SELF-CONTROL AND SELF-REFERENCING: REGAINING CONTROL BY REFERENCING THE SELF

by

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(Under the Direction of Leonard L. Martin)

ABSTRACT

Previous research has demonstrated that when individuals self-control they show performance decrements on subsequent self-control tasks (Baumeister, Bratslavsky, & Muraven, 1998). In our previous experiments, we have demonstrated that this self-control failure can be mitigated by reinstating the self via self-referencing (Shirk, 2009). Our previous manipulations, although successful, did not clearly indicate what component was responsible for preventing the self-control failure. Therefore, in two experiments I examine potential components of the self-referencing manipulation employed in our previous experiments. In my first experiment, I investigate whether making certain types of evaluations (i.e. objective or subjective) would prevent self-control failure. In my second experiment, I examine whether different forms of self-referencing (i.e. autobiographical, descriptive, and evaluative) differ in their effectiveness in preventing self-control failure. The results of Experiment 1 suggest that making either an objective or subjective evaluation after an initial act of self-control can prevent performance decrements on a subsequent self-control task. Experiment 2 provides more definitive evidence suggesting referencing immediate, self-descriptive information is the only effective form of self-referencing in preventing performance decrements on a self-control task after an initial act of

self-control. I then discuss how referencing idiosyncratic information may mitigate self-control failure.

INDEX WORDS: executive functioning, evaluations, self-control, self-control failure, self-referencing, self-suspension

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CHAPTER 1

INTRODUCTION

Overview and Aims

When individuals engage in self-control, they may discount, inhibit, or override their more immediate urges to behave in manner that is more appropriate for the situation. Individuals with the goal of losing weight, for example, may inhibit their desire for ice cream and eat a less desirable (but more goal-appropriate) salad. In controlling the self in this way, individuals may be more likely to attain their goals (i.e., lose weight), but they may also experience a number of negative consequences. For example, self-control can impair an individual's performance on tasks that involve executive functioning (e.g., decision making, persistence, self-control).

Two theoretical models of the effect of self-control on executive functioning have been offered: ego-depletion (Baumeister, Bratslavsky, & Muraven, 1998) and self-determination (Ryan & Deci, 2008). Although the two models differ from one another in their central focus, both models are based on an energy view of the self. Baumeister et al. proposed that the self has a limited reservoir of energy that individuals use to control the self. Exertion of self-control depletes this reservoir making it difficult for individuals to engage in subsequent self-control. Deci and Ryan focused not on the factors that deplete self-resources but on the factors that foster optimal self-regulation. From their perspective, self-regulation enacted with a controlled orientation depletes the reservoir of self-energy, whereas self-regulation enacted with an autonomous orientation does not. What is important in the present context is that both models assume that having to control the self depletes energy.

In this paper, I address a model of self-control that focuses on the cognitive processes and the information to which individuals refer to guide their behavior rather than on the energy individuals use to motivate their behavior. Although this model differs from the existing models in a number of ways, it is not necessarily antithetical to them. It might best be seen as complementary.

In brief, I believe that self-control can lead individuals to suspend self-referencing. In other words, self-control may decrease the probability that individuals process information in relation to aspects of the self, such as attitudes, preferences, beliefs, traits, and other forms of idiosyncratic information. If individuals fail to self-reference, then they will have difficulty performing behaviors that depend on information from the self (e.g., Do you want to continue working on this puzzle?). This is one reason why self-control can undermine performance on tasks that involve executive functioning. Self-control can lead individuals to discount the self as a source of information. I refer to this discounting as self-suspension. If the self-suspension hypothesis is correct, then inducing individuals to reinstate the self-referencing process following self-control can mitigate the negative effects of self-control on the performance of executive functioning tasks.

In this paper, I first discuss research illustrating the various kinds of behavior that can lead to poor performance on executive functioning tasks. Then, I discuss the two main explanations of the relation between self-control and executive performance. Next, I discuss research we have conducted on the relation between self-control and self-referencing, and I discuss research we have conducted showing that inducing individuals to resume self-referencing following self-control can prevent decrements in executive performance. Lastly, I discuss two

experiments that explored in more detail the processes by which reinstating the self-referencing process mitigates the effects of self-control on executive performance.

Ego-Depletion and Self-Control Failure

According to Baumeister et al. (1998), the self can be viewed as a limited resource. Executive functions such as making plans, initiating and inhibiting behaviors, or controlling the self seem to deplete this resource. As a result, individuals who have engaged in self-control would have difficulty performing subsequent executive functions. In one test of this ego-depletion hypothesis, Baumeister et al. (Experiment 1) asked participants to engage in self-control (i.e., they ate a non-preferred food, a radish) or not (i.e., they ate a preferred food, a cookie). Then, they had participants attempt to solve a series of puzzles. Unknown to the participants, the puzzles were not solvable. The authors measured the amount of time participants spent on the puzzles and how many attempts they made to solve them.

According to Baumeister et al. (1998), in attempting to solve the puzzles, individuals would draw upon their self resources. So, if participants who had engaged in self-control had less of this resource available than participants who had not engaged in self-control, then the former would show poorer performance on the puzzles. Consistent with this hypothesis, Baumeister et al. found that participants who self-controlled spent less time on the puzzles and made fewer attempts to solve them than participants who had not engaged in self-control.

This general finding has been conceptually replicated in a wide range of studies. Self-control has been manipulated by having individuals control their thoughts, emotions (Muraven, Tice, & Baumeister, 1998) or behaviors (Muraven, Gagne´, & Rosman, 2008) and by having them act in opposition to their beliefs (Baumeister et al., 1998). These kinds of manipulations have been shown to undermine a variety of behaviors such as proof reading, disengagement from

watching a boring video, physical stamina (Baumeister et al., 1998), persistence on difficult anagrams (Muraven et al., 1998), and creativity (Schmeichel, Vohs, & Baumeister, 2003). According to Baumeister and colleagues, each of these manipulations and dependent measures draws upon the same limited self-resource. That is why performing one of them makes it difficult for individuals to perform another.

When Self-Control Does Not Undermine Executive Performance

Not all instances of self-regulation undermine performance. Certain factors seem to be needed to turn an action from self-regulation to self-control and thereby deplete the reservoir of self-resources. Muraven and Slessareva (2003) had some participants suppress their thoughts (self-control condition), but had others memorize a list of words (no self-control condition). Then, they asked all participants to solve two unsolvable puzzles. If ego-depletion were occurring, then participants who had engaged in self-control would show less persistence on the puzzles than participants who had not engaged in self-control. This is what happened – unless participants had been given additional instructions.

Specifically, Muraven and Slessareva (2003) told some participants who had self-controlled that their performance on the puzzles could potentially benefit research on Alzheimer's disease. These participants performed as well on the puzzles as participants who had not engaged in self-control. According to Muraven and Slessareva, having a good justification for one's behavior can compensate for a depletion of one's self-resources.

In a conceptually related study, Moller, Deci, and Ryan (2006) showed that undermining one's autonomy can lead to self-control deficits. Following self-determination theory (Deci & Ryan, 2000), Moller et al. made the distinction between self-control (or controlled regulation) and autonomous self-regulation. The former requires individuals to act in ways that are

inconsistent with their core values, whereas the latter does not. Thus, the former but not the latter reduces vitality and depletes self-resources (Ryan & Deci, 2008). This means that self-control but not autonomous regulation would impair performance on tasks that require executive processing.

In one test of this hypothesis, Moller et al. (2006) told participants that later in the experiment that they would be watching a film or listening to music. Some participants were asked to choose which of these activities they would like to perform (autonomous-choice), whereas others were yoked to perform the activity chosen by another participant (controlled-choice). All participants were then asked to read through two pages from an introductory statistics book and cross out all the *e*'s that met a list of criteria.

Consistent with the distinction between self-control and autonomous self-regulation, participants given no choice in the initial task persisted less and made more mistakes on the letter *e* task than participants who were allowed to choose their initial task. The former also reported lower feelings of self-determination and these feelings mediated their performance. Such results suggest that it is not the behavior itself that impairs executive performance but the feelings of control that accompany the behavior (Ryan & Deci, 2008). According to Moller et al. (2006), controlled self-regulation leads to depletion of the self-resources, whereas autonomous self-regulation does not.

Self-Control and Self-Suspension

The evidence presented thus far is consistent with an energy view of the self. According to that view, behaviors performed in certain ways (e.g., without intrinsic motivation) decrease the self-resources (e.g., vitality) available to individuals and this, in turn, undermines their ability to perform tasks involving executive processing. There is reason to believe, however, that energy

depletion is not the only by-product of self-control. Self-control may also lead individuals to suspend self-referencing.

Using the self in judgments

Initial evidence that self-control can lead individuals to suspend their self-referencing was obtained by Martin, Shirk, and Burgin (2009). We began by having participants rate how much each of a series of trait adjectives (e.g., intelligent, creative, practical) described them. Next, we asked some participants to eat a non-preferred food (self-control), but allowed others to eat a preferred food (no self-control). Then, we had all of the participants rate five restaurants in terms of how much they would like to eat at each. The restaurants were described ostensibly in terms of the traits possessed by their patrons. For example, patrons at Restaurant H were described as intelligent, creative, practical, and loyal. For each restaurant, the traits used in the descriptions were ones on which participants had earlier rated themselves.

If participants were self-referencing, then they would prefer restaurants whose patrons shared traits with them. We found this to be the case for participants who had not engaged in self-control, but not for participants who had engaged in self-control. For the latter, there was no relation between their self-trait ratings and their evaluations of restaurants described in terms those traits. The results suggest that when individuals engage in self-control, they are less likely to refer to themselves when making a subsequent evaluation. The results do not make it clear, though, why this was the case.

One possibility is that self-control depletes self-resources and this, in turn, makes it difficult for individuals to reference or consult the self. Another possibility is that participants discount the self as a source of information simply because aspects of the self (e.g., desire for a cookie) are irrelevant in a self-control situation (e.g., eat a radish). If the energy hypothesis is

correct, then some sort of effort depletion is needed to produce self-suspension. If the discounting hypothesis is correct, then any manipulation that leads individuals to question the appropriateness of using the self as a source of information would produce self-suspension.

Situational Discounting

Martin et al. (2009) gave participants a brief description of a target person and asked them to judge this person's suitability for a job. The descriptions and jobs were designed to elicit either a positive (smart, unfriendly physicist) or a negative (smart, unfriendly doorman) initial impression. Then, we asked participants to make like-dislike statements about a number of items presented on a computer screen. Their statements were ostensibly being recorded for playback to other participants in a study on communication cues.

When an item appeared on a green background, participants were to state their genuine evaluation of the item. When an item appeared on a red background, participants were to suspend their genuine evaluation and wait to read the evaluation that was displayed on the screen. In this way, we established an association between the presence of the green screen and referring to one's genuine attitudes, and the presence of the red screen and suspending reference to one's genuine attitudes (e.g., Bem, 1965).

After participants completed their evaluative statements, we provided participants with additional, relatively neutral, information about the target person and asked them to render an overall impression of this person. Previous research has shown that individuals often base their overall impression on their first impression (e.g., Carlston, 1980). This means that participants with a positive first impression would be likely to render a more positive overall impression than participants with a negative first impression. This would be true, however, only if participants self-referenced. In other words, their overall evaluation would be correlated with their initial

impression only if participants consulted their initial impression (an aspect of themselves) while rendering the overall evaluation.

The likelihood that participants would refer to the self was manipulated by altering the color of the computer screen displayed as participants made their overall evaluation of the target person. For some participants, the screen that appeared after the last item was evaluated was green. For others, it was red. Recall that participants had stated their actual evaluations when the items appeared on a green background, but waited to be told what to say when the items appeared on a red background. Thus, some participants rendered their overall impression of the target in front of a screen associated with use of their genuine evaluations, whereas others rendered their overall impression in front of a screen associated with suspension of those evaluations.

Consistent with the hypothesis that individuals suspend self-referencing when that referencing seems inappropriate, participants showed a stronger correlation between their initial impression and overall impression when they rendered the overall evaluation in the presence of the green screen as opposed to the red screen. The results suggest that any manipulation that leads participants to question the appropriateness of consulting their self-information can lead them to suspend self-referencing. Self-control or effort expenditure is not necessary.

Self-Control, Self-Suspension, and Reinstating the Self

As reviewed earlier, several studies have shown that it is possible for individuals to overcome the negative effects of self-control on executive functioning performance. For example, self-control does not impair performance if participants are given a good reason to engage in that performance (Muraven & Slessareva, 2003), are given autonomy support (Muraven, Gagne´, & Rosman, 2008), or are placed in a good mood (Tice, Baumeister, Shmueli,

& Muraven, 2007). Such interventions are assumed to work because they restore self-resources (or keep those resources from being depleted). If self-control undermines executive performance by inducing self-suspension, however, then inducing participants to re-engage in self-referencing should eliminate the negative effects of self-control – even if energy is not manipulated. We have run several studies that support this hypothesis (Shirk, 2009; Shirk, Martin, & Burgin, 2009).

Reinstating self-referencing

In one experiment, we asked participants to rate themselves on a series of trait adjectives. Then, we had participants draw a picture of a tree. After that, half of the participants ate a non-preferred food (self-control), whereas half ate a preferred food (no self-control). Next, some of the participants in each of these groups were asked to determine if a drawing of a tree was the one they had made earlier. The tree drawing was not theirs. To determine this, however, participants had to recall the drawing they had produced earlier and compare it with the one they were being shown. In other words, they had to self-reference. Finally, all participants rated their preference for restaurants depicted in terms of the traits they had rated earlier.

If self-control induces self-suspension, then participants who had engaged in self-control would show a weaker correlation between their self-trait ratings and their evaluations of restaurants described in terms of those traits than participants who had not engaged in self-control. If asking participants to determine if a drawing is theirs leads them to reinstate self-referencing, however, then participants presented with the drawing would show a strong correlation between their self-trait ratings and their restaurant evaluations whether they had or had not engaged in self-control. The results supported this hypothesis.

The results suggest that reinstating self-referencing can mitigate the debilitating effects of self-control on use of the self in judgments. We have hypothesized, however, that a suspension

of self-referencing also contributes to the decrement in executive performance often seen following self-control. We ran another experiment to assess the effect of reinstatement on executive functioning performance.

Reinstatement and Executive Performance

Previous research has demonstrated that self-referencing can lead to improved cognitive processing (Brewer, 1988; Markus, Smith, & Moreland, 1985). For example, Markus et al. demonstrated that when individuals self-reference they show greater cognitive flexibility, the ability to shift from broader, more general knowledge structures to finer details. Therefore, if self-control leads to the failure to self-reference and self-referencing appears to influence cognitive processes, then does self-referencing (or the failure to self-reference) affect self-control performance after an initial act of self-control? We ran another experiment to investigate this possibility.

The procedure for this experiment was similar to that used in the previous experiment. Participants rated themselves on a series of trait adjectives. Then, they ate a non-preferred food (self-control) or a preferred food (no self-control). After that, some participants were asked if a pre-answered trait scale was the one they had completed earlier in the experiment (i.e., self-reference). Lastly, all participants completed the Trails B task, a validated assessment of executive performance (Lezak, 2004). In this task, participants are asked to draw a continuous line through an ascending series of letters and numbers, alternating between the two (i.e., 1, A, 2, B, 3, C).

If self-control impairs performance on tasks of executive functioning by decreasing self-referencing, then participants who ate a non-preferred food would show poorer performance on the Trails B task than participants who ate a preferred food – but only if they had not resumed

self-referencing. Participants who had engaged in self-control but who were asked if the pre-answered trait scale was theirs would not show a decrement in performance. This is what we found.

The results suggest that a reduction in self-referencing may account for some of the decrements in executive functioning performance caused by self-control. Of course, there is no reason to believe that a reduction in self-referencing is the only by-product of self-control. There may also be a decrease in motivation or self-resources. We ran an experiment to assess the role of self-referencing and motivation in mitigating decrements is self-control performance after an initial act of self-control.

Self-Referencing and Motivation

In this experiment, we independently manipulated self-referencing and motivation. As usual, participants began by eating a non-preferred food (self-control) or a preferred food (no self-control). Then, they completed a task that primed an intrinsic orientation, an extrinsic orientation, or a neutral orientation (Schimel, Arndt, Banko, & Cook, 2004). For the intrinsic task, participants ranked different identities (e.g., student, lawyer, and musician) in terms of their personal importance. Then, they completed a series of sentence fragments in relation to their top six identities. The sentences led participants to focus on the intrinsic reasons for holding each identity (e.g., Being a _____ makes me feel _____). Participants in the extrinsic condition also ranked identities and completed sentence fragments. For these participants, though, the fragments focused them on the extrinsic reasons for holding each identity (e.g., When I'm a successful _____, I receive _____). Participants in the no self-priming condition completed fragments that referenced general knowledge (e.g., The _____ Ocean is the largest

ocean on earth). Finally, all participants performed the Trails B task as a measure of their executive functioning.

Schimel et al. (2004) found that participants primed with an extrinsic orientation performed worse on a task of executive functioning than participants primed with an intrinsic orientation. If differences in motivation account for the effects of reinstatement, then we should see the same pattern. Participants primed with the extrinsic orientation would perform worse on the Trails B task than participants primed with the intrinsic orientation or a neutral, non-self orientation. If the self-related priming tasks led participants to resume self-referencing, however, then the specific motivational orientation primed in the task may have little effect. The crucial factor was that the tasks led participants to reference the self. Thus, writing about intrinsic or extrinsic values would lead to improved performance on the Trails B task among participants who had engaged in self-control.

Among participants who had not engaged in self-control, those primed with an intrinsic orientation performed better than those primed with an extrinsic orientation. This finding replicated previous work (Schimel et al., 2004). Among participants who had engaged in self-control, however, those primed with either the intrinsic or extrinsic self performed better than those not primed with the self. In other words, the motivational difference between intrinsic and extrinsic priming was observed only among participants who were already referencing themselves. Among participants who had engaged in self-control, the intrinsic and extrinsic priming tasks operated as reinstatements of the self-referencing process.

Section Summary

In a series of studies, we have obtained evidence that self-control can lead individuals to suspend self-referencing. This self-suspension, in turn, reduces self-concordance in judgments

and undermines executive functioning. We also found that self-control or effort expenditure is not needed to induce self-suspension. Individuals may simply discount the self as a source of information in situations in which the cues (e.g., red screen vs. green screen) suggest that it is inappropriate to consult the self. Inducing participants to reinstate self-referencing can lead them to make judgments that are more self-concordant and it can improve performance on tasks of executive functioning.

The effects of self-control have traditionally been explained in terms of self-energy. We seem to be finding evidence of a different process – one involving use (or disuse) of the self as a source of information. Below I discuss two studies designed to obtain more information about this process. Specifically, what does reinstatement do to mitigate the negative effects of self-control on executive functioning?

CHAPTER 2

EXPERIMENT 1

For our previous manipulations of self-referencing, participants rendered a self-related evaluation (e.g., Is this your drawing? Which of these identities do you endorse?). This type of evaluation was appropriate given that our assumption that the manipulation needed to induce participants to reinstate self-referencing. What would happen, though, if participants made an evaluation that did not directly involve the self (e.g., would that person make a good banker?)? Is it using the self as the basis of an evaluation that mitigated the effects of self-control or was it resumption of evaluation in general that was the crucial factor? I addressed this question in Experiment 1.

Participants began by eating a non-preferred food (self-control) or a preferred food (no self-control). Then, consistent with a procedure adapted from Strack, Martin, and Stepper, (1988), participants rated a series of pictures in terms of either an objective standard (i.e., "Basing your decision on an objective standard and without relying on your personal preference, how would you rate the pictures?"), a subjective standard (i.e., "Basing your decision on a personal standard, how would you rate the pictures?"), or they reviewed the pictures but were not asked to rate them. Finally, all participants completed an executive functioning task as a measure of self-control ability.

Strack et al. (1988) found that participants who evaluated cartoons relative to an objective standard were less influenced by their facial feedback than participants who evaluated the cartoons relative to a subjective standard. One way to interpret this finding is that in judging the

cartoons relative to an objective standard participants did not reference their self. They may have compared the cartoons to other cartoons. When participants assessed their amusement, however, they turned inward to assess their subjective reactions to the cartoons. In other words, they self-referenced.

So, I may be able to use a similar manipulation to tease apart our two hypotheses. If reinstatement involves re-engagement of the evaluative system in a generic sense, then rating the pictures in either a subjective way or an objective way would improve performance on the Trails B task relative to simply viewing the pictures. If reinstatement involves evaluation specific to the self, then I will find improved performance following self-control only among participants who rated how they liked the pictures according to a personal standard.

In Experiment 1, participants were presented with a bowl of radish halves and a bowl of cookies and were asked which of the two foods they preferred. Participants in the self-control condition were asked to eat a radish half, whereas participants who were not in the self-control condition were asked to eat a cookie. Next, participants were handed a series of pictures of abstract paintings and asked either to: a) look through the pictures and make a subjective evaluation of them, b) look through the pictures and make an objective evaluation, or c) only look through the pictures. Next, all the participants completed a mood inventory. Following the mood measure, all the participants completed the Trails B task, a measure of executive functioning.

I also hoped to obtained evidence relevant to the energy models of self-control. Previous research has shown that heightened self-determination (Moller et al., 2006) and heightened vitality (Muraven et al., 2008) led to better performance on self-control tasks. Therefore, I

included measures of self-determination and vitality at the end of the experiment in order to investigate possible relationships among self-control, self-referencing, vitality, and autonomy.

Method

Participants

Participants were 134 men and women from introductory psychology classes at the University of Georgia enrolled in the research participant pool. Participants received partial course credit for their participation.

Materials

Mood. I measured mood using the Brief Mood Introspection Scale (BMIS, Mayer, Gaschke, & Braverman, 1988). This scale is composed of 16 adjectives that reflect various combinations of positive and negative affect (e.g., happy, sad) and high and low arousal (e.g., angry, calm). Participants use a 4-point Likert scale anchored with "definitely do not feel" and "definitely do feel" to report the extent to which each adjective describes their current feelings. Higher scores on mood items (e.g., happy, caring) indicate a more positive mood. Likewise, higher scores on arousal items (e.g., peppy, jittery) indicate greater arousal.

Autonomy. I measured autonomy using a nine-item self-report measure of self-determination adapted from Reeve, Nix, and Hamm (2003). Statements are rated on a 7-point Likert scale ranging from 1 (*not at all true*) to 7 (*very true*). The scale includes the following three subscales: perceived locus of causality, volition, and perceived choice. Similar to Moller et al. (2006), the items were adapted to focus the participants on their experiences while completing the Trails B task.

Vitality. I measured vitality using an adapted version of the Subjective Vitality scale (Ryan & Frederick, 1997), a 7-item scale designed to assess individuals' feelings of aliveness

and positive energy that arises from acting in self-actualizing ways. The items were prefaced in such a way as to address participants' feelings during the Trails B task. Example items are "when completing the Trails task, I felt alive and vital" and "when completing the Trails task, I felt as though I had energy and spirit," rated on a 7-point Likert scale.

Procedure

Participants signed up for an experiment on taste preference and cognitive functioning. When participants arrived, the experimenter provided them with a brief overview of the procedure and obtained their informed consent. The experimenter then presented the participants with a bowl of cookies and a bowl of radish halves and asked the participants which of the two foods they would prefer to eat. After stating their preference, the experimenter asked some participants to eat their non-preferred food (self-control), but allowed others to eat their preferred food.

After participants had eaten either their preferred or non-preferred food, the experimenter presented a series of pictures of abstract paintings by Paul Klee and Wassily Kandinsky to the participants. Some participants were asked to evaluate the quality of the pictures either on an objective standard, a subjective standard, or were not asked to rate the pictures. More specifically, participants in the objective evaluation condition were asked, "Basing your decision on an objective standard and without relying on your personal preference, how would you rate the pictures?" Participants in the subjective evaluation condition were asked, "Basing your decision on a personal standard, how would you rate the pictures?" The response scale ranged from 0 (*The pictures were not at all good*) to 9 (*The pictures were very good*). Participants who did not rate the pictures were only asked to look through them.

After participants reviewed the pictures, they completed the BMIS and then performed the Trails B task (Reitan, 1958). For this task, participants had to connect 25 circles on an 8.5" X 11" sheet of paper. Thirteen of the circles contained a number ranging from 1 to 13; the other twelve contained a letter ranging from A to L. Participants were instructed to connect all the circles as quickly and accurately as possible using a single, continuous line. They were asked to do this in ascending order alternating between numbers and letters. Specifically, participants started with the circle containing the number 1, moved to the circle containing the letter A, then to the circle containing the number 2, then to the circle containing the letter B, and so on. The experimenter used a stopwatch to record the number of seconds participants needed to complete the task. The less time is indicative of better self-control.

After participants performed the Trails B task, the experimenter had them complete the measure of autonomy and the measure of vitality. After the participants had completed these two scales, the experimenter debriefed and excused the participants.

Results

Preliminary Analyses

Separate 2 (self-control vs. no self-control) X 3 (objective evaluation vs. subjective evaluation vs. no evaluation) ANOVA's were conducted to determine if there were differences between the groups in level of mood, arousal, vitality, and self-determination across conditions. There were no significant differences between the groups for level of vitality and level of self-determination. There was, however, a significant main effect of self-control on mood, $F(2, 128) = 4.29$, $p < .05$. Specifically, participants who had engaged in self-control reported a more negative mood ($M = 3.11$, $SD = 0.39$) than participants who had not engaged in self-control ($M = 3.27$, $SD = 0.36$). In addition, there was a significant interaction between self-control condition

and self-referencing for level of arousal, $F(2, 128) = 3.89$, $p < .05$. Therefore, in order to investigate whether self-control and self-referencing influenced the performance of the Trails B task beyond the potential effects of level of mood and arousal, the effects of mood and arousal were controlled in the primary analysis.

Primary Analysis

The main question was whether the reinstatement manipulations we used in previous experiments had engaged a generic evaluative process or a self-specific evaluative process. Before answering that question, though, it was important to determine if the results of Experiment 1 replicated previous findings regarding a decrease in executive performance following self-control. Therefore, I compared the effects of self-control on participants who had not evaluated the pictures. These are the conditions that parallel those of prior research. The planned comparison revealed that participants who had engaged in self-control ($M = 68.64$ s, $SD = 18.18$) took longer to complete the Trails B task than those who had not engaged in self-control ($M = 87.29$ s, $SD = 30.22$), $p = .01$, $d = 0.75$ (See Figure 1). Thus, Experiment 1 replicated previous findings (Baumeister et al., 1998; Shirk, 2009).

To determine whether engaging the evaluative system mitigated the decrease in performance on the Trails B task, I compared the performance of participants who had engaged in self-control but who had not evaluated the pictures to the performance of participants who had engaged in self-control and who had evaluated the pictures. The results revealed that having participants evaluate the pictures using either an objective or a subjective standard mitigated the effects of self-control. Participants who had engaged in self-control and who evaluated the pictures subjectively ($M = 68.12$ s, $SD = 17.05$) completed the Trails B task more quickly than those participants who only self-controlled ($M = 87.29$ s, $SD = 30.22$), $p = .01$, $d = 0.78$. The

same was true of participants who had engaged in self-control and then made an objective evaluation (M = 70.64 s, SD = 17.99), p = .05, d = 0.67. Thus, the results suggest that engaging the evaluative system in a general way was sufficient to enhance executive functioning after self-control. The evaluation need not be specific to the self.

Lastly, I used the performance of participants who had not engaged in self-control and who had not evaluated the pictures (M = 68.64 s, SD = 18.18) as a baseline group to see if the reinstatement resulted in improved performance to that of the baseline group. It had. There was no difference between the baseline group's performance and the performance of participants who had engaged in self-control and who had evaluated the pictures subjectively (M = 68.12 s, SD = 17.05) or participants who had engaged in self-control and who had made an objective evaluation (M = 70.64 s, SD = 17.99), ps = *ns*.

Discussion

The results of Experiment 1 suggested that making an evaluation, whether it involves the use of a subjective or an objective standard, can mitigate the decrements in self-control performance that can follow an act of self-control. In addition, this mitigation appears to be independent of mood, arousal, and feelings of autonomy and vitality. Because both the subjective evaluation and the objective evaluation were effective in mitigating the effects of self-control, the results suggested that it is the engagement of evaluative processes in a general sense and not in a more self-specific sense that is responsible for the mitigation. This conclusion, of course, rests on the assumption that the manipulation of type of evaluation was in fact effective. I return to this point in the General Discussion.

CHAPTER 3

EXPERIMENT 2

Experiment 2 was designed to obtain more insight into what it is about reinstating self-referencing that mitigates the detrimental effects of self-control. In our previous experiments, the manipulations of reinstatement were associated with a number of aspects of the self. When participants were asked to determine if the drawing of the tree was theirs, for example, they may have activated their autobiographical memory (i.e., recalled the tree they had drawn earlier), induced descriptive self-referencing (i.e., asked themselves, is that *my* tree drawing?), and/or used the self as a target for evaluation (i.e., compared the presented tree with a recalled version of their tree). Any or all of these processes could have contributed to the effectiveness of the reinstatement. So, in Experiment 2, I manipulated these features independently in order to assess the effectiveness of each in mitigating the effects of self-control on subsequent executive functioning.

As in the first experiment, some participants were asked to eat a non-preferred food (self-control), whereas others were allowed to eat their preferred food (no self-control). Then, participants were asked to engage in a task that involved autobiographical self-referencing, descriptive self-referencing, or evaluative self-referencing. To induce autobiographical self-referencing, I asked participants to recall a time when they had behaved in a way that reflected each of a series of ten traits. To induce descriptive self-referencing, I asked participants to rate how much of each of the ten traits described them at the moment. To induce the use of the self as a target of evaluation, I asked participants to indicate how much they would like to possess each of series of ten traits. Lastly, I asked a fourth group of participants to complete a series of ten

sentence stems requiring mundane or general knowledge (e.g. The _____ Ocean is the largest ocean; The _____ sat in the chair). This last condition should not induce self-referencing and, therefore, should act as a control condition.

Next, the participants were asked to report their current mood and then perform the Trails B task to assess their self-control capability. Then, the participants reported the amount of autonomy and vitality they experienced while performing the Trails B task. Finally, all participants were debriefed and excused.

Method

Participants

Participants were 210 men and women from introductory psychology classes at the University of Georgia participating in the research pool. Participants received partial course credit for their participation.

Materials and stimuli

Self-referencing inductions. All participants were presented with a list of 10 trait adjectives (e.g. logical, ambitious, open-minded). To induce autobiographical self-referencing, participants were asked to think of a time they acted in accordance with each of the 10 trait adjectives and write one or two sentences describing the moment. To induce descriptive self-referencing, participants were asked to indicate on a 7-point Likert scale ranging from 1 (*not at all*) to 7 (*very much*) how much each trait described them at that moment. Lastly, to induce evaluative self-referencing, participants were asked to indicate on a 7-point Likert scale ranging from 1 (*not at all*) to 7 (*very much*) how much they would like possess each trait.

Mood, Autonomy, and Vitality. The same scales of mood, autonomy, and vitality used in the first experiment (i.e., the Brief Mood Introspection Scale, the Self-Determination Scale, and the Vitality Scale) were used in this experiment.

Procedure

Participants signed up for an experiment on taste preference and cognitive functioning. When participants arrived, the experimenter provided them with a brief overview of the procedure and obtained their informed consent. The experimenter then presented participants with a bowl of cookies and a bowl of radish halves. The experimenter asked participants which of the two foods they would prefer to eat. After participants stated their preference, the experimenter asked some participants to eat their non-preferred food (self-control), but allowed others to eat their preferred food.

After participants had or had not engaged in self-control, they were assigned to one of four conditions. In one condition, participants were asked to recall a time when they behaved in a way that reflected each of a series of trait-adjectives (autobiographical). In a second condition, participants rated how much each of a series of trait adjectives described them at that moment (descriptive). In a third condition, participants made self-evaluations (evaluative). In this condition, participants rated how much they would like to possess each of a series of trait-adjectives. In the final condition, participants were given a series of sentence stems and asked to complete them (e.g. The _____ Ocean is the largest ocean). Because this condition did not involve self-referencing, it is considered the baseline condition.

After completing these tasks, participants completed the BMIS to assess their mood and the Trails B task to assess their executive functioning (i.e., self-control ability). Lastly,

participants completed the self-determination scale and the vitality scale. After the participants completed these scales, the experimenter debriefed and excused the participants.

Results

Preliminary Analyses

First, separate 2 (self-control vs. no self-control) X 4 (autobiographical vs. descriptive vs. evaluative vs. control) ANOVA's to determine if there were differences between the groups in level of mood, arousal, vitality, and self-determination across conditions. There were no significant differences between the groups for level of arousal and level self-determination. There was, however, a significant main effect between self-control conditions on level of vitality, $F(1, 202) = 4.96$, $p < .05$. Specifically, participants who had engaged in self-control reported lower feelings of vitality ($M = 3.89$, $SD = 1.16$) than participants who had not engaged in self-control ($M = 4.21$, $SD = 0.89$). In addition, there was a significant main effect of self-control on mood, $F(1, 202) = 5.28$, $p < .05$. Participants who had engaged in self-control reported a more negative mood ($M = 3.11$, $SD = 0.43$) than participants who had not engaged in self-control ($M = 3.24$, $SD = 0.35$). Therefore, in order to investigate whether self-control and self-referencing influenced the performance of the Trails B task beyond the effects of mood and vitality, the effects of these variables were controlled in all subsequent analyses.

Manipulation Check

To determine whether our self-control manipulation undermined executive functioning as it had in previous experiments, I compared performance on the Trails B tasks for participants who had not received a self-referencing manipulation. Consistent with previous experiments, participants who had engaged in self-control took longer to complete the Trails B task ($M =$

77.49 s, *SD* = 41.20) than participants who had not engaged in self-control (baseline condition) (*M* = 59.78 s, *SD* = 10.42), $p < .05$, $d = 0.59$ (See Figure 2).

Primary Analyses

Next, to determine if the different forms of self-referencing mitigated the poorer performance on the Trails B task, six planned comparisons were conducted. The first three compared the three self-control/self-referencing conditions to the self-control/no-self-referencing condition. Participants who had engaged in self-control and were then induced to reference autobiographical information (*M* = 76.10 s, *SD* = 36.10) or evaluate traits (*M* = 80.69 s, *SD* = 30.05) did not differ from participants who had engaged in self-control but did not self-reference (*M* = 77.49 s, *SD* = 41.20), *p*s = *ns*. Participants who had engaged in self-control and then reported the extent to which the traits described them demonstrated better performance on the Trails B task (*M* = 59.44 s, *SD* = 13.04) than participants who had engaged in self-control but who did not self-reference (*M* = 77.49 s, *SD* = 41.20), $p < .05$, $d = 0.59$. In other words, the only manipulation that mitigated the effects of self-control on executive functioning was having participants say how much they felt the traits described them at that moment.

I also performed three planned comparisons to see if there were differences between each of the self-control/self-referencing conditions and the baseline condition in which participants did not engage in self-control and did not self-reference. Participants who engaged in self-control and referenced autobiographical information took significantly longer to complete the Trails B task (*M* = 76.10 s, *SD* = 36.10) than participants in the baseline condition (*M* = 59.78 s, *SD* = 10.42), $p < .05$, $d = 0.61$. Similarly, participants who had engaged in self-control and then evaluated the traits took significantly longer to complete the Trails B task (*M* = 80.69 s, *SD* = 30.05) than participants in the baseline condition, $p < .01$, $d = 0.93$. There was no significant

difference, however, in performance between participants who had engaged in self-control and reported how much each trait described them at that moment (M = 59.44 s, SD = 13.04) and participants in the baseline condition (M = 59.78 s, SD = 10.42), $p = ns$.

Discussion

The results of Experiment 2 provided further insight into the aspects of self-referencing that mitigate the negative effects of self-control on executive functioning. Of the participants who had engaged in self-control, only those who reported the extent to which various traits described them demonstrated improved performance on the Trails B task. Specifically, the results of this experiment suggested that reinstating self-referencing involves more than only processing information about the self. It involves referencing one's immediate, self-descriptive information. In addition, the effect of self-referencing on executive functioning was not accounted for by the participants' mood, arousal, autonomy, and vitality.

CHAPTER 4

GENERAL DISCUSSION

I hypothesized that self-referencing (i.e., using one's idiosyncratic traits, values, and preferences as the basis for a judgment), or the failure to self-reference, plays a role in individuals' ability to self-control. More precisely, if individuals self-referenced between two consecutive acts of self-control, then they would not show self-control decrements on the second act. We have evidence that self-control leads individuals to suspend their self-referencing (Martin et al., 2009; Shirk, 2009). In addition, when individuals fail to self-reference, they demonstrate less cognitive flexibility (e.g., Brewer, 1988; Markus et al., 1985). Also, consecutive acts of self-control result in poorer self-control performance, including acts involving executive functioning (Baumeister et al. 1998; Vohs et al., 2008). Finally, one of the components of executive functioning is cognitive flexibility, specifically the ability to shift from one mental set to another (e.g., switching from letters and numbers; Kortte, Horner, & Windham, 2002).

Therefore, if 1) self-control leads to the failure to self-reference, 2) self-referencing leads to greater cognitive flexibility, and 3) cognitive flexibility is needed to perform well on tasks of executive functioning (such as self-control), then inducing individuals to engage in self-referencing following self-control may mitigate the decrements in self-control performance after an initial act of self-control. More specifically, when individuals are asked to eat a non-preferred food, they no longer self-reference, which leads to poorer Trails B performance. Poorer performance on the Trails B task is an indication of poorer cognitive flexibility (i.e., the ability to shift from numbers to letters). Therefore, if individuals self-reference prior to a subsequent act of self-control, then they should regain cognitive flexibility and perform well on an executive

functioning task such as Trails B task. My previous investigations have supported this hypothesis. Self-referencing does appear to play a role in self-control success. However, it remained unclear what the critical aspect of the self-referencing manipulation was that led to self-control success. Finding out was the primary purpose of my two current experiments.

In one of our earlier experiments, we reinstated self-referencing by having participants determine whether a tree drawing was theirs. In making this determination, participants might refer to autobiographical memories (e.g., "is that the drawing I made before?"), descriptive information (e.g., "is that *my* drawing?"), or evaluative information (e.g., "my tree drawing is better than that one"). The purpose of the current experiments was to determine the extent to which these processes might be involved in mitigating the performance decrements seen after self-control.

In Experiment 1, I found that participants who made either a subjective evaluation or an objective evaluation after engaging in self-control showed no performance decrements on a task assessing executive functioning. The results suggest, therefore, that engagement of the evaluative system in a general way (as opposed to a self-specific way) is sufficient to mitigate the effects of self-control. The results of Experiment 2, however, suggested a somewhat more complex picture. In Experiment 2, the effects of self-control were mitigated only when participants referenced themselves in a descriptive manner (i.e., "how much does that trait describe me?"). Recalling autobiographical memories or making an evaluation (i.e., "how much would I like to possess that trait?") did not improve performance following self-control.

How can we reconcile these two sets of results? I first consider the theoretical models that are currently predominant in the field (ego-depletion and self-determination theory). Then, I discuss what we know of the relationship between self-control, self-referencing, and cognitive

flexibility, and consider an alternative that I think may provide a better explanation than either of the current models. Namely, I consider the results in terms of reliance on idiosyncratic evaluations.

Ego-Depletion and Self-Control

Baumeister and colleagues (e.g., Baumeister et al., 1998; Muraven et al., 1998) have proposed that controlling the self demands energy and that this energy comes from a limited reservoir. Thus, if individuals engage in one act of self-control, they may have difficulty successfully completing a subsequent act of self-control because there would be less energy in the reservoir for the individuals to draw upon. The decrease in energy following self-control is called ego-depletion.

According to the ego-depletion model, individuals can complete sequential acts of self-control if they maintain their energy reservoir. They can do this either by keeping the energy from draining out of the reservoir or by replenishing the energy once it has been drained. An example of the former was provided by Muraven and Slessareva (2003). They showed that providing individuals with a good reason why they are controlling the self mitigates the debilitating effects of self-control on tasks requiring executive functioning (Muraven & Slessareva, 2003). An example of the latter was provided by Tice et al., (2007). They showed that putting individuals in a good mood mitigates the debilitating effects of self-control on executive performance (Tice et al., 2007).

This theoretical model, however, does not explain the results of my experiments. First, it is unclear how making an evaluation or referencing self-descriptive information could replenish the energy lost in controlling the self. For example, Vohs et al. (2007) demonstrated that perceived self-expression does not prevent decrements in self-control following ego-depletion.

Therefore, Vohs et al.'s finding would suggest that expressing one's evaluation (Experiment 1) or describing one's self in the present moment (Experiment 2) would be unlikely to mitigate the effects of an initial act of self-control. In addition, participants' mood did not differ across self-referencing conditions, including reported tiredness, an indication of ego-depletion (Baumeister et al., 1998). In short, my results were inconsistent with predictions from the ego-depletion model.

Vitality and Autonomy

Moller et al. (2006) and Muraven et al. (2008) investigated self-control failure from a self-determination approach. In accordance with self-determination theory, Moller et al. proposed that not all forms of self-regulation are depleting. Specifically, autonomous regulation, regulation in which individuals perform self-endorsed behaviors, does not deplete energy and, in fact, can boost individuals' sense of energy and vitality and can positively influence performance. In contrast, controlled regulation, the regulation of behavior due to external demands, can compromise individuals' feelings of energy and vitality and can undermine performance. Therefore, the authors argued that only controlled regulation undermines feelings of autonomy and vitality should lead to decrements in subsequent self-control ability.

In their experiments, Moller et al. (2006) did in fact find support that only controlled self-regulation is depleting. That is, only self-regulation that undermines a person's sense of autonomy will lead to poorer performance on subsequent self-control tasks. Conceptually related results were obtained by Muraven et al. (2008). The authors expanded on Moller et al.'s initial finding by demonstrating that participants receiving autonomy support while undergoing an initial act of self-control can prevent subsequent decrements on a subsequent self-control task and argued that subjective vitality may mediate this relationship.

For example, before participants self-controlled, by inhibiting thoughts of a white bear, they either received instruction from a very supportive and polite experimenter or a cold and unfriendly one. Next, the participants were asked to complete a task that required them to inhibit their responses, a subsequent self-control behavior. The authors found that lack of autonomy support led to less vitality and poorer performance. In short, from the perspective of self-determination theory, feelings of vitality and autonomy determine the extent to which individuals can successfully control the self.

Self-determination theory does not, however, adequately explain the results of my experiments. It is not apparent why making an evaluation or referencing self-descriptive information would change individuals' motivation on a subsequent unrelated task, especially compared to the referencing of autobiographical or evaluative information. Also, I did not find any differences between the groups in level of autonomy in either Experiment 1 or 2. Although I found that participants who self-controlled reported less vitality than those who did not in the second experiment, this main effect did not account for differences in performance on the Trails B task. In short, although changing individuals' feelings of autonomy and vitality can influence how well they self-control, this explanation does not sufficiently account for my findings.

Referencing Idiosyncratic Information

In Experiment 1, I found that having participants judge a series of paintings from either a subjective or an objective perspective was effective at mitigating executive functioning decrements after an initial act of self control. Because both conditions were effective at mitigating executive functioning deficits, the findings suggest that it is a generic evaluation that is necessary to reinstate the self versus a self-specific evaluation process. The results of Experiment 2, however, suggest that this conclusion might be premature. In that experiment,

having participants evaluate a series of traits did not mitigate the effects of self-control. Those effects were mitigated only among participants who rated the traits in reference to themselves (i.e., "does this describe me now?").

Why did both the subjective and objective judgments mitigate the effects of self-control in Experiment 1 but not in Experiment 2? One possibility is that the judgment task in Experiment 1 did not allow participants to use an objective standard. It may be difficult for undergraduate students to use an objective standard to evaluate abstract paintings. What are the objective features that make one Klee or Kandinsky painting better than another? Without such features, participants may have relied upon their own personal preferences for evaluating the paintings. If so, then they would have reinstated self-referencing, and would not demonstrate decrements in executive functioning following self-control. This explanation is obviously post hoc but there are aspects of Experiment 2 that lend some plausibility to the explanation.

In Experiment 2, participants who self-controlled but were asked to indicate the extent to which the traits described them were able to perform as well on a subsequent self-control task compared to participants who did not engage in self-control. The other two self-referencing conditions did not show this beneficial effect. Why would this be the case? When individuals self-referenced in the descriptive condition, they referenced idiosyncratic information, information that is distinctive of them as individuals and that defines who they are. I argue that it is this referencing of idiosyncratic information that prevents the decrements in performance following self-control.

In the autobiographical condition, by comparison, individuals were given ten traits and asked to recall times they acted accordingly. The traits, however, may not have been ones that they would have selected if given the option to think of their own. The traits did not necessarily

reflect how participants saw themselves or reflect features that distinguished them from others. For example, you may be able to think of time that you behaved in a way that would be considered comical, but you may not necessarily think of yourself as a funny person. Referencing autobiographical information in this manner does not individualize who you are. It is not idiosyncratic, and, therefore, it does not mitigate self-control failure.

Similarly, in the condition in which individuals were asked to rate how much they would like to possess a series of traits, participants may have evaluated each trait rather than determine whether or not they possess that trait (Swann, Griffin, Predmore, & Gaines, 1987). To make such an evaluation, they only needed to determine whether the trait was positive or negative. Therefore, individuals in the evaluative condition were not using idiosyncratic processing to evaluate whether each trait was representative of who they are.

In contrast to the autobiographical and evaluative conditions, in the descriptive condition participants were asked to determine how much a trait described them in the moment. This form of self-referencing requires the comparison of incoming information (e.g., traits) with idiosyncratic information. I argue that this form of self-referencing, in which the person is required to define the self in the moment, is what is necessary to mitigate self-control failure.

The evidence I have to support the hypothesis that participants in the evaluative condition made a simple evaluation of valence in contrast to a self-referential processing that occurred in the descriptive condition is as follows. If individuals made a simple evaluation of valence (i.e., "is this trait positive or negative?"), we would expect to see similar ratings across participants on traits. This would indicate that the participants were not referencing idiosyncratic information but were giving responses that reflected their view of traits as "good" or "bad." I found this homogeneity of responses across individuals on traits in the evaluative condition ($SD = 0.95$)

compared to the descriptive condition (SD = 1.19), $p < .01$. Similarly, if participants evaluated the traits relative to a norm, then we would expect that each individual's rating would be correlated with the average trait rating. Participants in the evaluative condition had a stronger relationship to participants' average ratings (r = .496) than participants in the self-descriptive condition (r = .319), p = .01. This general pattern of homogeneity of response and strong correlation to normative trait ratings provide further evidence that participants in the self-descriptive condition were using idiosyncratic information in their evaluation, whereas participants in the traits condition were not.

To summarize, previous research has demonstrated the relationship between self-referencing and self-control. Specifically, self-control can lead to the failure of individuals to self-reference and that self-referencing could mitigate the decrements seen in self-control performance after an initial act of self-control. It was unclear, though, what aspects of the self were involved in self-referencing (e.g., what aspects of the self were no longer referenced after self-control and what forms of self-referencing were effective in preventing self-control decrements). The results of these experiments demonstrate that after an initial act of self-control, individuals are likely to cease referencing their idiosyncratic information as the basis for their judgments. The results also suggest that reinstating referencing of this information is the key component in preventing self-control decrements following an initial act of self-control.

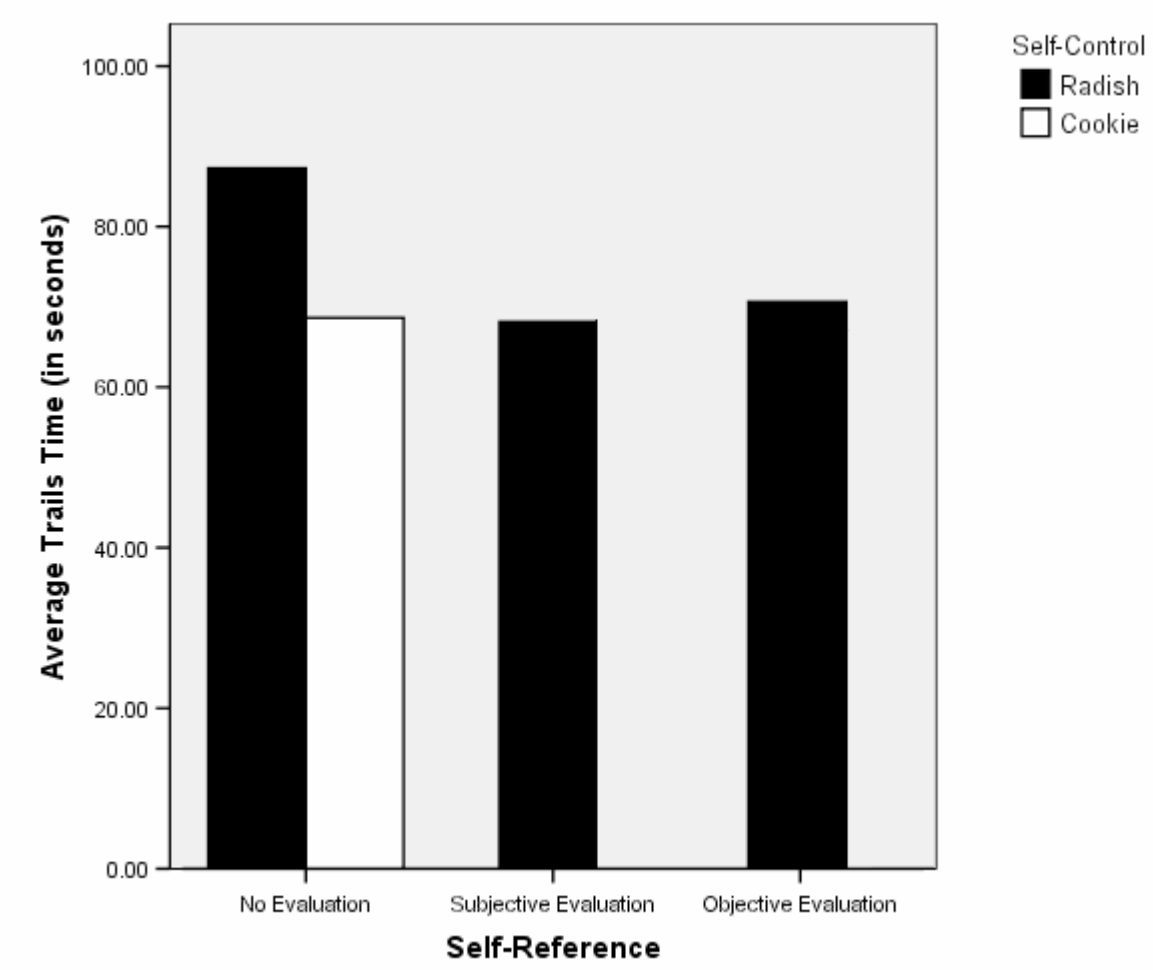

Figure 1. Experiment 1: Average time needed to complete the Trails B task

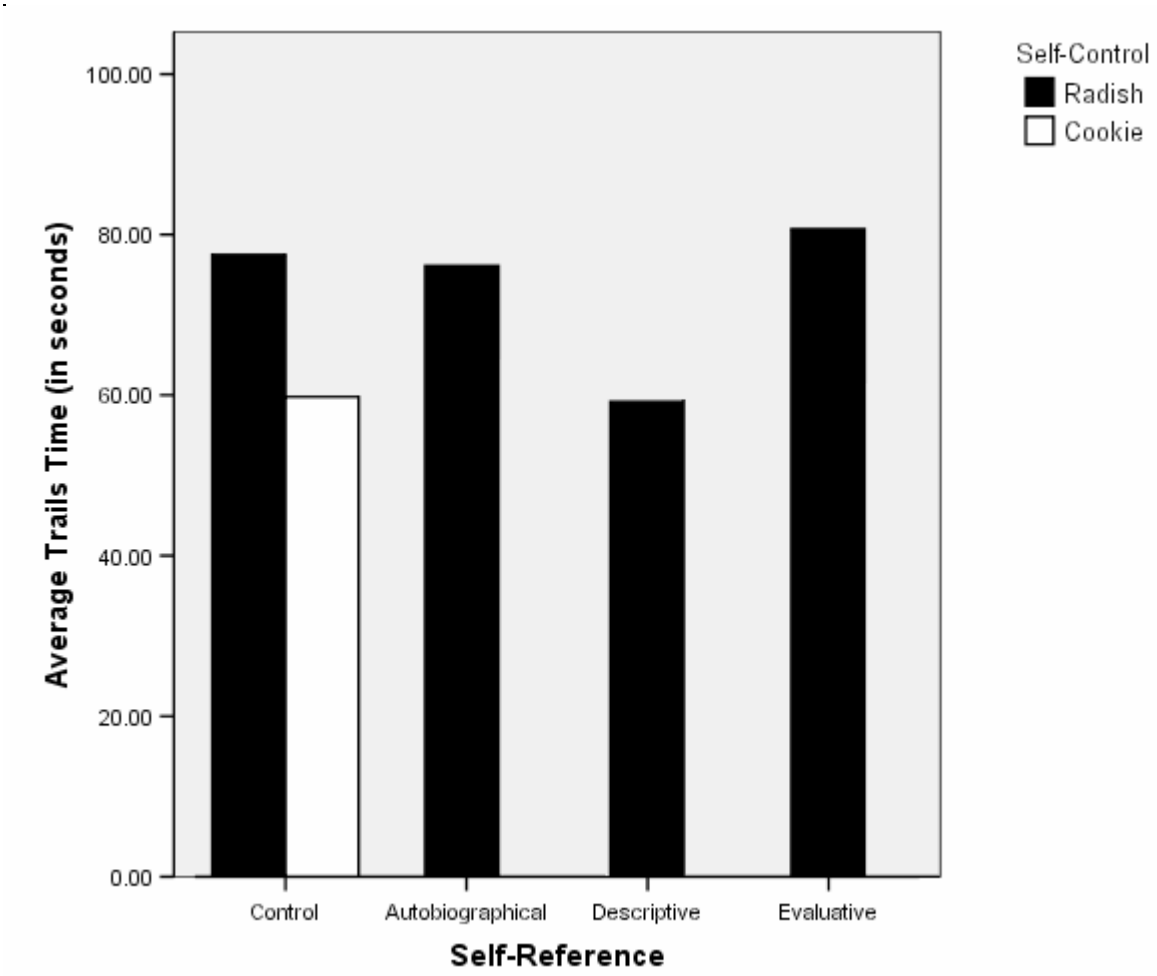

Figure 2. Experiment 2: Average time needed to complete the Trails B task

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