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Self-Control Conservation: A Proactive or Reactive Strategy?

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Preliminary evidence suggests that when individuals believe that they will have to exert self-control in the near future, their performance on an intervening self-control task suffers so that limited self-control resources are conserved for later use (Muraven, Shmueli, & Burkley, 2006). The current research sought to clarify whether conservation is enacted as a proactive strategy, before resources have actually been taxed. To test this, participants who anticipated a future self-control task were given the opportunity to avoid exerting self-control in the present. Inconsistent with a proactive account of conservation, participants did not choose to avoid self-control tasks. This suggests that when facing multiple self-control demands, individuals likely do not recognize the need to save resources until after exerting self-control.

People must exert control over their impulses and urges to successfully navigate the situations that they encounter in everyday life (Baumeister, Heatherton, & Tice, 1994). Multiple times throughout the day, individuals are faced with temptations and diversions that threaten the attainment of their long-term goals. However, the ability to resist these temptations is not endless; the exertion of self-control appears to deplete a limited resource or strength, making subsequent attempts at self-control more likely to fail (Muraven, Tice, & Baumeister, 1998). Therefore, in order to successfully guide behavior towards the attainment of long-term goals, it is necessary to allocate self-control resources so that they are available for when they are most needed.

Recent research has offered preliminary evidence that the judicious management of self-control strength may be possible. When individuals anticipate an ensuing need for self-control, their performance on an intervening self-control task decreases so that resources are conserved for the future (Muraven et al., 2006). However, it is not clear if individuals pursue conservation strategies proactively, before they have begun to exert any self-control, or only reactively, once they have already begun to expend self-control. One way to clarify this issue is to examine participants' preference for current self-control tasks when they know that they will need to exert self-control in the near future. If participants choose to avoid self-control tasks, it would suggest that they recognize the need to conserve resources even before they have begun to exert any self-control. This may have important implications for how individuals choose to exert self-control in situations in which they face multiple self-control demands.

Self-Control Strength

Self-control refers to the overriding or inhibition of urges, desires, emotions, or behaviors that conflict with long-term goals (Baumeister, Vohs, & Tice, 2007; Muraven & Slessareva, 2003). Over the last decade or so, a substantial body of empirical research has emerged in support of the view that the ability to exert self-control operates as a limited resource (see Hagger, Wood, Stiff, & Chatzisarantis, 2010). At the crux of this research is the notion that all acts of self-control use up, or deplete, a limited resource (i.e., self-control strength) required for self-regulation. Individuals who are low in these resources, either chronically or temporarily, are prone to self-control failure. Importantly, research on the limited strength model has demonstrated that all acts of self-control, no matter how disparate they may seem, deplete the same resource. Any behavior that requires the expenditure of self-control depletes the resource, making subsequent success at self-control less likely (Muraven et al., 1998).

Recent research has suggested that the decrements in self-control performance found in depletion studies are not caused by a complete absence of self-control strength, but rather by an unwillingness on the part of depleted participants to continue to exert self-control (Muraven & Slessareva, 2003). One reason that depleted individuals may be particularly unwilling to exert self-control is because they are conserving their depleted pool of self-control resources for future use (Muraven et al., 2006). Thus, after depleting their resources, individuals choose to further exercise self-control only when the potential outcomes associated with exerting self-control resources outweigh the motivation to save them. In a series of experiments, participants first completed a self-control task and then were informed about two remaining experimental tasks (Muraven et al., 2006). Depleted

participants who expected to need self-control strength in the near future performed worse on an intervening self-control task than participants who did not anticipate needing their resources. For example, depleted participants who anticipated needing self-control in the near future performed worse on an intervening task that required them to continuously exert control over their attention than participants who anticipated a future task that was difficult but that did not require self-control (Muraven et al., 2006, Experiment 2). Presumably, the decreased performance by depleted participants occurred because they were saving their self-control resources for the final task. In support of this, participants' self-reported conservation of energy significantly predicted worse performance on the intervening self-control task. In addition, poor performance on the intervening task predicted better performance on the final self-control task (Muraven et al., 2006, Experiment 4). Thus, individuals appear able to save limited self-control resources in the present so that they are available when they are needed in the near future. The basic idea that individuals conserve limited self-control resources for future use has recently been replicated by other researchers (Tyler & Burns, 2009).

The Conservation Process

Whereas the aforementioned research suggests that individuals can conserve limited self-control resources, it does not speak to the issue of whether this is a proactive or reactive process. Because previous research on conservation (Muraven et al., 2006; Tyler & Burns, 2009) has not measured exactly when during the intervening self-control task performance began to deteriorate, nor have any self-report measures regarding resource conservation been collected until after the completion of the intervening task, it is impossible to tell from previous research whether participants planned to conserve resources before actually exerting self-control on the task, or alternatively, if participants did not recognize the need to conserve strength until after the task began to deplete their resources. Further, although previous researchers (Muraven et al., 2006; Tyler & Burns, 2009) have mentioned other factors that may motivate individuals to conserve resources, previous research on self-control conservation has only used an initial, depleting task to motivate individuals to conserve strength. Thus, researchers have yet to adequately examine whether or not individuals conserve resources in situations when they have not recently exerted any self-control.

In support of the notion that conservation can be a proactive process, evidence suggests that individuals may endorse the belief that self-control is a limited resource (Martijn, Tenbult, Merckelbach, Dreezens, & de Vries, 2002, Experiment 2) and that these beliefs may influence the way individuals allocate self-control (Job, Dweck, & Walton, 2010). For instance, Job et al. (2010) only found evidence of depletion for individuals who believed that the ability to exert self-control is limited. This line of research suggests that individuals know self-control is governed by a limited resource, and that they act on these beliefs. Accordingly, when facing a self-control task in the future, individuals may prefer to avoid exerting self-control in the present as a way of conserving resources.

However, the aforementioned research on beliefs about self-control has yet to convincingly demonstrate that beliefs about the limited nature of self-control are strong enough to actually dictate the way people allocate self-control resources. Rather, experiments demonstrating the effects of lay beliefs on self-control behaviors have either explicitly

measured (Job et al., 2010) or manipulated (Martijn et al., 2002) participants' beliefs just prior to assessing task performance, making it possible that beliefs about self-control are not strong enough to influence behavior without first being externally activated, or, that the observed effects were due to experimental demand. Further, the limited research on self-control beliefs suggests that whereas the belief that self-control is a limited resource may be common, individuals likely hold multiple beliefs about self-control at the same time (Martijn et al., 2002). If people hold multiple beliefs about self-control, it is possible that the limited resource view of self-control only influences behavior once an individual has actually experienced the fatiguing effects of self-control exertion during a task. In sum, if individuals do not hold strong, clear beliefs that self-control is limited, they may only begin to conserve resources once they have actually begun to experience the fatiguing effects of resource depletion. Thus, individuals who anticipate a future self-control task may not avoid current self-control exertion because they may not recognize the need to conserve strength.

Clarifying whether or not conservation is enacted as a proactive strategy has important practical and theoretical implications. As previously mentioned, if individuals who anticipate future self-control use adopt conservation strategies based on their belief that an intervening task will tax their resources, then they may prefer to engage in tasks that they believe will not deplete their limited self-control strength. Thus, an individual's assessment of a task's self-regulatory demands may be an important determinant of whether or not they decide to engage in the task. More broadly, if conservation strategies are pursued proactively, it would suggest that individuals can be quite flexible in how they decide to allocate their limited resources, and that they do not need to wait for feelings of depletion to motivate them to conserve. Furthermore, determining if conservation is pursued proactively or reactively would help clarify whether or not beliefs about self-control influence how people allocate their limited resources in situations where they have yet to actually exert self-control.

Overview of the Current Experiment

The current experiment examined the extent to which individuals who anticipate a future need for self-control prefer to engage in intervening tasks that do not require self-control. If conservation strategies are enacted proactively, before resources have begun to be taxed, then individuals who anticipate future self-control use should prefer to avoid self-control exertion. To determine if this occurs, the extent to which non-depleted participants expected to need self-control for an important future task was manipulated. Unlike previous research on conservation, participants in the current experiment did not initially exert self-control. This ruled out the possibility that the decision to conserve resources could be influenced by any experiences with self-control during an initial, depleting task. Rather than motivating participants to conserve resources by using an initial depletion task, participants were told that their performance on the future task was important. Past theorizing on self-control conservation has suggested that regardless of initial level of depletion, individuals should be particularly motivated to conserve when they anticipate an important future task that will place heavy demands on their self-control resources (Baumeister, Muraven, & Tice, 2000; Muraven et al., 2006).

After manipulating expectations about the future task, participants were given a choice between two initial task options. The possible options differed in their self-control

demands, and participants' preferences were examined to see if they preferred to avoid self-control exertion. Control conditions were included to determine if any observed effects were specific to the self-control domain, or if similar results also emerged when individuals anticipated two contiguous memory tasks.

Lastly, participants' beliefs about the nature of self-control were measured as a potential moderator. If conservation strategies are pursued proactively as a plan to save strength, the conservation effect should be largest for participants who most strongly believe that self-control resources are limited.

Method

Subjects

Ninety undergraduates (50 males, 40 females) participated in return for partial course credit. Participants were run individually in experimental sessions that lasted approximately thirty minutes. The majority (86.7%) of participants were between the ages of 18 and 20, with the rest being 21 or older. The sample was largely (73.3%) European-American. 11.1% of the sample was African American, and 15.6% reported another ethnic category or preferred not to answer.

Design

Participants were randomly assigned to one of three experimental conditions. The experiment utilized a one-way ANOVA design, with future task (self-control, memory, no future task) as a between subjects variable. Participants' preference ratings of the two task options and actual choice between the options served as the primary dependent variables.

Procedure

Upon entering the laboratory, participants were told that they would be taking part in an experiment designed to assess task performance. No mention was made regarding any interest in self-control performance. After signing an informed consent sheet, participants were seated at a computer by the experimenter and administered the experimental materials. The computer randomly assigned participants to condition at runtime thereby making the experimenter blind to condition. MediaLab computer software (Jarvis, 2008) was used to present all experimental materials.

Expectations of future self-control use

Two-thirds of the participants were instructed that they would be working on two tasks during the course of the experimental session whereas the remaining participants (no future task group) were only informed about the first task. For the first task, all participants were told that they would be allowed to choose between two possible options (task options for the initial task are described in the next section). Participants who anticipated an additional task were informed that they would not have any choice regarding the second and final task. For these participants, half were told that the second task would be a thought suppression task that would require them to suppress unwanted thoughts whereas the

remaining participants were told that the second task would be a digit span task that would require them to remember a series of numbers. Participants were provided with a brief description of each task, and the descriptions explicitly mentioned either the self-control demands of the task in the case of the thought suppression task, or the memory demands of the task in the case of the digit span task. A pilot test ($N = 38$) that included specific items about each task (i.e., "How much memory ability do you think the thought suppression task will require?") revealed that these two tasks are perceived as being equally stressful and appealing (both $p > .19$), but that the thought suppression task is perceived as requiring more self-control, $t(37) = 5.34, p < .001, d = 1.15$, and the digit span task is perceived as requiring more memory ability, $t(37) = -6.74, p < .001, d = 1.63$.

To further manipulate participants' motivation to conserve self-control strength, all participants who expected a future task were informed that the future task was important. Specifically, participants who anticipated a future task were told that the task was an important part of a graduate student's dissertation. Pilot testing ($N = 68$) suggested that participants indicate a high level of task importance (4.15 out of 5) when they believe their performance on a task is helpful to a dissertation. In sum, all participants expected an initial task that would be their choice, and some expected an important future self-control task (thought suppression), some an important future memory task (digit span), and some no future task.

Measurement of task preference

For the initial task, participants were given descriptions of two experimental tasks, and they were informed that they could choose which one they would like to work on. All participants read descriptions of the same two tasks, the order of which was counterbalanced. Participants read about a continuous attention task, which would require them to maintain control over their attention while viewing and responding to visual stimuli, and about a pattern task, which would require them to view and remember a variety of different color patterns. Continuous attention tasks have commonly been used to measure self-control (e.g., Butler & Montgomery, 2005) and pilot testing ($N = 38$) revealed that the continuous attention task was perceived as requiring more self-control than the pattern task, $t(37) = 3.80, p = .001, d = 0.88$. Pilot testing also suggested that the pattern task is perceived to require more memory ability, $t(37) = -4.85, p < .001, d = 0.97$, but that the two tasks are perceived as being equally stressful and appealing (both $p > .27$).

After reading the descriptions of the two tasks, participants were prompted to rate the extent to which they would like to work on each task using a 7-point Likert scale (1 = Very Little, 7 = Very Much). They also made a choice between the two tasks (order counterbalanced) regarding which they would prefer to work on. Following this, participants used a 7-point Likert scale to rate each task in regards to its self-control and memory demands. Participants who anticipated a final task were also asked questions about their perceptions of the final task (e.g., self-control and memory demands, importance).

Following the task selection and ratings, participants were given a questionnaire that assessed their beliefs about self-control as well as a demographics questionnaire. The self-control beliefs measure was an 8-item measure adapted from the items used by Job et al., (2010). The measure assesses beliefs about self-control on a 6-point scale with anchors of 1 (Strongly Disagree) to 6 (Strongly Agree). Four of the items directly assess the belief that self-control is a limited resource (e.g., "After a self-control activity your energy is depleted

and you must rest to get it refuelled again.”) whereas four items assess the belief that self-control ability is not constrained by any limits (e.g., “When you have been working on a task that requires a lot of self-control, you feel energized and you are able to immediately start with another demanding activity”). In the current experiment, the two subscales of the self-control beliefs scale had adequate internal reliability and were negatively correlated (for limited subscale, $\alpha = .78$, for unlimited, $\alpha = .69$, respectively, $r(90) = -.48, p < .001$). After completing the questionnaires, participants contacted the experimenter, were debriefed, and released. Participants did not actually complete either the task they chose (continuous attention or pattern) or the task they anticipated (thought suppression or digit span).

Results

Perceptions of the Experimental Tasks

As expected, dependent samples t-tests indicated that the initial task options reliably differed in their self-control and memory demands. Specifically, the attention control task was perceived as requiring more self-control, $t(89) = 4.12, p < .001, d = 0.58$, and less memory ability, $t(89) = -6.29, p < .001, d = -0.97$, than the pattern task. Means for these variables are depicted in Table 1.

For the future task, independent samples t-tests revealed that participants who anticipated the thought suppression task reported that the future task required more self-

Table 1: Mean responses for perceptions of the continuous attention and pattern tasks.

Note: $N = 90$. All variables measured with a 7-point Likert scale with anchors of 1 (Very Little) and 7 (Very Much).

Variable	Continuous Attention		Pattern	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Self-Control Demands	5.28	1.32	4.37	1.79
Memory Demands	4.39	1.86	5.97	1.35

Table 2: Mean responses for perceptions of the future task.

Note: $N = 61$. All variables measured with a 7-point Likert scale with anchors of 1 (Very Little) and 7 (Very Much).

Variable	Thought Suppression		Digit Span	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Self-Control Demands	5.37	1.81	4.45	1.57
Memory Demands	4.20	1.86	5.77	1.26
Importance	5.90	1.03	5.84	1.42

Table 3: Responses on key variables across condition.

Note: $N = 90$. All variables except the percentage that chose the attention task measured using a 7-point Likert scale with anchors of 1 (Very Little) and 7 (Very Much).

Variable	Thought Suppression		Digit Span		No Future Task	
	M	SD	M	SD	M	SD
Desire to Engage in Attention Task	4.63	2.34	4.87	2.28	5.03	1.90
Desire to Engage in Pattern Task	3.50	2.37	3.65	2.41	3.66	1.99
Chose Attention Task (%)	76.7		64.5		69.0	

control, $t(59) = -2.11$, $p < .05$, $d = 0.54$, and less memory ability, $t(59) = 3.88$, $p < .001$, $d = -0.99$, than participants who anticipated the digit span task. Further, participants in both future task conditions rated the future task as more important than the neutral midpoint of the scale (both $ps < .001$). Means for these variables are depicted in Table 2.

Initial Task Preference and Choice

In contrast to pilot data that suggested that the attention task and pattern task were perceived as equally enjoyable, participants in the current experiment indicated a stronger desire to work on the attention task as compared to the pattern task, $t(89) = 2.99$, $p < .01$, $d = 0.56$. Further, when given an actual choice between the tasks, 70% of participants chose the attention task.

Inconsistent with the notion that individuals who anticipate future self-control demands prefer to avoid self-control exertion, one-way ANOVAs did not reveal any influence of future task on participants' desire to engage in either the attention task or the pattern task (both $ps > .77$). That is, regardless of whether participants anticipated the thought suppression task, the digit span task, or no future task, they reported the same desire to work on the two task options (see Table 3 for means). Furthermore, an internal analysis of the data revealed that participants' subjective perceptions of the future task's self-control demands were not correlated with their preference for either the attention or the pattern task (both $ps > .54$).

Similarly, the future task did not influence participants' actual choice between the task options, $\chi^2(2) = 1.09$, ns . A series of chi-square tests that included only two of the three future task groups did not reveal differences between any of the two conditions (all $ps > .29$). Also, a logistic regression analysis suggested that participants' subjective ratings of the future task's self-control demands did not influence their task choice ($p = .65$). In sum, whether the anticipated self-control demands of the future task were treated as a between-groups variable or as an individual measure, they did not appear to influence participants' desire to engage in either of the task options or their actual choice between the two task options.

Individual Differences

Regression analyses that treated beliefs about self-control as a continuous variable revealed that neither the belief that self-control is a limited resource nor the belief that it is an unlimited resource interacted with future task condition (all p s $> .29$) or exerted a main effect (all p s $> .47$) on participants' desire to engage in the attention task. Similarly, no main effects (all p s $> .23$) or interactions (all p s $> .10$) emerged for self-control beliefs on participants' desire to engage in the pattern task.

Exploratory Analyses

Contrary to expectations, the order in which the task options were presented significantly influenced participants' desire to engage in the two task options and their actual task choice. Indeed, participants for whom the attention task was described first reported a stronger desire to engage in the attention task than did participants for whom the pattern task was described first, $t(88) = 2.79, p < .01, d = 0.59$. Similarly, participants for whom the pattern task was described first reported a stronger desire to engage in the pattern task than did participants for whom the attention task was described first, $t(88) = -3.40, p = .001, d = 0.75$. The order of presentation also influenced participants' actual choice between tasks, $\chi^2(1) = 12.28, p < .001$. Participants who were presented with the attention task first chose the attention task 88.1% of the time, whereas participants presented with the attention task second chose the attention task only 54.2% of the time.

Because the order of presentation strongly influenced task choice, several analyses were conducted to test whether expectations about the future task affected participants' task preferences after controlling for the influence of order of presentation. A series of regression analyses and a loglinear analysis revealed that the influence of future task condition on task preferences and choice remained non-significant when controlling for order of presentation (all p s $> .71$). Further, participants' beliefs about self-control did not interact with future task or exert a main effect on task preference or choice when controlling for order of presentation (all p s $> .16$). In short, only the order of presentation of the task options, and not the anticipated demands of the future task or beliefs about self-control, exerted an influence on participants' task preferences and choice.

Discussion

The results of the experiment do not suggest that conservation is enacted as a proactive strategy. Indeed, participants who expected to engage in the thought suppression task did not show any less of a preference for the attention control task than participants who anticipated a future memory task or who did not expect to complete a future task at all.

This null effect was observed despite the attention control and thought suppression tasks being rated as requiring significantly more self-control than the pattern matching and digit span tasks, and despite participants acknowledging that their performance on the future task was important. Thus, the conditions appear to have been established to adequately test for conservation effects. Participants expected an important self-control task in the near future and yet they still did not choose to avoid exerting self-control in the present. Rather than taking into account the self-control demands of the task options when

making their choice, participants were influenced by seemingly irrelevant information (i.e., which task was described first). Interestingly, the observed null effects for task preference and choice emerged even amongst participants who believed that the ability to exert self-control is limited.

Implications

As noted above, individuals who anticipated an important self-control task in the near future did not prefer to engage in a task that did not require self-control. This null finding, when combined with the broader self-control conservation literature, may be useful in delineating the conditions that are required for self-control conservation to occur.

Although experimental evidence regarding self-conservation is limited, one consistent finding appears to be that conservation only occurs when participants have actually depleted some of their self-control resources. Indeed, previous research on self-control conservation has only found evidence of conservation in participants who initially engaged in a depleting self-control task (Muraven et al., 2006; Tyler & Burns, 2009). Participants who completed an initial control task (i.e., a non-depleting task) performed the same on an intervening self-control task regardless of whether or not they anticipated a future self-control task. Thus, although it has been suggested that factors other than initial depletion (e.g., importance, self-control demands of the tasks) may lead to conservation (Baumeister et al., 2000; Muraven et al., 2006), it is possible that individuals only conserve resources after they have experienced a certain level of fatigue or depletion.

Following this, and consistent with the current results, beliefs about self-control may not be enough to initiate self-control conservation. Thus, even though participants may report a belief that self-control resources are limited when they are queried during an experiment, these beliefs may not be strong or clear enough to actually influence behavior in the absence of self-control exertion. Indeed, when considering the existing evidence regarding self-control conservation, the actual expenditure of resources (i.e., initial depletion) may be a necessary precondition for conservation to occur.

Limitations

Although the results of the current investigation do not suggest that individuals pursue self-control conservation strategies proactively, several limitations exist that may temper this conclusion. For instance, despite pilot experiment results that suggested the attention task and the pattern task were equally attractive, the results of the experiment indicated that the attention task was actually more commonly preferred. It is possible that the appeal of the attention task relative to the pattern task may have outweighed any differences in self-control demands as a determinant of participants' preferences and choice. In addition, although the attention and thought listing tasks were rated as requiring significantly more self-control and less memory ability than the pattern and digit span tasks respectively, it should be noted that all four tasks were rated above the neutral midpoint for both self-control and memory demands (see Tables 1 and 2). Thus, it is possible that although the tasks used in the current experiment differed in their self-control and memory demands, the differences were not large enough to influence participants' actual behavior. Future research could address these shortcomings by ensuring that the task options differ only in regards to their self-control demands, and by selecting task options that differ more

dramatically in their self-control demands.

Additionally, it is possible that telling participants that their performance on the future task was important to a graduate student's dissertation did not sufficiently motivate them to conserve resources. Theorizing on self-control conservation suggests that for non-depleted individuals to conserve resources for the future, they must perceive the future self-control demands as being important (Baumeister et al., 2000; Muraven et al, 2006). Despite participants in the current experiment reporting that the future task was important, it is possible that their responses were a result of self-presentational concerns or concerns with social desirability as opposed to genuine beliefs that the future task was important. Perhaps an incentive that was more in accordance with participants' self-interest (i.e., paying them based on their performance) would have led participants to view the future task as being more important (see Schwartz, 1986), thus giving them a stronger motivation to conserve resources.

Lastly, it is possible that the dependent measures used in this experiment were not sensitive enough to detect resource conservation. Previous research has only used participants' actual performance on a self-control task as a measure of conservation (Muraven et al., 2006; Tyler & Burns, 2009). In the current experiment, conservation was assessed by participants' self-reported desire to work on the task options and their actual choice between the task options. Whereas it seems probable that individuals motivated to conserve resources for the future would prefer to avoid self-control tasks in the present, future research may be needed to determine whether or not the assessment of task choice is a valid way to measure resource conservation.

Conclusion

The results of the current investigation did not suggest that self-control conservation is a proactive process. Rather, participants who anticipated an important future self-control task did not choose to avoid tasks that require self-control exertion. When combined with the extant research on self-control conservation, the current findings suggest that individuals may not recognize the need to conserve resources until after they have actually started to exert self-control strength. This suggests that in situations when people face multiple self-control demands, they may not recognize the need to save resources until they begin to exert self-control.

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