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The Regulatory Easy Street: Self-Regulation Below the Self-Control Threshold Does not Consume Regulatory Resources

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Abstract

We present and test a theory in which self-control is distinguished from broader acts of self-regulation when it is both effortful and conscious. In two studies, we examined whether acts of behavioral management that do not require effort are exempt from resource depletion. In Study 1, we found that a self-regulation task only reduced subsequent self-control for participants who had previously indicated that completing the task would require effort. In Study 2, we found that participants who completed a self-regulation task for two minutes did not evidence the subsequent impairment in self-control evident for participants who had completed the task for four or more minutes. Our results support the notion that self-regulation without effort falls below the self-control threshold and has different downstream consequences than self-control.

Keywords

SELF-CONTROL; SELF-REGULATION; EGO-DEPLETION

A consequence of acts that require self-control is a temporary decrease in the ability to exert further self-control (Hagger, Wood, Stiff, & Chatzisarantis, 2010; Muraven, Tice, & Baumeister, 1998). For most people, this is very bad news. The chances of needing to exert self-control in the course of daily life are quite high, and as a result, people may spend a large portion of their days in a resource-depleted state and therefore less able to exert self-control than they would prefer. But is it possible that not all acts that appear to require self-control are sufficiently demanding to consume these limited resources? We examine the possibility that people vary in the extent to which specific acts tap into self-control, and as a result, vary in the extent to which self-regulation produces a reduction in the resources that underlie self-control.

The distinction between self-control and self-regulation is blurred, or ignored altogether, in many models. Some authors use the terms interchangeably, whereas others treat them as distinct constructs. We view self-regulation as the general process of managing thoughts, behaviors, goals, and identity (Carver & Scheier, 1981, Rothbaum, Weisz, & Snyder, 1982) and self-control as a specific type of self-regulation that occurs only when people

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consciously and effortfully attempt to override prepotent, or dominant, responses to situations. Self-control may involve affect, cognition, or behavior, and may involve initiating undesired responses or inhibiting desired responses (e.g., restraining from eating cookies or engaging in difficult physical exercise). Unlike other forms of self-regulation, which are largely automatic (e.g., Bargh, Gollwitzer, Lee-Chai, Barndollar, & Troetschel, 2001), self-control is a conscious process in which people are aware that they are doing something they would not like to do or not doing something they would like to do. In addition to being conscious, we suggest that self-control requires an exertion of effort. That is, resisting a beer at 7 a.m. does not require the same amount of restraint that resisting that same beer at 5 p.m. after a warm afternoon run might require. Resisting a beer in the morning is likely effortless, whereas resisting it in the afternoon might be effortful. Similarly, different people may find that overriding the same response (e.g., temptation to buy a new handbag) requires anywhere from no effort to a great deal of effort to control.

Consciousness and effort are not independent requirements of self-control. Responses that require a great deal of effort may be more likely to enter conscious awareness. Likewise, conscious responses may be perceived as more effortful than those of which people are unaware. In Figure 1, we graphically represent our view of self-control as a special case of self-regulation in which both effort and conscious awareness are high. Importantly, we argue that all responses represented in this figure are self-regulation, but that responses, once they pass certain thresholds of consciousness and effort, may also represent self-control.

Although the empirical literature on self-control continues to grow, current research is heavily focused on self-control as dependent on a limited resource. This model of self-control is based on the analogy of a muscle. Just as a weightlifter's muscles become fatigued after lifting weights, so a person's willpower becomes fatigued after exerting self-control (Baumeister, Bratslavsky, Muraven, & Tice, 1998). The analogy has been extended to show that willpower can be built through practice (Muraven, Baumeister, & Tice, 1999). Importantly, this work has demonstrated that self-control is a generic resource. Thus, exerting self-control by controlling one's emotions or thoughts leads to a decreased ability to control one's behaviors and vice versa.

The implications of this model are troubling for those who wish to improve self-control. If exerting self-control leads to a decreased ability to do so again, an argument could easily be made that it might not be worth exerting self-control. We suggest that one basis for hope is apparent in the muscle analogy. Weightlifters do not become fatigued after lifting one five-pound dumbbell; strong weightlifters might be able to lift a five-pound dumbbell dozens of times without developing any signs of fatigue. This ability occurs because lifting a light weight does not require converting to anaerobic activity. In the same way, people may be resilient to small acts of managing their behaviors. We suggest that these acts fall into the general class of self-regulation rather than the specific class of self-regulation that is self-control (i.e., conscious and effortful responding). Just as weightlifters may not have to transition from aerobic to anaerobic activity when the task is not demanding, when regulatory tasks are not demanding, people may not pass the self-control threshold.

1.1 The Present Studies

The purpose of the present studies is to investigate whether some acts of self-regulation do not pass the self-control threshold. We propose that, consistent with the muscle analogy, people may be unaffected by relatively easy demands and will only demonstrate resource depletion effects when those demands reach some threshold. To test the hypothesis that small amounts of what might otherwise constitute self-control do not lead to decreased self-control, we designed two studies. In Study 1, we used a qualitative distinction to separate

acts of self-control from self-regulation more broadly. Specifically, we focused on individual differences in whether a task (i.e., consuming vegetables) was perceived as requiring effort. In order to causally test that amount of effort distinguishes self-control from self-regulation more broadly, in Study 2, we used a quantitative distinction to test the hypothesis that the same regulatory behavior (i.e., managing attention) performed for varying durations leads to different outcomes in subsequent self-controlling. Across these two studies, we aimed to test the hypothesis that while self-control may consume resources that interfere with self-regulation, small acts of self-regulation do not consume these same resources.

2 Study 1

In Study 1, we construed effort required on a self-regulatory task through a measurement of individual differences. Specifically, we chose a task that for all people represents a positive standard (eating healthy). Although individuals may vary in the extent to which they are currently pursuing a healthy eating goal, we suspected that due to cultural upbringing, all participants would view consuming vegetables as important to their long-term health. Thus, eating vegetables represents a plausible self-regulatory task. However, we expected variability in the extent to which individuals reported this self-regulatory task to require effort. According to our hypothesis that self-regulation only impairs later self-control when it is effortful, we expected that individual differences in difficulty evaluations of eating vegetables would moderate the impact of completing a vegetable-taste test on subsequent self-control. Specifically, we expected that among participants who completed a vegetable consumption task, the more individuals reported consuming vegetables to require effort, the greater impairment in subsequent self-control they would demonstrate.

2.1 Methods

2.1.1 Participants—Sixty-three participants (52% male) were recruited from an undergraduate psychology pool. In exchange for participation, participants received partial course credit.

2.1.2 Procedure—The procedure for this study involved an assessment of the extent to which various activities (e.g., eating vegetables, going to class) required self-control and an experimental manipulation of whether or not participants were asked to sample raw vegetables. This design allowed us to examine whether individual differences in perceptions of behavioral effort required by eating vegetables moderated the effects of completing the taste test.

At the beginning of the study, participants completed a packet of questionnaires, in which they indicated whether eating vegetables required effort using a 1 (*does not require self-control at all)* to 5 (*requires a great deal of self-control*) scale ($M = 2.00$, $SD = 1.08$). Participants then completed a series of tasks, including, for approximately half of the participants, a vegetable-eating task. In this task, participants were presented with raw vegetables (i.e., cauliflower, broccoli, cucumber, carrots, celery), and asked to rate the appeal of each. Participants were instructed to take at least one bite of each kind of vegetable. The appeal rating served as a cover story for the purpose of the vegetable task.

At the end of the laboratory session, participants completed 15 difficult items from the Remote Associates Test (RAT; Mednick, 1962). For each item, participants were presented with three words (e.g., *elephant, lapse, vivid)* and asked to come up with a fourth word connecting the three (e.g., *memory*). Although this task was initially designed to measure creativity, it serves as an interesting measure of self-control because each problem is solvable yet difficult, requiring self-control to continue brainstorming for a correct answer.

Furthermore, for each problem, participants were given an option to continue on to the next without providing an answer to the current problem. Thus, we included 15 points at which participants could override an impulse to quit working on the difficult problems. Because the items on the RAT are difficult and were designed to measure creativity, persistence does not guarantee better performance (Mednick, 1962). Thus, we focused primarily on the amount of time in minutes participants spent working on the RAT items ($M = 7.26$, $SD = 4.15$). Persistence on difficult RAT items has been successfully used as a measure of self-control (vanDellen & Hoyle, 2010) and is similar to other common measurements of self-control such as persistence on difficult puzzles (Baumeister et al., 1998).

2.2 Results and Discussion

We used multiple regression analysis to examine persistence on the RAT. First, we entered a standardized score reflecting continuous self-ratings of the self-control required to eat vegetables and a dummy-coded variable reflecting whether or not participants had completed the vegetable taste-test. Next, we entered a product term reflecting the statistical interaction of these two variables. The analysis produced a significant interaction effect, $B = -2.34$, $t(59) = -2.35$, $p = .02$. We probed this interaction using simple slopes analysis (Cohen, Cohen, West, & Aiken, 2003). As Figure 2 shows, this interaction was driven by an effect of task evaluation only among those who completed the vegetable taste-test, $t(59) = -2.74$, $p < .01$. For participants who completed the vegetable taste-test, the more they reported that eating vegetables requires self-control the less they persisted on the RAT. However, among participants in the control condition, vegetable ratings were unrelated to later persistence, $t(59) = 0.63$, $p = .53$.

As predicted, evaluations of the difficulty of completing a task predicted the extent to which participants evidenced a decrease in subsequent self-control following completion of that task. Although participants completed a task that is generally viewed as relatively unpleasant (e.g., vanDellen & Baker, 2011), expected difficulty of the task predicted subsequent impairments in self-control. Specifically, regulatory resources were tapped only when the task required effort, a factor that we propose distinguishes self-control from self-regulation more generally. The fact that there was no relationship between the vegetable rating item and subsequent performance in the control condition suggests that this is not due to trait deficiencies in self-control in those who find it demanding to consume vegetables. Rather, the effect seemed confined to the specific self-regulatory task at hand.

3 Study 2

The purpose of Study 2 was to build on Study 1 by testing the hypothesis that a quantitative (rather than qualitative) distinction in amount of effort distinguishes self-control from more general self-regulation. Additionally, the design of this study was an experiment, allowing for causal interpretation of the role of effort in self-control. We expected that short demands on regulatory efforts would not diminish the limited resource on which self-control depends but that longer demands that required more effort would cross the self-control threshold. To test this proposition, we conducted a study in which participants across conditions managed the same behavior in the same way, but for different lengths of time. Specifically, we asked participants to regulate their attention for zero, two, four, or six minutes. Previous research asking participants to regulate their attention has shown that manipulations of four and six minutes in length lead to decreases in later attempts at self-control (e.g., Gailliot, Baumeister, et al., 2007). However, research has not examined whether shorter periods of the same behavior lead to similar deficits in regulatory capacity. In this manipulation, participants were asked to override their impulses by restraining from looking at words that are changing on the screen in front of them. When the words change, participants' eyes are naturally drawn to them. As a result, the manipulation required that participants frequently

(approximately every 15 seconds) stop themselves from doing something they are inclined to do.

We expected to find that, consistent with the resource depletion literature, completing this task for longer periods of time would require more effort and therefore undermine subsequent attempts at self-control to a greater degree. In order to test whether managing behaviors for two, four, or six minutes requires self-regulation beyond the self-control threshold, we measured performance on a second self-control task. Consistent with the findings from previous research, we expected that the six-minute version of the task would require effort and we would see a drop-off in performance on the second self-control task (Baumeister et al., 1998; Schmeichel, Vohs, & Baumeister, 2003). We expected that regulating attention for two minutes would not differ from no self-regulation and that regulating attention for four minutes would fall between two and six minutes.

3.1 Method

3.1.1 Participants—Eighty-six participants were recruited from an undergraduate psychology pool and a pool of community members (M_{age} = 21.38 years, SD = 4.91). Following data collection, 8 participants were excluded for failure to understand instructions, leaving a total of 53 females and 25 males.

3.1.2 Procedure—Participants completed the study on a computer in a private room. First, participants watched a silent video clip of a woman being interviewed (Gailliot, Baumeister, et al., 2007). Along with the video of the woman, a box with continuously changing words appears on the screen. Participants were randomly assigned to a control condition or to one of three attention management conditions. Participants in the three attention management conditions were instructed to constantly keep all attention on the woman and to avoid looking at the words. Control participants were not given instructions to manage their attention and watched the video for six minutes. In the attention management condition, participants were further randomly assigned to watch a 2 minute, 4 minute, or 6 minute version of the video. Participants were not told how long the video task would be. Finally, participants completed an anagram task containing 10 difficult but solvable problems and were told to solve as many anagrams as they were able. We recorded both the time spent on the task and the number of anagrams that were correctly solved. Because the anagrams were solvable, completion of an anagram (particularly quickly solving an anagram) might affect the overall time participants spent on the task. Therefore, and consistent with past research showing that performance on such difficult word problems is representative of state self-control (Baumeister et al., 1998; Schmeichel et al., 2003), we treated the number of anagrams correctly solved as our dependent variable (M = 5.46, SD = 2.68). Finally, participants completed a questionnaire recording age, sex, and perceived difficulty of the anagrams.

3.2 Results and Discussion

Because the focus of this study was on a quantitative distinction between self-control and self-regulation and because a previous regression analysis revealed that self-reported difficulty of the task predicted anagram performance, B = −2.24, $t(76) = -4.68$, $p < .001$, we controlled for this variable when using anagram performance as an outcome. Condition did not affect perceived difficulty of the anagrams, $F(3,74) = 0.21$, $p = .89$.

We found a marginally significant effect of condition on performance on the anagrams, $F(3, 74) = 2.64$, $p < .06$. The estimated mean performance for each condition is presented in Table 1. We next conducted a series of three planned contrast tests to examine how attention management affected later performance on the anagram task. First, we compared

participants in the zero and two minute conditions and found that they did not differ, $F(1, 74) = 0.34$, $p = .56$, $d = 0.14$. Next, we compared participants in the four and six minute conditions and found that they did not differ, $F(1,74) = 0.00$, $p = .99$, $d = 0.00$. Finally, we compared participants who had completed the task for either zero or two minutes to those who had completed the task for either four or six minutes and found an effect of extended effort, $F(1, 74) = 7.72$, $p < .01$, $d = -0.65$.*

These results support our hypothesis that some self-regulation falls outside the scope of self-control. All participants in the attention management task engaged in the same self-regulatory activity. The only difference was the amount of time — a quantitative proxy for effort — they spent regulating their attention. The data indicate that temporally short bursts of behavioral management (such as two minutes spent regulating attention) do not reduce self-control resources. Both control participants and those who had managed their attention for two minutes differed from participants who managed their attention for four or six minutes. Importantly, those who managed their attention for two minutes did not differ from those who had not managed their attention at all.

These results offer support for the notion that a requirement for self-control is the exertion of effort. Such a finding points to the need to carefully distinguish between self-regulation more generally and self-regulation that involves self-control. Importantly, this is a different outcome than what might have been predicted based on the current literature. That is, current wisdom might have led many to suspect that there is a dose-response (e.g., linear) relationship between initial self-regulation and later self-control. Our results, however, suggest that though this may be plausible after a certain point (i.e., we only investigated durations of up to six minutes), the amount of time participants engaged in overriding an impulse did not linearly predict degree of success at a subsequent act of self-control. Rather, our results suggest that a reduction in self-control resources may only occur after a certain threshold has been crossed.

4 General Discussion

The results of two experiments support our hypothesis that not all acts of self-regulation pass the threshold to be considered self-control. Specifically, we focused on the role of effort. In both studies, we worked from the assumption that acts of self-regulation require effort in order to lead to subsequent impairments in further self-controlling. In Study 1, we found that a qualitative representation of effort — the extent to which participants indicated that the task required effort — separated self-control from more general self-regulation. Participants who completed a task demonstrated impaired self-control on a subsequent task to the extent they perceived the task as requiring self-control. In Study 2, we found that a quantitative representation of effort — the length in time that participants completed the same inhibitory task — separated self-control from more general self-regulation. Participants who had to maintain effort on a task for at least four minutes differed from those who exerted no or little effort in their performance on a subsequent self-control task. Importantly, participants who had contributed effort to a lesser degree — who completed the task for two minutes — did not differ from those who exerted no effort. Across both studies, all participants in the experimental conditions engaged in self-regulation, either by pursuing a universally accepted standard of healthy eating or of managing their attention, yet only some participants used enough effort on the experimental task to require self-control above and beyond self-regulation.

*When not controlling for perceived difficulty, the omnibus effect of condition was not significant. However, regulating attention for four or six minutes continued to decrease performance compared to zero or two minutes, $F(1, 74) = 4.36$, $p = .04$, $d = 0.49$.

One potential alternative explanation to the present findings involves the rebound effect (e.g., Wegner, Schneider, Carter, & White, 1987). Although it is possible that participants may have had increased accessibility of vegetables or of unrelated words during measurement of the dependent variables, we think this is unlikely. The rebound effect involves the *content* of the suppression. In both of our tasks, participants were asked to suppress their behaviors, but these behaviors were not particularly content-rich, nor were they likely consistent across participants (e.g., not all participants would think the same things about vegetables).

In the present studies, we focused on effort on an initial task predicting whether that task required self-control. Although this approach offers the benefit of controlling for amount of consciousness (i.e., all participants who completed self-regulatory tasks were equally aware that they were completing them), an important step for future research will be to investigate whether varying the conscious awareness of engaging in self-regulation influences subsequent impairments in self-control. Preliminary evidence suggests that this will be a fruitful line of research because less conscious self-regulation leads to less impairment in subsequent behavioral management (Vohs, 2006). Additionally, future studies should consider additional factors that may influence the degree of effort required by self-regulation, including intensity of the demands on self-regulation and expertise on or experience with a specific task.

One potential alternative explanation to the present findings involves the rebound effect (e.g., Wegner, Schneider, Carter, & White, 1987). Although it is possible that participants may have had increased accessibility of vegetables or of unrelated words during measurement of the dependent variables, we think this is unlikely. First, the rebound effect has only been demonstrated with the *content* of thought suppression rather than the act of suppression itself. Second, the participants in Study 2 were equally exposed to the act of suppressing yet they still differed in their later performance. Finally, the particular content of suppression behaviors seems unlikely to have a rebound. People seem unlikely to focus on the fact that they are suppressing an urge while they eat vegetables, for instance,

Our research is particularly interesting given other research on automatic and routine behaviors. When people develop automatic methods of managing their behaviors, they may use fewer resources to complete tasks that might otherwise drain them (Vohs, 2006; Wood & Neal, 2007). We suspect that these automatized tasks may not surpass the self-control threshold. Combined with the evidence that we provide in our study, this might explain why people are able to manage so many behaviors in a small time frame (e.g., get out of bed, eat cereal instead of cookies for breakfast, brush their teeth, wear socially appropriate clothing, arrive at work on time, etc.). If these tasks are either habitual or occur quickly, they may not cross the self-control threshold, and subsequently, people may not experience resource depletion. Furthermore, future planning for behaviors, such as the type encouraged by implementation intentions, may reduce the amount of effort needed to manage behavior, and thereby improve efforts at self-regulation without impairing self-control. Our work is therefore consistent with past findings that implementation intentions can improve self-regulation (e.g., Webb & Sheeran, 2003) and suggests that a fruitful line of future research may be to examine the extent to which implementation intentions reduce the amount of effort needed to complete a task. Our work also highlights the potential for individual differences in ability in domains of self-regulation to explain why some people are influenced more strongly by specific situations than others. An exciting avenue for future research is identifying how successful individuals can be at predicting whether specific tasks or activities will require them to exert self-control.

Understanding that not all behavioral management will necessarily lead to later regulatory impairment is important given research suggesting that beliefs about how self-control affects capacity influence whether people demonstrate resource depletion effects (Job, Dweck, & Walton, 2010; Martijn, Tunbült, Merckelbach, Dreezens, & DeVries, 2002). Importantly, no prior work has investigated if people can accurately predict whether a task will require self-control. Although our work begins to answer this question (i.e., people who believed eating vegetables required self-control did evidence decreases in self-control), it is unclear whether this effect is due to perceptions about the task or the fact that the task actually required self-control. Future research should address whether and how people can distinguish behavioral management tasks that require self-control from those that do not.

Given the importance of self-control in daily life (Mischel, Shoda, & Peake, 1988; Tangney, Baumeister, & Boone, 2004), our findings have particular significance. People may be more successful at self-control if they can break longer demands on self-control resources into smaller periods of self-regulation. Furthermore, people may be able to experience the benefits of increased capacity for self-control after practicing at such small acts of self-regulation (Baumeister, Gailliot, DeWall, & Oaten, 2006; Gailliot, Plant, Butz, & Baumeister, 2007), thereby increasing not only their current level of success but also their future potential for success at exerting self-control.

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Highlights

- Completing a task depleted resources only when individuals considered it difficult.
- Completing a self-regulatory task depleted resources only when it required sustained effort.
- Self-control is a subset of self-regulation marked by effort and consciousness.

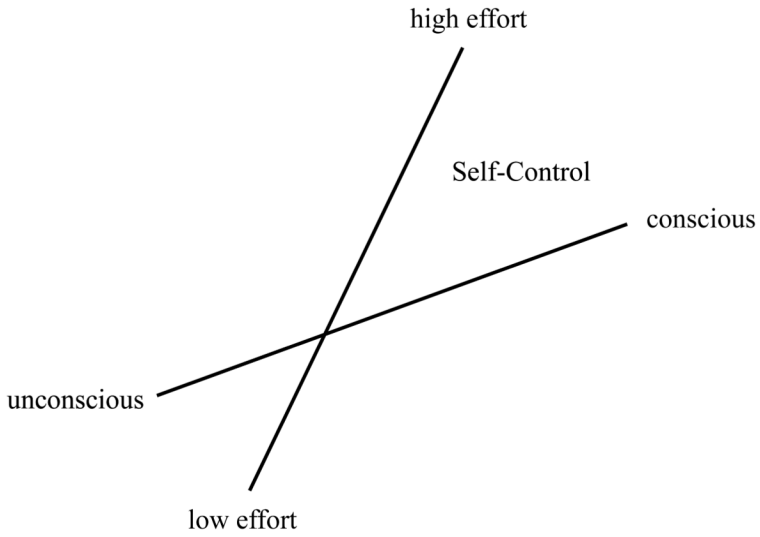

Figure 1.
Self-control in self-regulation space.

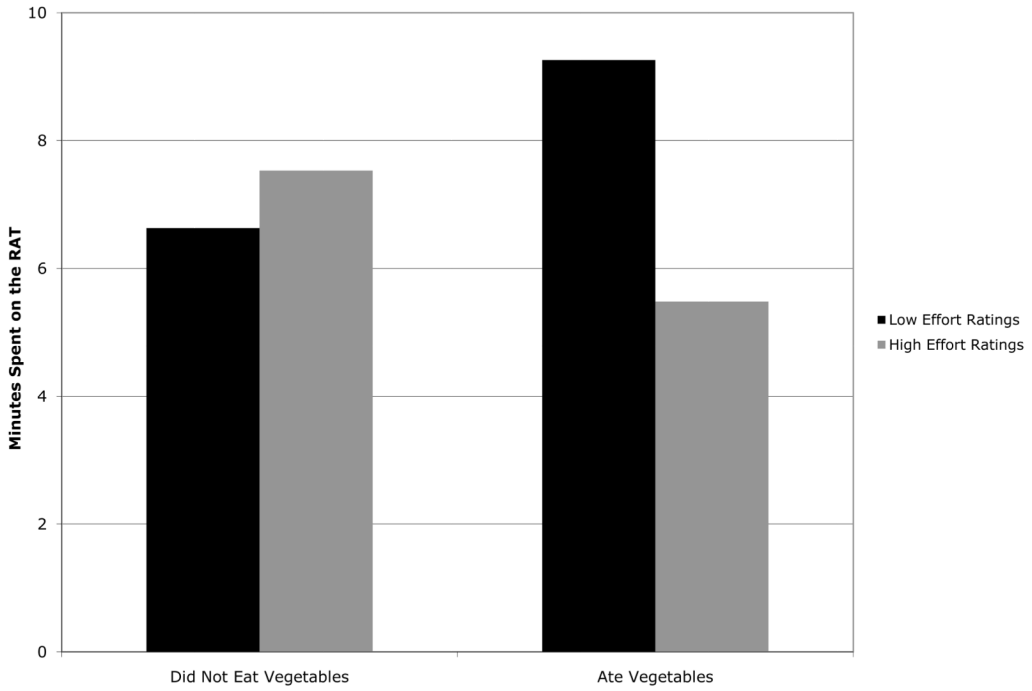

Figure 2.
The interaction between task difficulty rating (one standard deviation above and below the mean) and task completion in predicting subsequent persistence on the RAT.

Table 1

Effect of Length of Attention Management on Performance

Condition	*N*	*M (SD)*
No attention management	22	5.82 (2.59)$_a$
Short attention management	19	6.32 (3.02)$_a$
Medium attention management	19	4.89 (2.71)$_b$
Long attention management	18	4.72 (2.21)$_b$

Means with different subscripts are marginally significantly different from each other, $p < .09$.