the high-pay, no instruction condition appears discrepant, this cell does not differ from the low-pay, no instruction condition, which is consistent with the previous experiments that found nondepleted participants are less sensitive to motivational cues than depleted participants. In summary, depleted participants who were given an incentive to exert self-control performed as well as nondepleted participants.

For the sweet beverage, a different pattern of results emerged. As demonstrated by Figure 3, the interaction between pay and first task was not significant, $F(1, 47) = 1.71$, *ns*. A focused contrast also indicated the participants in the suppress reaction condition who were poorly paid ($M = 34.9$) consumed just as much as participants in the suppress reaction who were well paid ($M = 33.6$) and as much as participants in the no instruction condition (high pay, $M = 41.6$; low pay, $M = 31.3$), $F(1, 47) = .013$, *ns*. Depletion and motivation do not interact to predict performance on a task that does not require self-control. To summarize, participants consumed the same amount of sweet beverage regardless of their level of depletion. An individual's performance on a task that does not require self-control, such as drinking a good-tasting beverage, was not affected by previous self-control demands.

Alternative explanations. The differences between conditions in amount of bitter beverage consumed were unrelated to mood, arousal, frustration, or any other variable as measured at the end of the experiment. More specifically, the amount of bitter beverage participants consumed did not correlate with their perception of difficulty of the first task (the depletion task), $r(45) = -.13$; effort they exerted on the first task, $r(45) = -.052$; unpleasantness of the first task, $r(45) = -.015$; and liking of the first task, $r(45) = .055$, all $ps > .35$. These factors did not mediate the relationship between initial self-control task and final self-control performance. Furthermore,

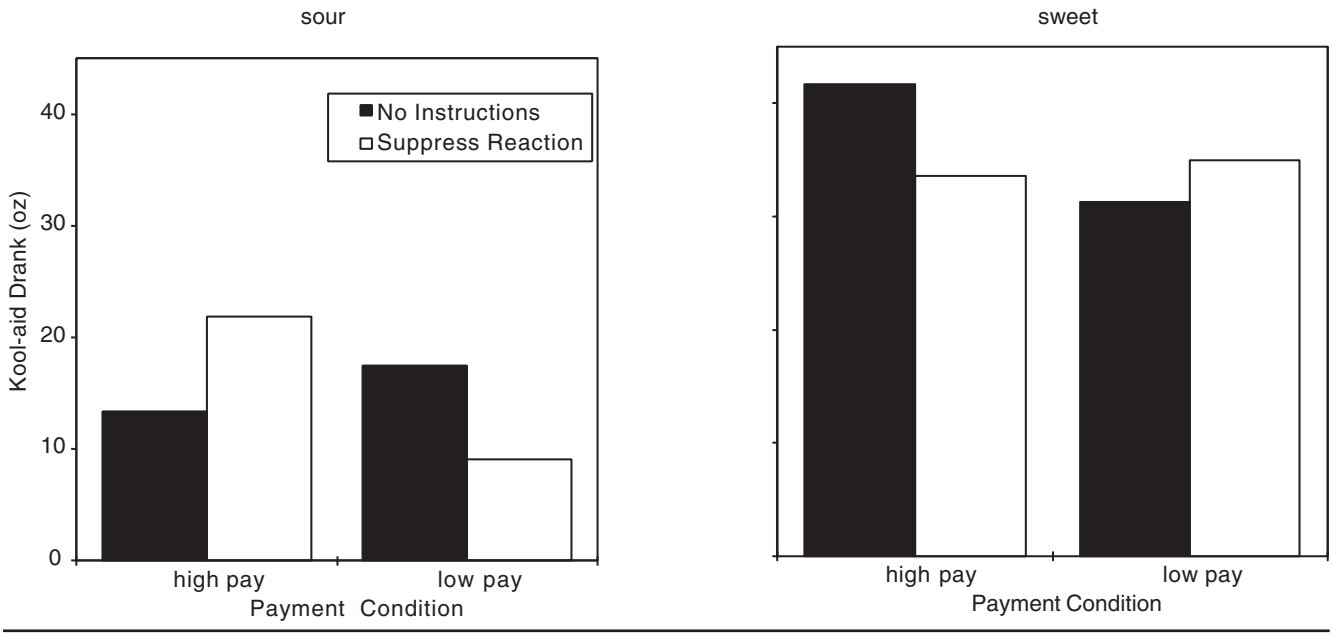

Figure 3 Sweet and sour Kool-Aid consumed, based on first task and pay.

the two-way interaction between first task and pay for the amount of bitter-tasting beverage consumed remained significant when any of these variables were added as a covariate to the ANOVA model to control for mood effects, *p*s < .05. Differences in mood and effort exerted in the first task did not influence how much participants consumed. The lack of mood effects in the current experiment is consistent with previous research on depletion.

Discussion

Similar to the results of Experiments 1 and 2, the results of Experiment 3 suggest that the incentives for exerting self-control and level of self-control strength (depletion) jointly determine the amount of self-control exerted subsequently. If depleted participants were not given a sufficient incentive to exert self-control, they performed more poorly than nondepleted participants. Conversely, when motivated, depleted participants performed as well as nondepleted participants on a test of self-control. The results suggest that depleted individual are not unable, but perhaps unwilling, to exert self-control. Motivation had an effect on depleted participants but no effect on nondepleted participants, which suggest depletion may increase individuals' sensitivity to the rewards of the situation. Alternative explanations, such as mood or difficulty of the first task, cannot easily account for the results.

Also, consistent with prior research on depletion (e.g., Muraven et al., 1998), Experiment 3 demonstrated that the effects of prior exertion of self-control are limited to self-control tasks. Drinking a large quantity of a good-tasting beverage was judged as equally difficult as drinking a bitter beverage, yet depleted participants' performance on a task that required self-control was very different from depleted participants' performance on a task that did not require self-control. The significant factor in depleted participants' performance may be how much self-control the task required, not how difficult the task was. Self-control strength has no impact on tasks that do not require self-control; the effects of depletion apparently are specific to tasks that require self-control.

GENERAL DISCUSSION

Self-control performance may be a product of individuals' previous exertions of self-control and their incentives for exerting self-control. Whereas previous studies (Baumeister et al., 1998; Muraven et al., 1998) have found that after inhibiting a strong impulse individuals perform more poorly on subsequent tests of self-control, the present studies demonstrated that that effect is moderated by motivation. In particular, depleted participants who are working on a self-control task that they believe could help others (Experiment 1) persisted on a frustrating task longer than depleted participants who believed the task was unlikely to help others. Depleted participants who worked on a task that they believed was unlikely to benefit them (Experiment 2) also were less likely to keep practicing as compared to depleted participants who believed that the task could benefit them, and they were less likely to keeping practicing than nondepleted individuals. Finally, Experiment 3 demon-

strated that when the incentives for exerting self-control are small, depleted individuals are less likely to quaff an unpleasant beverage than nondepleted participants, but when the incentives are large, that difference disappears. Combining the three experiments meta-analytically, we found that contrast was significant, average $d = .67$, $p < .01$. Across three experiments, depleted individuals given little incentive to exert self-control performed more poorly on tests of self-control than depleted individuals who were given greater incentives to exert self-control and more poorly than nondepleted individuals. Indeed, depleted individuals who were high in motivation performed as well as nondepleted individuals who were high in motivation.

The results of Experiment 3 also suggest that exerting self-control only affects subsequent performance on tasks that require self-control and has no impact on tasks that do not require self-control. The effects of depletion seem to be specific to self-control. This finding suggests that there may be something unique about exerting self-control that leads to poorer self-control performance subsequently. This conclusion is borne out by the manipulation checks. Across all three studies, a common conclusion was that the initial tasks did not differ significantly except in the amount of self-control they demanded.[3] More specifically, the initial tasks did not differ in relative difficulty, frustration, effort required, unpleasantness, or other variables. Participants who had to exert self-control were in the same mood and were no more aroused than participants who did not have to exert self-control. Controlling for the difficulty, unpleasantness, or dislike of the initial task also had minimal impact on the relationship among motivation, depletion, and self-control performance. Because mood, frustration, and unpleasantness were not correlated with self-control performance and did not differ across conditions, it seems unlikely that the decline in self-control perform is a product of these variables. Hence, theories such as negative state relief, learned helplessness, or self-efficacy, which require these variables as mediators, are hard pressed to explain the present findings. Moreover, one would expect that learned helplessness would affect all outcomes equally. Yet, in Experiment 3, we found that outcomes that required self-control were affected by participants' initial exertion of self-control, whereas outcomes that did not require self-control were not affected. A factor specific to exerting self-control seems to be related to poorer performance on subsequent tests of self-control.

To summarize, the results imply that self-control performance is determined by more than just previous self-control demands; motivation has a role. There are several potential explanations why motivation may compensate for the effects of depletion. First, the exertion of self-control might lower individuals' willingness to exert self-control (effort or motivation). This explanation discounts the role of resources and just assumes that motivation is the critical factor. Although the motivation explanation is potent, it fails to explain why the effects of exerting self-control are specific to self-control tasks, as demonstrated by Experiment 3. This account also is hard pressed to explain why difficult tasks that do not require self-control have no effect on subsequent self-control performance. In short, there is something unique to exerting self-control in that it only affects self-control tasks. A general lack of motivation does not seem like a viable explanation.

An alternative explanation is that the exertion of self-control reduces motivation specific to self-control. There may be two reasons for this, both of which spring from the idea that self-control acts like a limited resource. First, after exerting self-control, subsequent attempts at self-control may be more difficult and require more effort. Much like a fatigued person will find digging a ditch more demanding than a rested person, a depleted person may have to work harder to exert self-control. Motivation increases the likelihood of putting forth the effort. We call this the well model because much like water becomes harder to obtain as a well dries up, self-control may become more difficult as strength is depleted. This well model supposes that self-control is indeed a limited resource.

The second potential model that explains the current findings assumes that depleted individuals are motivated to conserve strength. Similar to the well model, this model assumes that exerting self-control depletes a limited resource, but instead, this model assumes that self-control become less likely (not more difficult) as strength decreases. In particular, individuals should be motivated to conserve limited resources. Moreover, this motivation to conserve should be greater in individuals low in resources (such as depleted individuals) than in individuals flush with resources. Much like $100 is worth more to a starving student than to a millionaire, self-control strength may be more valuable to a depleted person than a well-rested person. Hence, self-control breaks down after the exertion of self-control not because individuals become unable to exert self-control or because self-control becomes more difficult but because they wish to conserve strength. This is not necessarily a conscious, deliberative process but rather something individuals do continually with very little awareness. Depletion may cause people to become more selective in whether they will exert self-control. Indeed, in the present experiments, manipulations of motivation had a greater effect on the self-control performance of depleted individuals than nondepleted individuals (but, consistent with this model, Experiment 3 demonstrated

that manipulations of motivation had the same effect on depleted and nondepleted individuals when the task did not require self-control). Increasing individuals' motivation to exert self-control gives them incentive to use their strength and overcome their natural desire to conserve strength. We call this the conservation model.

Future research should be able to differentiate between the conservation and the well model by manipulating participants' expectations for future self-control demands—the conservation model suggests that individuals should be sensitive to future self-control demands, whereas the well model suggests that individuals will not be. Both models are mute, however, on whether individuals can compensate for more extreme levels of depletion. The present set of studies suggest that people can compensate for a small loss of strength. Individuals may not be able to compensate for a greater depletion of strength, much like there are physiological limits on human performance, however. If very depleted, a dieter may be unable to resist the urge to eat, no matter how strong his motivation may be. Motivation can compensate for but not eliminate depletion. The present findings also do not speak to whether there may be irresistible urges—urges so overwhelming that no amount of motivation and strength are enough to resist them.

Although the self-control strength model can account for the results, it is unclear whether such a limited resource model is necessary to explain the results. However, the results of these and other studies (e.g., Baumeister et al., 1998; Muraven et al., 1998, 2002) clearly demonstrate that the exertion of self-control leads to a subsequent decline in self-control performance. Furthermore, as noted above, the decrease in self-control performance among depleted individuals is not produced by negative moods, arousal, frustration, or physical fatigue and is specific to self-control tasks. Thus, we suggest that people act as if self-control is a limited resource. Whether a resource truly underlies self-control and, if so, the exact nature of that resource remains to be investigated. At this point, however, we can say with reasonable confidence that the self-control strength model seems to capture the essence of self-control.

Unlike prior studies (e.g., Baumeister et al., 1998; Muraven et al., 1998) that have held motivation constant, both motivation and depletion were manipulated in the current studies. When motivation was low, we replicated previous results that found that the exertion of self-control leads to poorer self-control performance. When motivation is high, the effects of depletion disappear, however. We did not find a main effect for motivation, perhaps because of a ceiling in how much effort participants are willing to put forth in a laboratory study of self-control (which is also consistent with the conservation model). These findings suggest that individuals can compensate for the loss of self-control strength. Individuals should be most likely to suffer a breakdown in self-control when they are depleted and low in motivation. Similarly, a depleted individual is likely to stop controlling unimportant behaviors before loosening restraints over more important behaviors. This may explain why participants in studies on depletion quit frustrating tasks without cursing the experimenter aloud for the pain they have suffered.

The finding that individuals can compensate for a loss of self-control resources with increased motivation may be important for other models that posit limited resources. For example, Gilbert, Tafarodi, and Malone (1993) suggest that when individuals' energy is being reduced through a cognitive load they are less able to correct for false ideas. The present study suggests that this may only be true when individuals are low in motivation; when their motivation is high, individuals who are cognitively busy may be able to debias themselves as well as individuals who are not as overloaded. Similarly, one would expect that individuals low in cognitive resources but high in motivation would be more able to make mental corrections (Wilson & Brekke, 1994) than individuals low in resources and low in motivation.

The results also suggest that an understanding of motivation is crucial to understanding self-control. Thus, various models of motivation (Brehm & Self, 1989; Locke & Latham, 1990) may help to explain self-control failures, particularly when individuals are low in self-control strength. Most notably, we did not measure or differentiate between intrinsic and extrinsic motivation (Deci & Ryan, 1985). Superficially, the motivators in the present study ranged from highly internal (Experiment 1) to highly external (Experiment 3), and all had the same effect on depletion. This suggests that, at least for depleted individuals, the type of incentive for exerting self-control is not crucial. Future researchers may want to look at this distinction in more detail to determine if motivation orientation plays a role in depletion.

Emotions, in particular positive affect, may be important in compensating for the effects of depletion. Prior research has found that positive affect may lead to increased motivation because positive moods may signal that one's resources are adequate and therefore a small loss of resources or costs is acceptable (Aspinwall, 1998; Trope & Pomerantz, 1998). Negative emotions may have the opposite effect on the willingness to use and lose resources. Thus, the extent to which a manipulation of motivation affects individuals' mood may alter their willingness to lose self-control resources. Hence, mood may affect self-control outcomes.

In conclusion, self-control performance is a product of the individual's motivation to exert self-control and

his or her resources. Individuals can compensate for a lack of self-control resources with increased motivation, at least up to a point. Whereas a lack of resources may contribute to self-control failure, it is not the ultimate cause. The moderating influence of motivation suggests that depletion does not necessarily lead to self-control failure. The role of motivation in self-control also can help explain why, when depleted, people may lose control of their appetites but not their temper (or control their appetites and lose emotional control). In short, motivation and resources are both important components of self-control.

NOTES

1. The interaction between initial task and incentive condition approached significance for the full sample, $F(1, 39) = 3.28$, $p < .07$, and was significant for the subsample of participants who were not stopped, $F(1, 31) = 5.19$, $p < .05$.

2. The unfocused interaction between initial task and practice condition was not significant, $F(1, 89) = .089$, *ns*.

3. That is not to say that one task required self-control and the other did not. Instead, the tasks were structured so that one task should require much more self-control than the other. Individuals' reports of the amount of inhibition and overriding required in Experiment 1 support that assumption.

REFERENCES

Aspinwall, L. G. (1998). Rethinking the role of positive affect in self-regulation. *Motivation and Emotion, 22*, 1-32.

Baker, S., & Kirsch, I. (1991). Cognitive mediators of pain perception and tolerance. *Journal of Personality and Social Psychology, 61*, 504-510.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.

Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist, 54*, 462-479.

Barkley, R. A. (1997). *ADHD and the nature of self-control*. New York: Guilford.

Batson, D. (1990). How social an animal? The human capacity for caring. *American Psychologist, 45*, 336-346.

Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego-depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology, 74*, 1252-1265.

Baumeister, R. F., Heatherton, T. F., & Tice, D. M. (1994). *Losing control: How and why people fail at self-regulation*. San Diego, CA: Academic Press.

Brehm, J. W., & Self, E. (1989). The intensity of motivation. *Annual Review of Psychology, 40*, 109-131.

Cabanac, M. (1986). Money vs. pain: Experimental study of a conflict in humans. *Journal of the Experimental Analysis of Behavior, 46*, 37-44.

Christenfeld, N., & Creager, B. (1996). Anxiety, alcohol, aphasia, and *um*s. *Journal of Personality and Social Psychology, 70*, 451-460.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.

Gilbert, D. T., Tafarodi, R. W., & Malone, P. S. (1993). You can't not believe everything you read. *Journal of Personality and Social Psychology, 65*, 221-233.

Glass, D. C., Singer, J. E., & Friedman, L. N. (1969). Psychic cost of adaptation to an environmental stressor. *Journal of Personality and Social Psychology, 12*, 200-210.

Hayes, S. C. (1989). *Rule-governed behavior: Cognition, contingencies, and instructional control*. New York: Plenum.

Herman, C. P., & Mack, D. (1975). Restrained and unrestrained eating. *Journal of Personality, 43*, 647-660.

Johnson, K., & Cabanac, M. (1983). Human thermoregulatory behavior during a conflict between cold discomfort and money. *Physiology and Behavior, 30*, 145-150.

Kanfer, F. H., & Karoly, P. (1972). Self-control: A behavioristic excursion into the lion's den. *Behavior Therapy, 3*, 398-416.

Leith, K. P., & Baumeister, R. F. (1996). Why do bad moods increase self-defeating behavior? Emotion, risk taking, and self-regulation. *Journal of Personality and Social Psychology, 71*, 1250-1267.

Locke, E. A., & Latham, G. P. (1990). *A theory of goal setting and task performance*. Englewood Cliffs, NJ: Prentice Hall.

Mayer, J. D., & Gaschke, Y. N. (1988). The experience and meta-experience of mood. *Journal of Personality and Social Psychology, 55*, 102-111.

Muraven, M. (1998). *Mechanisms of self-control failure: Motivation and limited resources*. Unpublished doctoral dissertation, Case Western Reserve University, Cleveland, OH.

Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin, 126*, 247-259.

Muraven, M., Collins, R. L., & Nienhaus, K. (2002). Self-control and alcohol restraint: An initial application of the self-control strength model. *Psychology of Addictive Behaviors, 16*, 113-120.

Muraven, M., Tice, D. M., & Baumeister, R. F. (1998). Self-control as a limited resource: Regulatory depletion patterns. *Journal of Personality and Social Psychology, 74*, 774-789.

Seligman, M. P. (1975). *Helplessness: On depression, development, and death*. San Francisco: Freeman.

Shallice, T., & Burgess, P. (1993). Supervisory control of action and thought selection. In A. Baddeley & L. Weiskrantz (Eds.), *Attention: Selection, awareness, and control* (pp. 171-187). Oxford, UK: Oxford University Press.

Tice, D. M., Bratslavsky, E., & Baumeister, R. F. (2001). Emotional distress regulation takes precedence over impulse control: If you feel bad, do it! *Journal of Personality and Social Psychology, 80*, 53-67.

Tiffany, S. T. (1990). A cognitive model of drug urges and drug-use behavior: Role of automatic and nonautomatic processes. *Psychological Review, 97*, 147-168.

Trope, Y., & Pomerantz, E. M. (1998). Resolving conflicts among self-evaluative motives: Positive experiences as a resource for overcoming defensiveness. *Motivation and Emotion, 22*, 53-72.

Vohs, K. D., & Heatherton, T. F. (2000). Self-regulatory failure: A resource-depletion approach. *Psychological Science, 11*, 243-254.

Vroom, V. H. (1964). *Work and motivation*. New York: John Wiley.

Wegner, D. M., & Pennebaker, J. W. (1993). Changing our minds: An introduction to mental control. In D. M. Wegner & J. W. Pennebaker (Eds.), *Handbook of mental control* (pp. 1-12). Englewood Cliffs, NJ: Prentice Hall.

Wilson, T. D., & Brekke, N. (1994). Mental contamination and mental correction: Unwanted influences on judgments and evaluations. *Psychological Bulletin, 116*, 117-142.

Wright, R. A., & Brehm, J. W. (1989). Energization and goal attractiveness. In L. A. Pervin (Ed.), *Goal concepts in personality and social psychology* (pp. 169-210). Hillsdale, NJ: Lawrence Erlbaum.

Wright, R. A., Brehm, J. W., & Bushman, B. J. (1989). Cardiovascular responses to threat: Effects of the difficulty and availability of a cognitive avoidance task. *Basic and Applied Social Psychology, 10*, 151-171.

Received February 12, 2002
Revision accepted August 7, 2002