BEING ACTIVE AND IMPULSIVE: THE ROLE OF GOALS FOR ACTION AND INACTION IN SELF-CONTROL

BY

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THESIS

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ABSTRACT

Although self-control often requires behavioral inaction (i.e., *not eating* a piece of cake), the process of inhibiting impulsive behavior is commonly characterized as extremely cognitively active (i.e., *actively exerting* self-control). Two experiments examined whether motivation for action or inaction facilitates self-control behavior in the presence of tempting stimuli. Experiment 1 used a delay discounting task to assess the ability to delay gratification with respect to money. Experiment 2 used a Go/No-Go task to assess the ability to inhibit a dominant but incorrect motor response to the words "condom" and "sex". The results demonstrate that general goals for inaction promote self-control, whereas general goals for action promote impulsive behavior. These findings are discussed in light of recent evidence suggesting that goals for action and inaction modulate physiological resources that promote behavioral execution.

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CHAPTER 1: INTRODUCTION

Imagine you are at a party and the hosts have graciously supplied an extensive selection of hors d'oeuvres and desserts for the guests to enjoy. Unfortunately, you have just gone on a diet, and now you are confronted with a common and unpleasant dilemma: you need to exert self-control and overcome your desire to indulge in a piece of chocolate cake so you can get in shape and look good this bathing suit season. How should you proceed? Common parlance would urge you to “exert” your willpower, “fight” the temptation, “overcome” your desire, “control” your impulse, and other variations on the theme of actively countering your urge to eat. Although action in the face of a temptation seems like a plausible route to self-control success, self-control itself often requires behavioral inaction. That is, to succeed in your diet, you must *not eat*, which is an inaction. Due to this paradox it is unclear whether self-control is better accomplished through general goals to be active or inactive.

CHAPTER 2: LITERATURE REVIEW

2.1 Defining self-control and general goals for action and inaction

Self-control can be defined as the ability to delay gratification and pursue long-term goals over short-term goals (Ainslie, 1975), as well as the ability to inhibit dominant responses (Logan & Cowan, 1984; Swann, Bjork, Moeller, & Dougherty, 2002). Overall then, self-control requires the inhibition of one response (the short-term or dominant) in pursuit of another response (the long-term or non-dominant). Despite large amounts of research on self-control, the relation between these responses and motivation for action and inaction has not been investigated. Specifically, is inhibition facilitated more by goals for action or inaction? This is an important question, as recent empirical work has demonstrated that behavior can often be guided by broad goals to be generally active or inactive, regardless of the specific behavior that is ultimately pursued (Albarracin et al., 2008; Albarracin, Leeper, & Wang, 2009). Lab studies have demonstrated that priming general goals for action (by presenting words related to action, such as "active" and "go") leads to more active behavioral pursuit than priming general goals for inaction (by presenting words related to inaction, such as "rest" and "stop"). Throughout a number of studies, general action goals have lead to increases in both motor and cognitive behaviors, such as drawing, exercising, learning, and decision making. Oppositely, general inaction goals have lead to corresponding decreases in all of these behaviors. Importantly, these effects are not direct prime-to-behavior effects, but instead display goal properties, such as (a) increased effect strength with delayed goal pursuit, (b) goal satisfaction in response to executing goal-relevant behaviors, and (c) rebound effects of the inhibited goal when the focal goal is satisfied (Albarracin et al., 2008; Laran, 2009). The implications of general goals for action and inaction on self-control behavior are not straightforward because these general goals influence both cognitive and motor output. As such, it is unclear whether general goals for action or inaction facilitate inhibition – there are legitimate arguments for both sides of this issue, and we will summarize them presently.

2.2 The case for why action goals may facilitate self-control

Although many self-control situations require immediate behavioral inaction – particularly those situations that involve the avoidance of a tempting stimulus (e.g., not eating cake now to lose weight later) – the process of inhibition can often be quite cognitively effortful and consumes a great deal of physical resources (Gailliot et al., 2007). Limited resource models of self-control often conceptualize the limited resource as being used up through "active volition" and later restored during periods void of such active volition – i.e., periods of inaction (Baumeister, Bratslavsky, Muraven, & Tice, 1998). Furthermore, preparation for action leads to the mobilization of important physiological resources that support instrumental behavior (Brehm, Wright, Solomon, Silka, & Greenberg, 1983; Wright, Brehm, & Bushman, 1989). Recent evidence has demonstrated that subliminally priming general goals for action (vs. inaction and control goals) results in increased effort mobilization, operationalized via performance changes in the sympathetic nervous system (Gendolla & Silvestrini, in press). Therefore, a goal for action may promote self-control through the mobilization of resources that are then available for inhibition. Further, the same evidence that has linked general action goals to resource mobilization has also demonstrated that general inaction goals de-mobilize these resources to below-baseline levels (Gendolla & Silvestrini, in press). If inhibition is a resource-heavy process, then decreased availability of resources in response to inaction goals should be expected to hinder rather than promote self-control (Gailliot et al., 2007).

2.3 The case for why inaction goals may facilitate self-control

However, motivation for action could also be antagonistic with self-control through the direct promotion of action without adequate forethought. Given that self-control suffers when the pressure to act is too high (Dickman, 1990), action goals may reduce self-control by increasing the pressure to execute a rushed action. Moreover, goals for inaction might be inherently compatible with self-controlled inhibition. After all, several common measures of inhibitory control are based on the ability to withhold an active response (i.e., to be inactive), which is a process that might be facilitated by general goals for inaction.

2.4 Overview and rationale

As motivation for action and inaction are both plausible routes to achieve self-control success, in the present work we sought to determine whether general goals for action or inaction facilitate self-control behaviors in situations involving tempting stimuli. In Experiment 1, we primed participants with a goal for action or inaction and then assessed their preference for immediate versus delayed monetary gratification using a delay discounting task (Ainslie,1975; Kirby, Petry, & Bickel, 1999), which has been shown to predict self-control behavior in a variety of important domains, including illicit drug use (Kirby et al., 1999), alcohol abuse and dependence (Dom et al., 2006), binge eating (Yeomans et al., 2008), violent behavior (Cherek, Moeller, Dougherty, & Rhoades, 1997), and risky sexual activities (Lawyer, 2008). In Experiment 2, we primed participants with a goal for action, inaction, or control and then assessed their ability to inhibit a dominant response to a tempting stimulus using a Go/No-Go task, which is a task associated with self-control behavior in various domains, including alcohol abuse (Dom et al., 2006), nicotine use (Mitchell, 2004), and violence (Dolan & Fullam, 2004).

CHAPTER 3: EXPERIMENT 1

3.1 Participants and overview

Twenty-nine male and female undergraduates participated in this experiment in return for partial course credit. Participant sex had no effects and is not discussed further. The design included two cells: action goal primes and inaction goal primes.

3.2 Procedures and measures

3.2.1 Cover story

After entering the testing laboratory and being seated at a computer, participants were informed that they would complete a "verbal ability" task, which in reality served as a priming manipulation. After priming, participants completed a "monetary decision task" that was actually used to assess self-control.

3.2.2 Goal priming task

Participants were randomly assigned to an action (n = 16) or inaction (n = 13) goal prime condition, and primes were presented in a word-completion task. Participants were presented with 24 words that had certain letters missing and were asked to fill in the remaining letters to complete the words. Of the 24 words, ten were "critical words" for each group, whereas the remaining 14 were fillers. The critical words differed between action (e.g., "start, "active") and inaction (e.g., "stop", "pause") conditions, and were selected based on their association with "action" or "rest" in the empirically derived Computerized Edinburgh Association Thesaurus (Kiss, Armstrong, Milroy, & Piper, 1973). The target words have been extensively pretested and produce no mood effects, and prior use has confirmed that their presentation results in goal priming rather than simple conceptual priming (Albarracin et al., 2008; Laran, 2010). During debriefing, no participants reported a belief that their responses to any of the earlier tasks influenced their performance on later tasks, suggesting that participants were unaware of the nature of the goal priming task.

3.2.3 Delay discounting task

In delay discounting tasks, participants are presented with a series of choices between two hypothetical rewards – one is small and available relatively soon, whereas the other is large and available after some time delay. The purpose of the task is to assess an individual's preference for immediate versus delayed gratification. In a typical delay discounting task, a question could be "Would you prefer \$11 now or \$30 in 7 days from now?", and participants are considered self-controlled when they choose the larger, delayed option (in this case, \$30). In the present experiment, participants responded to a series of 27 such questions from Kirby et al. (1999), in which the monetary values (the tempting stimuli) ranged from \$11 to \$85 and the time delays ranged from 7 to 186 days. Based on participants' response patterns, researchers can generate a parameter representing impulsive decision making. Two common parameters derived from delay discounting tasks are *k*-values (e.g., Kirby et al., 1999) and the area under the discounting curve (AUC; Green, Myerson, & McFadden, 1997). In the present experiment, both estimates yielded identical results, and thus only *k*-values will be discussed.

3.2.4 Self-control estimate

To estimate the *k*-value for each participant, we used the following procedure: First, *k*-values for each of the 27 questions were calculated, using the following formula (for a full discussion of this parameter, see Kirby et al., 1999):

k = ((Large reward in dollars)/(Small reward in dollars) – 1)/(Time delay in days)

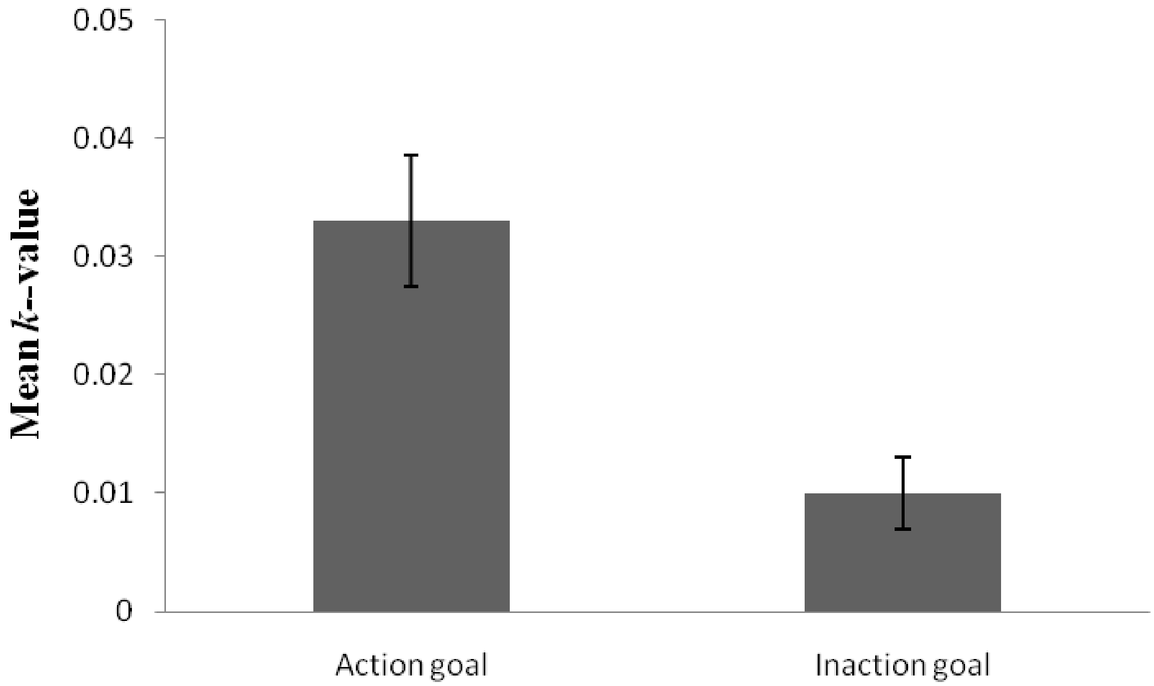
The higher the *k*-value, the more impulsive (less self-controlled) someone would have to be to choose the smaller, sooner option in that question. Thus, when someone chooses the smaller reward on a question with a *k*-value of .25, this person is behaving much more impulsively than someone who chooses the smaller reward on a question with a *k*-value of .04. When assessing *k*-values, it is generally assumed that individuals' behavior will conform to some specific *k*-value estimate, and thus participants should choose the larger reward for all questions with a larger *k*-value than this estimate and the smaller reward for all questions with a smaller *k*-value than this estimate. Therefore, after calculating the *k*-value for each question, we ordered the questions from smallest to largest *k*-value, and examined each participant's data for a "switch point." The switch point was defined as the question on which a participant stopped choosing the smaller reward and began choosing the larger reward once the questions were ordered based on *k*-value (note that the questions were randomly ordered when presented to participants). Because participants' responses were not perfectly consistent with this hypothetical pattern, we found the point that minimized discrepant responses – that is, we found the *k*-value for each participant that corresponded to a minimum number of large-reward choices for smaller k-values and small-reward choices for larger *k*-values. This *k*-value estimate was then assigned to the participant. This procedure is similar to the one used by Kirby et al. (1999), and as mentioned, identical results were obtained with a non-parametric AUC analysis (for details on AUC, see Green, Myerson, & McFadden, 1997).

3.3 Results and discussion

A one-way analysis of variance (ANOVA) on *k*-values using goal-prime as a between-subjects factor revealed that participants in the action-goal condition (*M* *k*-value = 0.033; *SD* = 0.022) were significantly more impulsive in their choices than participants in the inaction-goal condition (*M k*-value = 0.010; *SD* = 0.011), $F(1, 27) = 11.39$, $p = .002$, partial $\eta 2 = .30$. These results, which are summarized in Figure 1, suggest that motivation for inaction facilitates self-control relative to motivation for action. Therefore, goals for action do not appear to promote self-controlled behavior, despite their ability to mobilize resources that are used for effortful behavior (Gendolla & Silvestrini, in press). Unfortunately, this experiment's lack of a control condition prevents us from knowing whether general inaction goals facilitate self-control, general action goals impair self-control, or both effects occur. To resolve this ambiguity, Experiment 2 included a control condition.

3.4 Figures

Figure 1. Effects of general goals for action and inaction on delay of gratification



Note. Higher values represent less delay of gratification. Therefore, lower values indicate more self-control.

CHAPTER 4: EXPERIMENT 2

4.1 Participants and overview

Fifty-one male and female undergraduates participated in this experiment in return for partial course credit. Participant sex had no effects and is not discussed further. The design included three cells: action prime, control prime, and inaction prime.

4.2 Procedures and measures

4.2.1 Cover story

Upon entering the testing laboratory and being seated at a computer, participants were informed that they would complete two Go/No-Go (GNG) training blocks, an ostensible "visual perception" task that served as a subliminal priming manipulation, and a final GNG block. The last GNG block provided our dependent measures.

4.2.2 Go/No-Go task

In GNG tasks, participants are presented with a series of stimuli on a computer and are instructed to respond to certain stimuli ("go"), but to withhold responding to all other stimuli ("no-go"). The dependent measures that are available from this task are false alarms (FA), misses (MI), and mean reaction time to respond to "go" stimuli (RT). FAs (trials on which a participant should have withheld a response but did not) measure a lack self-control, as they represent an inability to inhibit the dominant "go" response. MI (trials on which a participant should have responded but did not) are related to inattention (Derefinko et al., 2008). Based on the results of Experiment 1, we hypothesized that action goals would lead to more FA than inaction goals. Because MI are not directly related to inhibitory behavioral control, we did not predict differences on this measure. Although RT is not a direct measure of self-control, previous work has demonstrated that the resources mobilized by action goals can lead to faster response times on certain tasks (Gendolla & Silvestrini, in press). Therefore, it is possible that action goals may lead to quicker RT than inaction goals, and this RT difference may thus be related to FA. However, the previous work demonstrating effects of action-inaction goals on RT used a memory recall task rather than a motor inhibition paradigm, and thus this prediction is somewhat speculative and secondary to the current aims of uncovering the effects of action-inaction goals on self-control.

Because of our hypothesis that action-inaction motivation should moderate self-control behavior, we wanted to use targets in the GNG tasks that held some important motivational relevance for our participants. Therefore, each block of GNG consisted of 60 trials, and on each trial the word "condom" or "sex" was presented. In the first block of practice GNG, half of the participants were randomly assigned to respond to "condom" but not "sex", and the other half to "sex" but not "condom". Within each block, 45 trials were "go" trials that required participants to respond by clicking the computer mouse, whereas the remaining 15 trials were "no-go" trials that required participants to withhold responding. This ratio was used to establish "go" as the dominant response. Words were presented for 200 ms, and there was a 2-second interval between word presentations. For the second GNG training block, response patterns were switched, so that participants who initially responded to "condom" responded to "sex", and vice-versa. The switch was intended to ensure that each group had been exposed to "condom" and "sex" an equal number of times before the critical GNG block. Participants were given two full practice GNG blocks before the goal manipulation.

4.2.3 Goal priming task

Participants were randomly assigned to an action goal (n = 19), inaction goal (n = 22), or control prime condition (n = 20). As part of an ostensible visual perception task, participants were instructed to carefully watch the computer screen and respond by pressing the space bar immediately each time they saw a string of asterisks appear (******). Each trial was separated by a 2 second interval and consisted of a fixation cross presentation, followed by a 60 ms forward mask of ampersands (&&&&&&), a 25 ms goal prime, a 60 ms backward mask of ampersands, and then a 200 ms presentation of asterisks. The goal primes differed between conditions and were words that denoted action (e.g., "start", "active"), inaction (e.g., "pause", "still"), or neutral concepts (e.g., "square", "candle"). During debriefing, no participants reported awareness of the subliminal primes or indicated a belief that their responses to any of the earlier tasks influenced their performance on later tasks, suggesting that participants were unaware of the nature of the goal priming task.

4.2.4 Critical Go/No-Go block

After the goal prime task, participants completed a final GNG block. The response pattern was the same one used in the second GNG training block, such that participants who were asked to respond to "condom" in the second training block were again asked to respond to "condom" but not "sex", and vice-versa. As before, there were 45 "go" trials and 15 "no-go" trials. We computed three dependent variables, including FA, MI, and RT.

4.3 Results and discussion

4.3.1 Data cleaning

Participants whose responses to the second practice GNG and critical GNG blocks indicated that they failed to read and understand the instructions to switch response patterns from the initial GNG practice block (e.g., change from "go to sex" to "go to condom") and thus had exceptionally high error rates for both FA and MI were excluded from all analyses (i.e., these participants had error rates that approached 100%). This excluded a total of 10 participants (3 action, 3 inaction, and 4 control), leaving 16 action, 19 inaction, and 16 control participants.

4.3.2. Initial analysis of false alarms, misses, and reaction times

A 3 (goal prime: action, control, inaction) x 2 (go stimulus: “condom”, “sex”) ANOVA on FA revealed a main effect of prime, $F(2, 45) = 3.78$, $p < .05$, partial $\eta 2 = .14$, a main effect of go stimulus, $F(1, 45) = 4.03$, $p = .05$, partial $\eta 2 = .08$, but no significant interaction of prime and go stimulus, $F < 1$. Identical ANOVAs on MI and RT revealed no significant effects, all $Fs < 1.9$, *p*s > .17.

4.3.3 Follow-up analysis of false alarms

A post-hoc Tukey test for goal-prime condition on FA revealed that participants with an inaction goal committed significantly fewer FA (*M* = 1.26; *SD* = 1.37) than participants with an action goal (*M* = 3.13; *SD* = 2.42). Although neither inaction nor action differed significantly from control (*M* = 2.44; *SD* = 1.79), the pattern of means indicates that inaction goals led to more self-controlled behavior, whereas action goals led to more impulsive behavior.

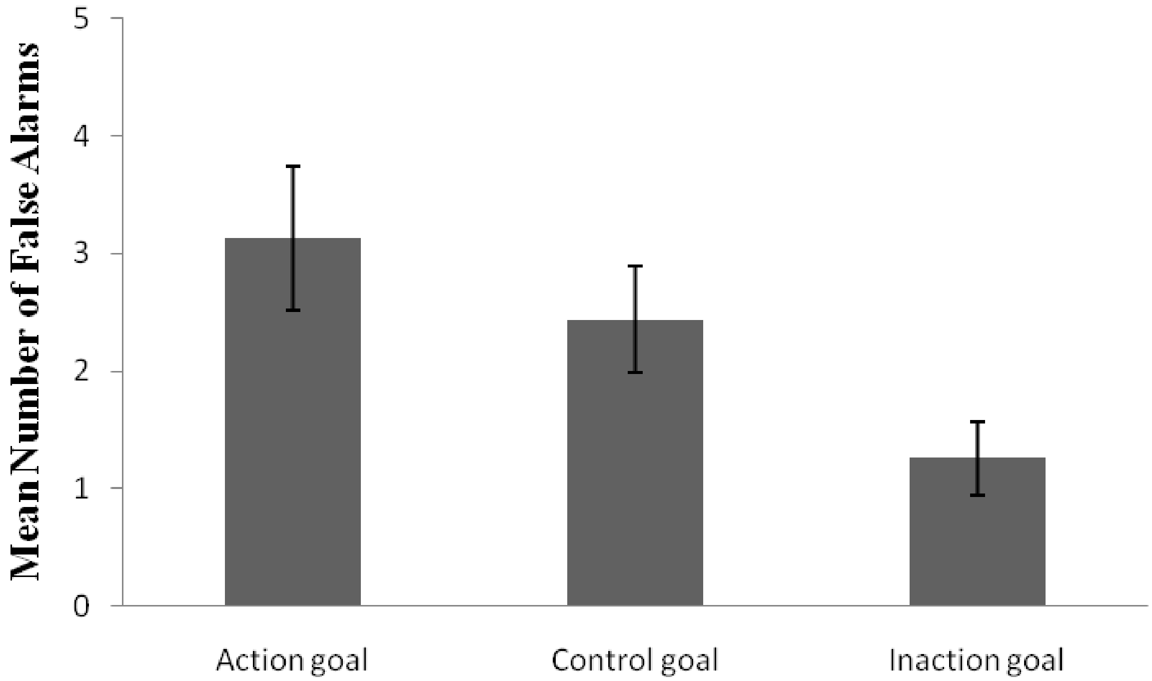
The main effect of go stimulus on FA indicates that participants were more impulsive when they had to respond to “sex” (*M* FA = 2.84; *SD* = 2.27) than “condom” (*M* = 1.62; *SD* = 1.53). As previously indicated, this effect did not interact with goal condition, suggesting that action-inaction goals exert strong, independent effects on self-control above and beyond the nature of the stimulus at hand. Overall, this result suggested that action-inaction motivation may be fundamentally important in self-control situations.

4.3.4 Conclusions

These results, which are summarized in Figure 2, support and extend the findings of Experiment 1, and suggest that self-control is facilitated by goals for inaction and hindered by goals for action. Although the difference in RT did not reach significance, the pattern of means was in a meaningful direction, such that action goals led to quicker responding (*M* = 333 ms; *SD* = 39 ms) and inaction goals to slower responding (*M* = 365 ms; *SD* = 49 ms) compared to control (*M* = 340 ms; *SD* = 62 ms). To further explore the relation between RT and FA, we calculated the pearson-correlation between these variables: $r = -.41$, $p = .003$. This correlation indicates that participants who were quicker to respond in the GNG task also tended to make more FA. Considering this fact together with the pattern of RT means in the prime conditions suggests that goals for action may lead to quick, impulsive responding, whereas goals for inaction may lead to slower, more reasoned behavior.

4.4 Figures

Figure 2. Effects of general goals for action and inaction on the ability to inhibit a dominant response



Note. Higher values represent less inhibition of the dominant response. Therefore, lower values indicate more self-control.

CHAPTER 5: GENERAL DISCUSSION

5.1 Summary

Although successful self-control often requires behavioral inaction (e.g., *not eating* a piece of cake), self-control itself is commonly referred to as a form of "active volition" (see Baumeister et al., 1998). Therefore, the influence of general goals to be active or inactive on self-control behavior was not theoretically straightforward. Goals for action could promote self-control through resource mobilization available for active self-control, whereas goals for inaction could hinder self-control by down-regulating these resources. However, goals for action could also be antagonistic with self-control by promoting active behavior in response to tempting stimuli, whereas goals for inaction could support self-control by promoting relative inaction, thus reducing the active or immediate responses that define impulsivity in these situations. Therefore, it was unclear a priori whether goals for action or inaction would provide the more successful route to self-control in the present experiments.

The two experiments reported in this paper suggest that motivation for inaction facilitates self-control, whereas motivation for action hinders self-control. Because self-control consists of the preference for larger, delayed gratification compared to immediate gratification (Ainslie, 1975), as well as the ability to inhibit dominant but inappropriate responses (Logan & Cowan, 1984; Swann et al., 2002), we used separate tasks to measure both facets. In Experiment 1, participants with a general goal for inaction (vs. action) displayed significantly stronger preferences for delayed gratification. In Experiment 2, participants with a general goal for inaction were significantly more capable of inhibiting a dominant motor response, whereas participants with a goal for action were less capable of inhibiting this response. Furthermore, this pattern occurred whether the stimulus to be avoided was highly attractive ("sex") or not ("condom"). Overall then, these experiments suggest that goals for inaction can facilitate self-control, whereas goals for action can hinder self-control.

5.2 Limitations

Although the reaction time measures in Experiment 2 were in a theoretically meaningful pattern (action < control < inaction) that conceptually replicated previous work (Gendolla & Silvestrini, in press), the differences did not reach significance. Nonetheless, this pattern suggests that motivation for action mobilizes resources that encourage rapid behavioral execution, whereas motivation for inaction de-mobilizes these behavior-execution resources. This is one potential mechanism for the present findings – that is, motivation for inaction facilitates self-control by down-regulating resources that are used to execute behaviors in a rapid manner. This extra time between stimulus onset and behavioral execution may allow "cool" cognitions to override initial "hot" responses to tempting stimuli (Metcalfe & Mischel, 1999). However, in the present studies physiological measures were not used and the reaction time measure did not quite reach significance. Therefore, the claim that inaction leads to increased self-control by de-mobilizing resources that encourage immediate, impulsive responding requires further support, though the present studies provide some initial evidence for this claim.

5.3 Strengths

A strength of the present study was operationalizing self-control with two distinct measures – Experiment 1 measured preference for delayed gratification, whereas Experiment 2 measured the ability to inhibit a dominant motor response. Additionally, the first experiment used a supraliminal word completion task to prime action-inaction goals, whereas the second experiment used a subliminal priming procedure. The difference in effect size for prime condition between the two experiments (partial $\eta 2 = .30$ in Experiment 1 vs. partial $\eta 2 = .14$ in

Experiment 2) may be due to this difference in goal priming procedure and/or operationalization of self-control. In light of these differences between experiments, the consistent effects of action-inaction motivation on self-control are particularly persuasive and suggest that motivation for inaction facilitates self-control, whereas motivation for action hinders self-control. The magnitude of this effect may vary depending on the strength of the motivation and the nature of the self-control behavior, but the existence of the effect is clear.

5.4 Concluding remarks

Taken together, the present experiments suggest that self-control is facilitated by motivation for inaction and hindered by motivation for action. This effect is robust and is found when examining different forms of self-control behavior and when instilling this motivation both supra- and subliminally. One possible mechanism for this effect is the modulation of resources that encourage behavioral execution, but further work is needed on this point. For now, the implications are clear: when presented with a self-control dilemma, a goal to be inactive is likely to lead to more self-control success than a goal to be active. Instead of listening to common wisdom and “fighting” your urges by “exerting” your willpower to counter a temptation, you may fare much better in your quest to not eat that piece of chocolate cake by simply relaxing and adopting a goal to be inactive.

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