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Ego Depletion and Boredom: Does Boredom Compromise Future Acts of Self-control?

John Lemay

EGO DEPLETION AND BOREDOM: DOES BOREDOM COMPROMISE FUTURE
ACTS OF SELF-CONTROL?

by

JOHN LEMAY

(Under the Direction of Amy A. Hackney)

ABSTRACT

This study explored how boredom might influence self-control when participants

believed that willpower is unlimited or limited. After completing one of two

questionnaires, which induced the belief that willpower is either unlimited or limited,

participants then completed one of three tasks. The tasks consisted of a non-ego

depleting self-control task, an ego-depleting self-control task, and a task shown to induce

boredom, with the nondepleting and depleting conditions having been replicated from

research by Job, Dweck, and Walton (2010). In the non-depleting condition, participants

completed a task that involved crossing out all occasions of the letter "e" found on two

pages of text (Baumeister, Bratslavsky, Muraven, & Tice, 1998). Then, participants had

their self-control measured by the Cognitive Estimation Test (CET; Bullard et al., 2004).

Lastly, they completed the Boredom Proneness Scale (Farmer & Sundberg, 1986) to

possibly establish a link between individuals' disposition towards boredom and their

ability to engage in self-control. It was hypothesized boredom would compromise the

ability to successfully engage in self-control more so than a previous act of self-control.

The results did not support our hypotheses. There was no main effect of willpower

condition, main effect of task type condition, or interaction effect between the two.

Nevertheless, an interaction between task type and gender was discovered, with females

scoring worse after the depleting task than after the boredom task. However, this result

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for females should be viewed with caution, given that this flexibility in data analysis has been shown to generate a false-positive rate as high as 12.6% in past research (Simmons, Nelson, & Simonsohn, 2011). These results encourage a holistic view of self-control in that self-control is likely influenced simultaneously by both individuals' motivations as well as a limited resource.

INDEX WORDS: Self-Control, Willpower, Ego Depletion, Boredom, Motivation

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by

JOHN LEMAY

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JOHN LEMAY

Major Professor: Amy A. Hackney
 Committee: Karen Z. Naufel
                  Janie Wilson

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CHAPTER 1

INTRODUCTION

"In the absence of willpower, the most complete collection of virtues and talents is wholly worthless." -Aleister Crowley

Self-control, or the ability to attain deliberative control over impulses (Ainslie, 1975), is a significant and recurrent theme in the everyday lives of people, has the ability to greatly influence one's quality of life, and harbors the potential for far-reaching consequences. A prominent idea within self-control research examines why, when there are choices between at least two things, people sometimes choose a quicker incentive. For example, research by Vohs, Baumeister, and Schmeichel (2012) demonstrated that individuals' capacity for self-control influenced their preference for a smaller amount of money in the present versus a larger amount in the near future. The fact that individuals may choose a quicker reward over one that will be given in the future is especially intriguing when the quicker incentive may be unequivocally worse than a different choice. Baumeister et al. (1998) reason that acts of self-control can affect a wide variety of behaviors and characteristics of a person's life such as: a person's diet, other health-related behaviors such as smoking, and even marital success. Perceptibly, if humans lacked any capacity to regulate themselves many difficulties would arise, both on an individual and societal level. Therefore, well-designed research on self-control is necessary. Research concentrated on self-control or, as it is sometimes referred to, self-regulation, has largely become associated with certain theoretical groups that are separated based on how the researcher views the functioning of self-control.

Purpose of the Study

Given the previous findings on self-control and how individuals' self-regulatory capacities may be manipulated, it is necessary to investigate further into other possible influences in order to provide more information as to specific ways in which self-control may be negatively impacted. The current research assessed if a lack of cognitive engagement or resource use adversely impacted a subsequent act of self-control. Specifically, this study sought to determine if a state of boredom lessened the probability of successfully engaging in an act of self-control in the immediate future and if so, that it reduces this chance more so than a previous act of self-control.

CHAPTER 2

REVIEW OF PAST LITERATURE ON SELF-CONTROL

Capacity Approaches to Self-Control

During the past decade, self-control has received a robust amount of attention in
the psychological literature. Much of the research in this area has concentrated on how
self-control, hypothesized to be dependent upon limited cognitive resources, is influenced
by this limited resource's expenditure. It is speculated that the presence of this cognitive
resource affords acts of self-control. The theory described as the strength model of self-
control holds that distribution of this resource occurs during acts of self-control and this
process can leave individuals in a state of *ego depletion* (Baumeister et al., 1998). This
theory holds that one's ability to implement self-control can be thought of as similar to
the actions of a muscle. That is, when one engages in acts of self-control it progressively
weakens this cognitive resource pool until it is emptied. This subsequent ego-depleted
state is a period in which individuals have particularly weakened self-regulation, much
like one would be after prolonged physical exertion. Across several experiments,
Baumeister and colleagues have demonstrated that ego depletion does negatively impact
further acts of self-control (Baumeister, 2002, 2003; Baumeister, Vohs, & Tice, 2007;
Muraven & Baumeister, 2000; Vohs et al., 2008).

In order to test the theory that the self's capacity to engage in self-control is
limited, Baumeister et al. (1998) originally completed a series of four studies. In the first,
participants were placed in a room that contained a plate of freshly baked chocolate chip
cookies and a plate of radishes. Participants were instructed to either eat the cookies or
the radishes. Then, participants completed a task involving problem solving. This task

was an unsolvable geometric tracing task and was made unsolvable in order for the researchers to measure how long the participants persevered and, in theory, regulated the urge to quit the task. As hypothesized, participants who were in the radish condition and therefore had to resist the urge to eat the cookies persisted significantly less longer at the problem-solving task. Participants in the radish eating condition additionally reported that fighting the urge to eat the cookies was substantial. It seems that resisting this urge to eat the cookies over the radishes imposed a mental cost that was later pronounced in resisting the urge to quit the problem-solving task.

Further experiments in the Baumeister et al. (1998) study show that a different kind of volitional action (specifically, making a responsible choice) (Experiment 2), suppressing one's emotional response (Experiment 3), and having to make an active choice to discontinue watching a boring movie (Experiment 4) are all impacted by a previous act of self-control. This series of studies supports the thesis that regulation of the self draws from a limited pool of cognitive resources and that various cognitive actions draw from this same pool. The studies demonstrate this proposition by showing that the capacity for subsequent operational volition is weakened by a previous act of self-regulation.

Additional exploration of self-control has attempted to substantiate the capacity-based approach and to extend the findings by demonstrating what this limited resource may be. Research conducted by Gailliot and Baumeister (2007) holds that controlled and effortful processes, such as acts of self-control, rely on the availability of glucose. Because glucose is vital for brain functioning and Benton, Owens, and Parker (as cited in Gailliot et al., 2007) demonstrated that low glucose is associated with impaired

performance on effortful cognitive tasks, self-control could be susceptible to fluctuations

in glucose. Gailliot and colleagues hypothesized that effortful processes would cause

significant fluctuations in glucose and the lowered levels of glucose would cause

decrements in self-control. Across several studies, the authors found support for their

hypothesis and revealed that acts of self-control reduced participants' blood glucose

levels, that this lower glucose level resulted in poorer performance on a subsequent self-

control task, and that consuming glucose eliminated this detriment in self-control

performance (Gailliot et al., 2007). Not only do these results demonstrate that acts of

self-control possibly rely on a common, finite resource they also suggest that this

resource is glucose.

Despite these intriguing conclusions, more recent research has been conducted

that questions the findings of Gailliot et al. (2007). Molden et al. (2012) reevaluated the

findings of previous work by Gailliot et al. (2007) and found that carbohydrate

metabolization was not necessary for sustaining self-control. Over the course of four

experiments, Molden et al. (2012) found that exerting greater self-control did not lead to

greater glucose consumption. The researchers also demonstrated that carbohydrates'

effects on both physical and cognitive self-control are not necessarily related to their

metabolic consumption. That is, simply rinsing, and not ingesting, a carbohydrate

solution results in significantly higher self-control than rinsing with a non-carbohydrate

solution. Finally, Molden et al. (2012) established that rinsing with carbohydrates does

not release an endogenous energy store.

These results detract from the findings of the capacity approach or energy model

of self-control and strengthen the view that acts of self-control can be largely influenced

by one's motivations. Specifically, Molden et al. (2012) states, "Although engaging in self-control often leaves people less willing to subsequently exert further self-control, it does not leave them without the energy to do so when properly motivated" (p. 7). In other words, despite the fact that one's ability to self-regulate can be negatively impacted by previous self-control engagement, this deterioration is better accounted for and explained by insufficiencies in motivation rather than a decreased energy source.

Cognitive Approaches to Self-Control

Another approach aimed at revealing why individuals capacity for self-control fails after repeated acts of self-control is one that focuses on individuals' beliefs and motivations. This research has approached self-control by looking at subjectively based cognitions in order to assess the underlying mechanisms that influence self-control. Under this approach to self-control, various studies suggest that the ability to engage in self-control is viewed as a function of beliefs, judgments, expectations, attitudes, and intentions (Hagger, Wood, Stiff, & Chatzisarantis, 2010). Within this theoretical canon, Ajzen and Fishbein (1980) have established the theory of reasoned action. This theory hypothesizes that volitional behavior is directly determined by an individual's intent to execute the behavior. In addition, one's attitude (i.e., the positive or negative evaluation of actually performing the behavior) and subjective norms (i.e., perceived social pressure to perform or not perform the behavior) influences this intent (Bagozzi, 1992). More specifically, this approach holds that acts of self-control, much like any other behavior, are solely under the control of the individual and are not restricted by a finite cognitive resource. Instead of running out of a limited "energy" that controls acts of volition and self-control, this approach holds that behaviors are influenced solely by individuals' intents, attitudes,

and beliefs. Fishbein and Stasson (1990) state that, "When one is asked about performing a behavior that is under one's own volitional control, one typically believes that one can, and will, do whatever one intends or tries to do" (p. 177).

Ajzen (1991; Ajzen & Madden, 1986) subsequently built upon the theory of reasoned action as it only addresses behaviors under volitional control. However, the theory of planned behavior extends the theory of reasoned action by attempting to also explain behaviors that are not entirely under volitional control. Although the theory of reasoned action posits that behavior is ultimately regulated by intentions, which are determined by an individual's attitudes and perceived social pressures, the theory of planned behavior adds an additional component in order to account for behaviors that might not be completely under the control of the individual. This new component, perceived behavioral control, is the person's belief as to how easy or difficult performance of the behavior is likely to be (Ajzen and Madden, 1986). This theory is of importance to self-control research because many behaviors are exposed to and impacted by both internal and external factors. Bagozzi (1992) reports that within this theory, perceived behavioral control not only influences our intentions that, in turn, influence behavior, but perceived behavioral control has the capacity to directly influence an individual's behavior. In an article that reviews this theory, Ajzen (1991) postulates that successful acts of self-control are predominantly contingent on both the intentions (motivations) and perceptions of individuals. The focus of Ajzen's (1991) statement is on the perception of one's ability to self-regulate rather than on currently available resources that may dictate the success or failure of engaging in self-control behavior.

Self-Control as an Unlimited Resource

Research by Job et al. (2010) follows the cognitive approach to self-control and does this by emphasizing individuals' beliefs about their intentions and ability to engage these intentions. The results of this research appears to weaken the capacity based approaches such as the strength model set forth by Baumeister et al. (1998). In one study included in the article, the authors revealed that, under certain circumstances, a state of ego depletion might be avoided altogether (Job et al., 2010). Specifically, in order to further determine the mechanisms involved in self-control, Job et al. (2010) sought to uncover if individual's implicit beliefs about self-control moderated the effects of ego depletion.

In their first study, participants completed six items that assessed their implicit theories about willpower. After this, participants completed what they were told was a "stimulus detection task." This task, adopted from previous research (Baumeister et al., 1998; Tice et al., 2007; Wheeler, Briñol, & Hermann, 2007), manipulated a state of ego depletion by having participants establish a pattern of behavior and then attempting to break free of the learned routine. Directly after conclusion of the ego depletion task participants completed a Stroop task. This task is a standard dependent measure of ego depletion that has been used in numerous studies of self-control (Gailliot & Baumeister, 2007; Inzlicht, McKay, & Aronson, 2006; Webb & Sheeran, 2003). Participants were initially randomly assigned to complete either the initial ego depletion manipulation in its entirety or to another group, where they only completed the part in which they established the behavior, but did not attempt to undo this behavior. This random assignment assured that participants had to either complete acts of self-control or did not, respectively. If individuals had previously completed acts of self-control, their

consequent performance on a dependent measure of self-control (Stroop task) was compromised.

The finding that a previous act of self-control compromises subsequent self-control is consistent with the strength model. However, researchers verified that this finding was moderated by individual's implicit beliefs about self-control. The main effect of ego depletion condition was qualified by an interaction with individual's implicit theories (Job et al., 2010). When participants held a non-limited resource theory belief, they showed no difference in performance on the Stroop task between the depleting and non-depleting conditions. This finding runs counter to the fundamental argument that preceding acts of self-control will compromise successive acts of self-control because individuals' who believed willpower is unlimited showed no signs of ego depletion after having engaged in an act of self-control.

Because the researchers used correlational methods in the first experiment to establish that the effects of ego depletion may be avoided, Job et al. (2010) next used experimental manipulation of implicit theories involving willpower in order to test if there was a causal influence on ego depletion. In order to achieve this causation, participants were given one of two biased questionnaires that were used to foster either the belief that willpower is limited (e.g., "Working on a strenuous mental task can make you feel tired such that you need a break before accomplishing a new task") or that it is unlimited (e.g., "Sometimes, working on a strenuous mental task can make you feel energized for further challenging activities") (Job et al., 2010). The majority of the second experiment was the same as the first study, except for the initial phase. During the first phase participants completed the biased questionnaire and then engaged in the same

ego depletion task and Stroop task as in the previous experiment. As hypothesized, only individuals who embraced a limited resource theory concerning willpower were influenced by a previous act of self-control. Conversely, individuals who adopted the position that willpower is unlimited did not show an ego depletion effect.

The finding that the main effect of ego depletion was qualified by an interaction with willpower beliefs confirms the results from study one that implicit theories about willpower do moderate the effect of ego depletion on individuals. Additionally, the results from study 2 demonstrate the fact that individuals' beliefs in willpower may moderate ego depletion is causal in nature. As stated earlier, the findings of Job and colleagues appear to additionally weaken the argument first proposed by Baumeister et al. (1998) not only correlationally (study 1), but through the use of causal methods as well (study 2). Hence, at least at normal levels of functioning, such as when individuals' motivations or performances are not under extreme constraints, an individual's capacity to self-regulate is contingent upon their personal beliefs about their ability to control their own behavior. These experimental findings bolster the theoretical approach to self-control that focuses on the cognitive underpinnings involved in acts of self-regulatory behavior.

In the analysis of study 2, Job et al. (2010) reported an unexpected result. Participants who had been induced to hold an unlimited resource theory and who completed a non-depleting self-control task actually performed worse on a subsequent measure of self-control than did participants who had simply performed a depleting self-control task beforehand. It was speculated by the authors that participants in the unlimited resource theory condition whom performed worse (those in the non-depleting

self-control manipulation) may have had their self-control compromised by the experience of boredom. However, Job et al. (2010) did not verify this speculation with further investigation.

Boredom

Boredom is an affective episode that most people can likely identify with; some individuals may even find themselves commonly experiencing this state (Van Tilburg & Igou, 2011). The state of boredom relates to a central human need for meaningful and challenging activities and it has the capability to influence individual's thoughts, feelings, motivations and actions (Van Tilburg & Igou, 2011). Upon conducting a database search for the term "boredom," it was evident that most research involving boredom focuses on tedium in relation to the workplace, educational settings, or to the extent in which individuals may become bored, which is described in the literature as "boredom proneness" (Farmer & Sundberg, 1986).

Certain research has focused on how boredom is a distinct experience that is unique from other emotional states. Specifically, Van Tilburg and Igou (2011) induced a state of boredom in their participants in order to determine if boredom is experientially distinct in its content from other undesirable affective experiences. They discovered in study one of their research that boredom is, in fact, experientially distinct from other negative effects such as sadness, frustration, and anger. Van Tilburg and Igou (2011) state that boredom potentially makes people feel unchallenged. Boredom can also cause individuals to believe that their actions, according to a specific situation, are meaningless and hold no value. Moreover, the research article addresses how boredom is closely associated with boredom proneness (study 2), with current experience of boredom (study

3) and that boredom is influenced by the individual's environment (study 4). For the purposes of the current research, study four is of vital importance.

In order to see if a state of boredom actually influences an individual to frame a situation as boring and therefore experience boredom affectively, Van Tilburg and Igou (2011) manipulated boredom in order to determine if the manipulation influenced the individuals' current state. This finding would allow for conclusions to be drawn about situational factors involved in creating a situation that is framed as boring. Additionally, it would methodically demonstrate that boredom is a state that can be experimentally induced and manipulated with certain reliability. Following the manipulation of boredom, participants answered several questions aimed at determining how the participants interpreted the situation (e.g., "To what extent did the task you just completed make you feel bored?") In addition, participants were asked questions about the experience of boredom in general. These included questions such as: ''To what extent do you feel restless and unchallenged at the same time?'' ''To what extent do you wish to turn to a more meaningful activity?'' ''To what extent do you want to do something more meaningful?'' and ''To what extent do you want to be challenged?'' Furthermore, to test and see if boredom is a distinct emotional state from sadness, anger, and frustration, participants rated the extent to which they currently felt each of these emotions, including boredom.

The analysis specified that participants in the high boredom condition (i.e., copying ten references) framed the situation as more boring than did the participants in the low boredom condition (e.g., copying two references) (Van Tilburg & Igou, 2011). This result demonstrates that the task successfully prompted an experiential state of

boredom in the participants. It further corroborates the findings of study one that boredom is a distinct emotional state from certain other affective experiences and that an integral part of the experience of boredom is a lack of motivation that is likely due to absence of interest in the task at hand. Pursuit of ambitions is a large part of human life and can greatly influence the quality of life an individual experiences. Therefore, motivation is an integral part of the human experience and deserves adequate attention.

Research has looked at motivation and how it relates to self-control. Research conducted by Schmeichel, Harmon-Jones, and Harmon-Jones (2010) argues that failures of self-control that have followed prior efforts at self-control (i.e. ego depletion) could at least partially be explained by individuals' increase in approach motivation. In other words, Schmeichel et al. (2010) found that prior acts of self-control acted to increase impulse strength, or individual's desire to act, in a word, their motivation. At the very least, the current strength model of self-control only accounts for one side of the self-control battle, decreased self-control strength. Schmeichel et al. (2010) hold that this model must also take into account the other side, impulse strength. Stated differently, the strength model as it currently stands does not account for individuals' motivations, which have been shown to be an influential factor in determining how well individuals are able to engage in successive acts of self-control.   Additionally, an increased incentive for one's performance has been shown to reverse the effects of ego depletion (Muraven & Slessareva, 2003; Tice, Baumeister, Shmueli, & Muraven, 2007). This reversal of ego depletion demonstrates the importance of the role of motivation and interest in determining the likelihood of successfully committing to an act of self-regulation.

Motivation, Interest and Self-Control

The pursuit of goals is an important feature of individuals' lives. If and how these ambitions and aspirations are attained are influenced by a number of aspects. Deci and Ryan (2000) hypothesize that the motivation for individuals to adhere to their goals is fueled by psychological needs for competence, autonomy, and relatedness. The authors add to this assumption by proposing that when people are intrinsically motivated to put time and energy towards the pursuit of a certain goal, that engagement in the activity is the actual goal. For an example along these lines, the individual who wishes to get in better shape will find that exercising, or going to the gym, or engaging in other healthy behaviors such as these is the definite goal. Put differently, the goal is the behavior that allows the individual to attain the desired final outcome. Deci and Ryan (2000) additionally reason that this intrinsic motivation involves active engagement in tasks that individuals find interesting. According to Deci and Ryan (2000), a task is interesting to the extent that individuals find the task satisfying, particularly, if the task satiates the psychological needs for competence and autonomy.

Sansone and Smith (2000) offer another perspective to how task interest may influence motivation and, in turn, self-regulatory behaviors. They posit that instead of focusing on the enablement of a set of psychological needs, the level of interest in carrying out a behavior will be determined by the degree to which the environment expedites or inhibits the individual's pursuit of goals. This perspective corroborates Ajzen's (1991) theory of planned behavior (i.e., the combined influence of subjective norms and perceived behavioral control on an individual's intention and, ultimately, subsequent behavior) in that both hold that the pursuit of a goal and the self-control

needed to adhere to the pursuit are affected by environmental influences, or at the very

least, the perceptions of these influences.

In order to experimentally evaluate the influence motivation might have on self-

regulatory behavior, Vohs, Baumeister, and Schmeichel (2012) measured participants'

ability to control their behavior after either manipulating participants to have high levels

of motivation or neutral levels of motivation. The researchers manipulated motivation by

either telling the participants that the research they were a part of could have a significant

influence on science's understanding of mental diseases and that this would aid consumer

welfare, happiness, and health (high motivation condition) or not telling the participants

anything about the special importance of the study (neutral motivation condition). They

demonstrated that subjective motivation could overcome the effects of self-control

depletion, at least to a certain degree (thereby substantiating the cognitive-based

theoretical approach, if only under certain circumstances). More specifically, the effects

of motivation were most effective when participants had previously completed only two

self-control tasks. Subjective motivation lost its influence when participants were

severely depleted (i.e., they had previously completed four self-control tasks). By

analogy, the authors explained this conclusion as akin to physical strength such that a

tired person might perform at a high level when bolstered by subjective motivation or

self-confidence, but severe exhaustion would take its toll regardless of such factors (Vohs

et al., 2012). Even if only at minor levels of self-regulation, motivation appears to be

able to support individuals in self-regulating their actions and help in the pursuit of

personal goals.

From a review of the relevant literature, it could be suggested that boredom is a result of a lack of motivation and interest in individuals' current environment. Research has shown that manipulating individuals' levels of motivation by increasing their motivation can reduce the occurrence of ego depletion, if only to a certain extent (i.e., when self-control requirements are not extremely taxing), it stands to reason that the reverse of this finding could be true. That is, decreasing individuals' motivation by way of boredom may have the effect of diminishing individuals' ability to successfully engage in self-control. It could be then shown that a lack of motivation and interest has the ability to significantly impair individuals' ability to persist towards certain goals. Boredom and motivation and interest appear to be two sides that must be balanced in order for individuals to successfully regulate their behavior.

Most research pertaining to self-control, however, has focused on the roles that motivation and interest play in influencing this behavioral occurrence and have left boredom and its role in self-control unexplored. In addition, these findings would lend credence to the role of the subjective cognitive aspects' such as beliefs, judgments, expectations, attitudes, and intentions have on self-control and would support findings that argue that self-control is a function of both individuals' beliefs, motivations, interests as well as a limited resource such as glucose.

CHAPTER 3

SUMMARY AND OVERVIEW OF CURRENT STUDY

The current literature on self-control addresses the underlying mechanisms such actions (Baumeister & Vohs, 2007; Schmeichel, Harmon-Jones, Harmon-Jones, 2010;Vohs et al., 2012) Nevertheless, no existing research has directly tested the contrasting side, namely, how boredom could influence subsequent attempts at self-regulation. Past research has demonstrated that activities that are evaluated as lacking interest and motivational value have a higher chance of being appraised as boring (Van Tilburg & Igou, 2011). Accordingly, as research has suggested, motivation plays an invigorating role in regards to increasing one's self-control (Baumeister & Vohs, 2007). Therefore, it logically follows that boredom may play a reverse function by acting to lessen individuals' ability to engage in self-control by decreasing their motivation to continue. Thus far, this has yet to be verified empirically.

In an attempt to confirm the influence that subjective experience has on the subsequent ability to successfully engage in self-regulatory behavior, the current study sought to confirm the findings of Job et al. (2010) and, in addition, to experimentally test the assumption that boredom may undermine a subsequent act of self-control. These goals were attempted by replicating the non-limited resource theory condition of study two in the Job et al. (2010) article and adding a third condition in which boredom was experimentally-induced using a method that has been shown by previous research to reliably induce boredom.

The Boredom Proneness Scale (Farmer & Sundberg, 1987), which measures individuals' tendency to experience boredom, would allow for supplemental conclusions

to be drawn about the role boredom may play in influencing an individual's ability to self-regulate their behavior. It was expected to allow us to demonstrate a predictive relationship between participants' tendency to experience boredom and their ability to self-regulate. That is, the logic was if boredom proneness was found to moderate the relationship between the nondepleting task, the depleting task, or the boredom task and the subsequent self-control task, this could allude to the potential role more general, behaviorally-based traits (such as the tendency to experience boredom) play in determining one's ability to self-regulate, in addition to how an individual's current state impacts one's ability to execute self-control.

Hypotheses

Broadly stated, it was hypothesized that the experience of boredom would compromise the ability to self-regulate one's subsequent behavior in comparison to no experience of boredom. Below, the moderating effects of willpower beliefs are delineated.

For the individual's randomly assigned to the nondepleting and depleting task conditions, it was hypothesized that we would find results similar to Job et al. (2010). It was expected that, for those in the nonlimited-resource theory, those who completed the nondepleting task would perform worse than those who completed the depleting self-control task prior to a measure of self-control ability. For the individuals who were randomly assigned to the limited-resource theory, it was expected that, following typical ego-depletion patterns, those who completed the nondepleting task would perform significantly better than those who completed a prior depleting self-control task.

For the current study's added condition of boredom, the results were hypothesized to strengthen the findings of the speculation by Job et al. (2010) that individuals who believe willpower is unlimited may be depleted by boredom rather than prior acts of self-control. We expected to do this by establishing, through the use of a task that has been shown to reliably induce boredom, that boredom could impair subsequent self-control. See Appendix A. For example, since individuals who believe willpower is unlimited, cannot be depleted by an act of self-control, perhaps they can be depleted by boredom through boredom's exhaustion of their motivation.

These findings would allow us to replicate and extend the findings of Job et al. (2010) and support the view of how individuals' beliefs and motivations can influence self-control and that it is not simply just a matter of depleting a limited resource. Finally, in an attempt to demonstrate more trait-based influences on self-control, it was predicted that participants' tendency to experience boredom would have an influence on the self-control task such that those who scored higher on boredom proneness would perform worse on the self-control task.

CHAPTER 4

Method

Participants

One hundred forty Georgia Southern University undergraduate students (89 female, 51 male) participated in the experiment. Participants received extra class credit for their participation or participated as part of a course requirement.

Stimuli

Biased Non-limited & Limited Theories of Willpower Questionnaires. These questionnaires were used to induce agreement with either the belief that willpower is an unlimited or limited resource from which individual's may draw in order to accomplish acts of self-control. Some of the items in the questionnaire that are aimed at inducing the belief that willpower is nonlimited include: "Sometimes, it can be very inspiring to think over a matter with great concentration" and "It can be energizing to be completely focused on a demanding mental activity, so that you are able to remain concentrated for a while," and examples of the limited questionnaire items include: "When you think over a matter with great concentration, it can be sometimes tiring" and "Working on a strenuous mental task can make you feel tired much so that you need a break before accomplishing a new task" (Job et al., 2010). Individuals responded to the questionnaire using a 6-point Likert scale format, ranging from (1) strongly agree to (6) strongly disagree. Due to the nature of the questionnaire, in which questions are designed to foster agreement, no items are reverse-scored. See Appendices B and C.

Boredom task. This task manipulated the experience of boredom by having participants copy ten references taken from a Wikipedia entry on concrete (e.g.,

Kosmatka, S.H., Panarese, W.C. (1988). *Design and control of concrete mixtures.* Skokie, IL). See Appendix D.

 Self-Control Tasks. Self-control was manipulated via the same method as used in previous self-control research (Baumeister et al., 1998; Vohs et al., 2012) and involved two versions (non-depleting or depleting) of the previously described "stimulus detection task." See Appendix E.

Design

 A 2 (Non-Limited or Limited Willpower Questionnaire) x 3 (Non-Depleting Self-Control Task or Depleting Self-Control Task or Boredom Task) design was used in this study.

Measures

 Self-Control. The measurement of participants' self-control involved the Cognitive Estimation Test (CET; Bullard et al., 2004). This test involves the use of complex cognitive functions including activation and retrieval of semantic memories, planning, working memory, mental control, self-monitoring, and self-correction. Shallice and Evans (1978) state that the cognitive estimation involves attempts to provide reasonable answers to questions for which pertinent knowledge, but not the specific answer, is available to the subject (as cited in Bullard et al., 2004). The test included 20 items that involve five estimation questions from four categories: time/duration ("How long does it take to iron a shirt?"), quantity ("How many seeds are there in a watermelon?"), weight ("How much does a telephone weigh?"), and distance ("How long is a giraffe's neck?") (Bullard et al., 2004).See Appendix F.

Both Schmeichel et al. (2003) and Vohs et al. (2012) have applied this test as a dependent measure of self-control and found that results corroborate past research involving individuals"…unable to obtain an appropriate strategy for answering a question or who has inadequate error-checking is more likely to produce a very incorrect response" (Shallice & Evans, 1978, p. 3). Analysis by Schmeichel et al. (2003) have validated the Cognitive Estimation Test for use as a dependent measure of self-control by finding that more participants provided very inappropriate answers in their emotion regulation condition (which required self-control) than in their no-regulation condition, $t(35) = 2.27$, $p = .03$, $d = 0.75$.

Boredom Proneness Scale. Developed by Farmer and Sundberg (1986), this scale evaluated the extent to which individuals were inclined to experience boredom. This includes 27 items that are answered in a 7-point Likert format, with higher scores denoting a higher propensity to experience boredom. Tests for reliability of this scale found that the internal consistency using a sample of 233 college undergraduates. It was found to have satisfactory internal consistency ($\alpha = .79$). Burisch (1984) cites examples demonstrating that self-ratings are often quite valid measures of trait constructs (as cited in Farmer & Sundberg, 1986). In order to determine the validity of the Boredom Proneness Scale Farmer and Sundberg (1986) presented the scale to 222 college undergraduates and found that the BPS yielded a strong relationship with a composite self-rating score ($r = .67$, p< .001), which indicates that one's willingness to label oneself as bored in personal activities bear a close association with the BPS. Additionally, the Cronbach's alpha obtained for the current sample was also satisfactory ($\alpha = .78$). Eighteen of the items are scored to directly reflect high boredom proneness (e.g., "Time

always seems to be passing slowly") and ten items are reverse scored (e.g., "I find it easy to entertain myself") (LaPera, 2011).See Appendix G.

Manipulation Check. Participants in each condition were asked for their causal assessment of the prior self-control or boredom manipulation: ''To what extent did the task you just completed make you feel bored?'' on a seven-point interval scale ranging from one (not at all) to seven (very much).

Demographics Questionnaire. Participants completed a questionnaire that included items that allowed for the collection of data such as age, race, and class.

Procedure

Initially participants were randomly assigned to complete either the biased nonlimited resource or limited resource theory questionnaire, which were both used in research employed by Job et al. (2010). These questionnaires have been shown to reliably foster agreement with the theory they suggest (i.e., nonlimited resource theory, $t(21) = -4.78$, $p < .01$ and limited resource theory, $t(23) = -8.74$, p $<.01$). Therefore, these questionnaires were used in the current study to induce either the belief that willpower is an unlimited or limited resource. This allowed for the replication and extension of the findings of Job et al. (2010) and for definitive conclusions to be drawn about whether the non-depleting self-control task in their nonlimited resource theory condition can actually be conceived as boring and whether boredom impaired subsequent self-regulation.

The second phase involved participants completing a stimulus detection task typically used to compromise subsequent self-control. In one condition, participants completed a non-depleting version designed to not require self-control. In detail,

participants were first instructed to cross out every letter *e* on a whole page of meaningless typewritten text. Following this, they completed a second page in which they must again cross out every instance of the letter *e.* Participants were given approximately five minutes to complete each page. Similar to Job et al. (2010), we postulated that it was possible that this task would induce boredom, but to a lesser degree than the forthright boredom task.

In the next condition participants crossed out every letter *e* during the first sheet that was presented to them just as the participants in the previous condition did, but for the second page, participants only crossed out each *e* if certain rules were met (e.g., cross out every letter *e* except in cases where a vowel appeared immediately adjacent or only one letter removed from the *e*). Because the first page of text established a behavioral pattern of crossing out every instance of the letter *e*, the second page required continual acts of self-control in order to not mistakenly cross out an *e* if conditions dictated that the letter *e* not be crossed out. Therefore, this task required self-control and is a depleting task characteristically used in dual-task paradigm self-control research (Baumeister et al, 1998; Hagger et al., 2010; Vohs et al, 2012). To further ensure this task required self-control the pages were lightened in order to make them harder to read and require further attention as has been employed in past research (Baumeister et al., 1998).

In an attempt to extend the findings of the investigation completed by Job et al. (2010), a third condition was implemented that did not involve a self-control task but incorporated a task that has been previously used in research to induce a state of boredom (Van Tilburg and Igou, 2011). In this condition the participants copied ten references

from a Wikipedia entry on concrete as initially performed in the Van Tilburg and Igou (2011) study.

Subsequently, participants in each condition then completed the dependent measure of self-control. This involved participants completing the Cognitive Estimation Test (CET). As previously mentioned, Schmeichel et al. (2003) employed this test to measure self-control in participants and found that decision makers' ability to reasonably form answers to objectively vague questions relies on self-control resources. This measure requires active and logical thinking in order to produce plausible estimates (Vohs et al., 2012). This allowed us to determine how participants in each condition were influenced by the non-depleting stimulus detection task, the depleting stimulus detection task, and the boredom-inducing task. Finally, participants in each condition completed the Boredom Proneness Scale (BPS) and a demographics questionnaire (Farmer & Sundberg, 1986).

CHAPTER 5

RESULTS

Preliminary Analyses

Preliminary analysis of the CET responses found that at least 40% of participants

scored within the acceptable range (between the 25th-75th percentiles) on each question;

the one exception was CET question number 16, "How long is a giraffe's neck?" Only

19.6% of participants scored within the acceptable range (between the 25th-75th

percentiles) on this question. Due to the difficulty of this question for the large majority

of the participants, this question was removed from the calculation of participants' CET

scores. One participant was dropped from the study due to giving purposely-erroneous

answers, leaving data from 139 participants for analysis.

Manipulation Checks

Following Job et al. (2010) and Vohs et al. (2012), we calculated a manipulation

check for the willpower-biased questionnaires by comparing the mean in each condition

against each questionnaire's scale midpoint of 3.5. One-sample t tests demonstrated that

participants in both the non-limited and limited willpower theory conditions approved the

scale items more so than the midpoint: non-limited ($M = 2.65$, $SD = 0.68$), $t(69) = -10.5$,

$p < .01$; limited ($M = 2.36$, $SD = 0.70$), $t(68) = -13.6$, $p < .01$. In other words,

participants agreed with the theory of willpower that was consistent with the bias for the

questionnaire they received. Consequently, the biased questionnaires were successful in

fostering agreement to their respective theories.

Additionally, a manipulation check was conducted to ensure that each of the task

conditions (non-depleting, depleting, & boredom) was perceived differently in terms of

the amount of boredom they elicited. Similar to research conducted by Van Tilburg and

Igou (2011), after each participant completed their corresponding task we asked them for

their assessment of the task in terms of how boring they perceived it to be. The item

measuring perceived boredom of the task was subjected as a dependent variable to a one-

way ANCOVA with task condition as the independent variable and boredom proneness

as the covariate, $F(2, 135) = 5.24$, $p = 01$. Pairwise comparisons indicated that

participants perceived the boredom condition as more boring ($M = 5.21$, $SD = 1.49$) than

the depleting self-control task ($M = 4.40$, $SD = 1.80$), p = .01, and the non-depleting self-

control task ($M = 4.95$, $SD = 1.51$) was perceived as more boring than the depleting self-

control task, $p = .02$.   There were no differences, however, in perceived boredom

between the boredom and nondepleting conditions (p = .64). In order to not arouse

suspicion as to the true purpose of the manipulations, the check was conducted at the end

of the procedure, at the risk of participants forgetting the manipulation's strength.

Hypotheses Testing

Following prior research by Schmeichel et al. (2003) and Vohs et al. (2012),

participants' scores on the measure of self-control (CET) were calculated 3 different

ways in order to allow for maximum sensitivity. First, scores on the CET1 were

calculated such that responses that fell between the 25th and 75th percentiles of the

response range were categorized as correct and received a score of 1 and responses that

fell outside this range received a score of 0. Therefore, higher scores using this method

reflect better performance.

The second scoring method for CET2 that was utilized gave 2 points to responses

that fell within the 25th and 75th percentiles of the response range, 1 point to the responses

that fell in the response range of 90% of the sample but not within the 25th and 75th percentiles, and 0 points to all other responses. Therefore, this scoring method allowed for more sensitivity regarding how participants scored.

Finally, the third method for CET3 utilized a chi-square analysis to analyze the prevalence of participants who gave very inappropriate responses. Using this analysis, participants were categorized as having given one or more very inappropriate (0 point) answers versus none of these.

The primary analysis that was conducted to test the effects of task type and willpower belief on subsequent ability to self-regulate consisted of a series of 2 (nonlimited vs. limited resource theory) x 3 (nondepleting vs. depleting vs. boredom tasks) ANCOVA. This design employed participants' CET scores as the dependent measure and theory type and task type as independent variables. Furthermore, boredom proneness was entered as a covariate in order to control its effects on CET performance.

CET1 scores ranged from 4 to 14 in this sample. There was no significant main effect of willpower condition on CET1 scores, with participants in the willpower limited condition ($M = 10.2$, $SD = 2.30$), scoring similarly as participants in the unlimited willpower condition, ($M = 9.49$, $SD = 2.39$), $F(1,132) = 3.31$, $p = .071$. Neither the main effect of task type, $F(2, 132) = .078$, $p = .925$, nor the interaction between task type and willpower, $F(2, 132) = .850$, $p = .430$ were statistically significant. See Appendix H for all cell means and standard deviations for CET1.

CET2 scores ranged from 12 to 33 in this sample. There was no significant main effect of willpower condition on CET2, with participants in the limited willpower condition ($M = 25.04$, $SD = 4.22$) scoring similarly as participants in the unlimited

willpower condition ($M = 24.51$, $SD = 3.84$), $F(1,132) = .628$, $p = .430$. Neither the main

effect of task type, $F(2, 132) = .50$, $p = .61$, nor the interaction between task type and

willpower, $F(2, 132) = .078$, $p = .93$ were statistically significant. See Appendix I for all

cell means and standard deviations for CET2.

Scoring method 3 could not be used in this sample. Results showed that all but

one participant in the current sample answered at least one of the CET questions in a very

inappropriate way.

Secondary Analyses

Since there was no variability in CET scores, we tested participant gender to see if

any other variables affected the CET. Therefore, the role of gender on CET scores was

considered. A 2 (gender) X 2 (nonlimited vs. limited resource theory) x 3 (nondepleting

vs. depleting vs. boredom tasks) ANCOVA was conducted. This design employed

participants' CET scores as the dependent measure and theory type and task type as

independent variables. Furthermore, boredom proneness was again entered as a covariate

in order to control its effects on CET performance. However, it is realized that this

flexibility in data analysis has the potential to increase the false-positive rate (Simmons et

al., 2011).

There was no significant interaction between willpower condition and gender

found for CET1, with participants in the limited willpower condition ($M = 10.18$, $SD = 2.30$) scoring similarly as participants in the unlimited willpower condition ($M = 9.48$, $SD = 2.39$), $F(2,132) = 1.81$, $p = .181$. Additionally, there was no significant interaction

between task type and gender found for CET1, with participants in the nondepleting task

(M = 10.02, SD = 2.65), the depleting task (M = 9.68, SD = 2.18), and the boredom task

(M = 9.83, SD = 2.32) scoring similarly, $F(2,132)$ = 1.58, p = .209.

There was a significant task condition by gender interaction found on CET2

$F(2,132)$ = 3.52, p = .032. Follow up simple effects testing revealed that females in the

depleting condition had lower CET2 scores (M = 23.36; SD = 4.18) than females in the

nondepleting condition (M = 25.34; SD = 3.18), p = .048, and boredom conditions (M =

25.94 SD = 4.16), p = .02. Males did not differ in their CET2 scores by task condition,

all p's > .05.

CHAPTER 6

DISCUSSION

It was hypothesized that the experience of boredom would compromise the ability to self-regulate one's subsequent behavior in comparison to no experience of boredom within the other two conditions of nondepleting and depleting self-control tasks. Additionally, it was also hypothesized that beliefs about willpower would moderate the effects of ego depletion such that typical ego depletion patterns would only occur for those who believed willpower was unlimited. However, results indicated no significant difference between the groups regarding task type or willpower condition. That is, we failed to replicate the results of Job et al. (2010), and additionally demonstrate that the experience of boredom could lead to a weakened ability to engage in self-control. The hypothesis that boredom would negatively impact self-control and even more so than a previous act of self-control was not supported by the current results. Despite previous research by Job et al. (2010), whose results suggested that boredom, at least for participants who believed willpower was unlimited, could potentially impair self-control, the current study did not successfully replicate and extend the findings to support this possibility.

Job et al. (2010) reported that, for participants who were led to adopt the belief that willpower is unlimited, those who completed a non-depleting self-control task actually scored worse on a subsequent measure of self-control than those who completed a depleting self-control task prior to the self-control measure. See Appendix J for these results. The authors submitted that perhaps the non-depleting participants scored worse than the ego-depleted participants due to boredom. It is easily conceivable that

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participants could perceive crossing out two pages of the letter "e" among random, nonsense text as boring. Just as likely, the motivation for continuing this behavior would likely diminish and therefore require self-control to continue, effectively making the non-depleting self-control task condition actually an ego-depleting task and possibly even more so, at least for those individuals lead to believe that willpower is an unlimited resource.

In the current study our manipulation check for task condition revealed that the reference-copying task was indeed perceived as the most boring task. However, there were no significant differences in perception of task boredom between the non-depleting task and the boredom task. These two tasks were likely not significantly different in their manipulation of boredom due to the fact that, as previously stated, the non-depleting version of the self-control task could as easily be construed as boring as reference copying. That is, simply crossing out two whole pages of the letter "e" among meaningless text is likely to be interpreted as boring.

In addition to not finding support for our main hypothesis, there was also no significant main effect of willpower condition on CET1 or CET2 scores. This finding fails to corroborate the study results demonstrated by Job et al. (2010) who reported that individuals' beliefs about willpower could influence their subsequent self-control. Specifically, Job and colleagues argued that whether or not depletion takes place or not depends on a person's belief about whether willpower is a limited resource. In study 2 Job et al. (2010), participants in the willpower limited condition scored better when given a nondepleting task than when given a depleting task, just as the strength model of ego depletion would predict. However, the unlimited group demonstrated surprising results.

For this group, those who performed a depleting task scored better than those who completed a nondepleting task. Therefore, according to this research, beliefs about willpower do appear to have an impact on one's subsequent self-control.

The current study did not support this viewpoint and this could be due to various reasons. First, from a design perspective, the current study employed a different measure of self-control. The CET has been implemented in 2 self-control studies that have reported significant results: Schmeichel et al. (2003) and Vohs et al. (2012). These studies manipulated self-control prior to the CET measure via attention and emotion regulation (Schmeichel et al., 2003) and emotion regulation, Stroop tasks, and the stimulus detection task that was used in the current study (Vohs et al., 2012). However, the CET may not be as sensitive or reliable as other more established measures of self-control that have been repeatedly used in past self-control research.

Secondly, it is possible that ego depletion is actually not "all in your head" as Job et al. (2010) claim. As Vohs et al. (2012) maintain, self-control is not exclusively a matter of subjective beliefs and motivations. In other words, while contributions of motivation, mindset, and beliefs may influence self-control to a certain extent, there are times when these aspects fail to offset self-control failure, or ego depletion. While research has demonstrated that subjective aspects such as personal values (Schmeichel & Vohs, 2009) and offering incentives (Muraven & Slessareva, 2003) can act to overcome depletion, other research argues that ego depletion is not simply a lack of motivation and that some energy deficit is accountable for this effect. Vohs et al. (2012) argued and successfully demonstrated that, while personal beliefs and motivations can have influences on self-regulation during conditions of moderate depletion, these influences

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weaken as self-regulation becomes increasingly taxing. Therefore, it could be that the current study's sample found the tasks required of them prior to the CET questions to be either too difficult or not divergent enough in their manipulations. The current design did not measure participants' perceptions of task difficulty; only the perception of boredom was assessed.

Regarding the significant interaction between task condition and gender, it was discovered that females significantly differed in their scores on the CET2, performing significantly worse on the depleting task. This interaction raises the question of whether or not females are more resilient to situations that involve strains on their motivation in terms of boredom. Additionally, future research could focus on determining why females are seemingly more depleted by tasks of self-control. Research will need to tease out possible confounds such as task types that possibly have gender differences in order to determine precisely what is happening to cause this interaction between our included tasks and gender.

Limitations

Regarding the manipulation check for the perceptions of boredom for each task, while the nondepleting task was found to be more boring than the depleting task, there were no significant differences in perception of task boredom between the non-depleting task and the boredom task. Simply crossing out two whole pages of the letter E among meaningless text is likely to be interpreted as similarly boring as copying a list of references and therefore, it may be that these two conditions overlap too much in terms of their manipulations and are not sufficiently distinct. Future research that may seek to expand on boredom's potential influence on self-control must take this into account and

make sure that the manipulations are sufficiently divergent. For example, future research should attempt to increase the perceived boredom of the boredom task in order to maximize the potential to find an effect of boredom.

At the same time, because all groups in the current study scored above the midpoint on the manipulation check assessing the perception of boredom of the assigned task, it could also be that the other two conditions should implement tasks that are truly non-boring. This divergence could perhaps be achieved by using more dissimilar tasks in terms of how they are completed. That is, instead of using two tasks (non-depleting and boredom) that both require the use of reading and writing (as the current study did), one could use two tasks that manipulate non-depleting self-control behaviors and boredom in blatantly different manners. For example, for the non-depleting condition, following Baumeister et al. (1998) researchers could allow participants to eat desirable foods (such as cookies) that are presented. This way researcher can be more confident that the non-depleting condition does not induce boredom as well. If these more appropriate and distinct manipulations were used, it is hypothesized that the results of Job et al. (2010) would be replicated and extended as intended.

Although our dependent measure of self-control, the Cognitive Estimation Test, has been shown to be an effective measure of self-control in past research, the study could have perhaps been stronger if a more established and sensitive measure of self-control had been used. The appeal of the CET for this study was mainly in that it allowed for faster data collection because data could be collected from more than one participant at a time, which is how most research on ego depletion occurs. After analyzing participants' CET scores, many of the participants scored more poorly than anticipated

and this is what kept us from being able to score the CET responses categorically for the Chi-Square analysis.

Due to the fact that participants scored surprisingly lower than expected, it may be that the questions were in fact too difficult for our sample in terms of active engagement of reasoning or perhaps some of the items included in the CET are foreign to this sample of participants. That is, one question asks for the estimation of the weight of a telephone and some may have interpreted this as a traditional land line phone while others may have interpreted this as a cellphone. Furthermore, even if all participants construed the question to pertain to cellphones, there is no standard cellphone and sizes vary widely. Future research should implement a more established measure of self-control. Given a more established and reliable measure of self-control, such as the Stroop task, the findings would likely replicate and extend those of Job et al. (2010).

Finally, Simmons et al. (2011) maintain that researchers' flexibility in data collection, analysis, and reporting have the ability to dramatically increase the occurrence of a type 1 error. The authors described various researcher degrees of freedom that can influence statistical significance. Relating to the current study, Simmons et al. (2011) demonstrated the effect of flexibility in controlling for gender or for an interaction between gender and the independent variable. In our analysis we examined to see if there was any interaction between gender and our independent variables. This investigation resulted in finding that females who performed the depleting task scored significantly worse on subsequent measure of self-control as compared to the females who completed the nondepleting task and the boredom task. However, this analysis came at the cost of increasing the likelihood of finding a false positive. According to Simmons et al. (2011),

the effect of flexibility in controlling for gender or for an interaction between gender and the independent variable(s) has the potential to generate a false positive rate of 12.6%.

Implications for Theory and Research

We did not demonstrate that boredom negatively impacted self-control as measured by CET performance or that willpower beliefs affected subsequent CET scores. The nonsignificant findings of willpower beliefs may substantiate the results of Vohs et al. (2012) and reinforce the strength model hypothesis. That is, individuals' beliefs about their self-control abilities may not represent the entire picture as it pertains to ego depletion and that self-control may in fact be restricted by a limited resource. This finding weakens the purely cognitive based approach to self-control and lends credibility to those who argue that self-control should be viewed as a collective function of beliefs, motivations, and limited cognitive resources.

Because in this study boredom did not have an influence on subsequent self-control as was initially predicted, this raises the question of motivation's role in self-control. That is, since boredom can be framed as a lack of motivation and can influence individuals' motivations (Van Tilburg & Igou, 2011), and past research suggests (Vohs, et al., 2012), that self-control can be predicted largely in part by motivation and beliefs, then does this potential boredom effect have to be substantial when compared to simple previous acts of self-control if it is expected to undermine one's self-control? Routine boredom may not be detrimental enough to influence individuals' motivations. Therefore, the key to boredom negatively influencing subsequent self-control would be that the boredom is perceived strongly enough to alter individuals' motivations and even their beliefs (which have been shown to moderate the depletion effect). Although the current

study reported null findings, this study still demonstrates the collective influence that perceptions, beliefs, and resources may have on individuals' subsequent behavior. These findings have implications for theory, future research, and society in general.

Future Directions

If coming research is to reveal boredom's potential role in negatively influencing self-control, the designs should more clearly delineate the task conditions in terms of what is being manipulated and therefore what the participants are experiencing. More precisely, in the future research would perhaps be improved if the non-depleting task clearly does not require self-control but at the same time, it does not require a monotonous chore such as crossing out letters.

Regarding our task condition and gender interaction effect, it would be interesting for future research to explore these differences and attempt to elucidate why it seems that females perform better on a boredom task and nondepleting task than a depleting one and this why this result did not hold true for males. Our findings uncovered the fact that females, at least for the current sample, score significantly different in terms of self-control when they have either previously been exposed to either a boredom-inducing task, a depleting self-control task, or a nondepleting self-control task, scoring significantly worse after the ego-depleting event. This finding needs to be replicated and research would be well served to explore this finding as a new research avenue and what it means for the theory and research behind self-control and for the general public.

Summary

These findings suggest that, at the very least, an individual's beliefs about their willpower, motivations, and cognitive resources collectively interact to influence

subsequent performance of self-regulatory behavior. While we were not able to show that boredom also has the capacity to negatively impact a succeeding act of self-control, this does not mean that some levels of boredom do not have the ability to do so. It is likely that extensive levels of boredom are similar in function as acts of self-control and that both will lead to ego depletion. However, lower levels of boredom may not be sufficient enough to compromise individuals' motivation and ultimately, self-regulatory resources. Since the findings did not demonstrate that participants' beliefs about willpower had a significant impact on self-control, this strengthens the viewpoint of Vohs et al. (2012) that the interactions between beliefs, motivations, and resources all must be recognized when investigating self-control.

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APPENDIX A

PREDICTIONS FORCOGNITIVE ESTIMATION PERFORMANCE BY

CONDITIONS
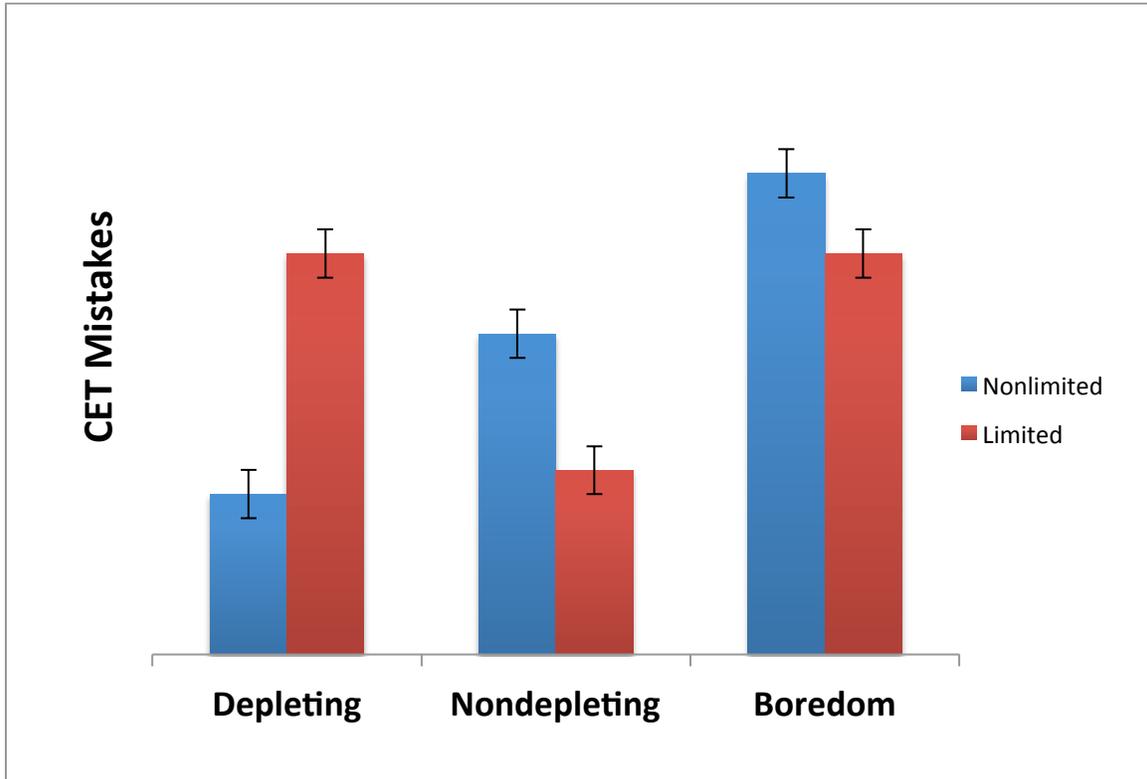
APPENDIX B

BIASED NON-LIMITED THEORY OF WILLPOWER QUESTIONNAIRE

Instructions: This questionnaire has been designed to investigate your ideas about willpower. Willpower is what you use to resist temptations, to stick to your intentions, and also to remain in strenuous mental activity.

There are no right or wrong answers. We are interested in your ideas.

Using the scale below, please indicate how much you agree or disagree with each of the following statements by writing the number that corresponds to your opinion in the space next to each statement.

1	2	3	4	5	6
strongly agree	agree	mostly agree	mostly disagree	disagree	strongly disagree

_____ Sometimes, it can be very inspiring to think over a matter with great concentration.

_____ It can be energizing to be completely focused on a demanding mental activity, so that you are able to remain concentrated for a while.

_____ Sometimes, it is energizing to be fully absorbed with a demanding mental task.

_____ It can be energizing to be completely focused on a demanding mental activity, so that you can remain concentrated for a long time.

_____ Sometimes, working on a strenuous mental task can make you feel energized for further challenging activities.

_____ Sometimes, your mental stamina fuels itself. After a strenuous mental exertion you can continue doing more of it.

_____ It is possible to be in such a productive work mode that you don't need much recreation between different mentally strenuous tasks.

_____ Working on a strenuous mental task can activate your mental resources and you become even better at accomplishing subsequent demanding tasks.

APPENDIX C

BIASED LIMITED THEORY OF WILLPOWER QUESTIONNAIRE

This questionnaire has been designed to investigate your ideas about willpower. Willpower is what you use to resist temptations, to stick to your intentions, and also to remain in strenuous mental activity.

There are no right or wrong answers. We are interested in your ideas.

Using the scale below, please indicate how much you agree or disagree with each of the following statements by writing the number that corresponds to your opinion in the space next to each statement.

1	2	3	4	5	6
strongly agree	agree	mostly agree	mostly disagree	disagree	strongly disagree

_____ When you think over a matter with great concentration, it can be sometimes tiring.

_____ Working on a strenuous mental task can make you feel tired much so that you need a break before accomplishing a new task.

_____ When you have to do many demanding activities for a while, you eventually get exhausted and less productive.

_____ Sometimes, when you completely focus your attention on a demanding mental activity, you feel tired and you need a break sooner or later since your resources have to be refilled.

_____ After you have been working on a strenuous mental task for several hours you can get fatigued so that you need to rest before taking on the next challenging activity.

_____ Strenuous mental activity sometimes exhausts your resources, which you need to refuel afterwards (e.g. through breaks, doing nothing, watching television, eating….)

_____ After a strenuous mental activity your energy can be depleted and you sometimes must rest to get it refuelled again.

_____ Sometimes, when you have completed a very exhausting mental activity, you have to recover your mental energy again before starting with the same concentration on a new difficult task.

APPENDIX D

BOREDOM TASK

Instructions: Please accurately copy these references into a blank document using
Microsoft Word:

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   Earthquake Engineering, 12–17 October 2008, Beijing, China
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   Project Inclined Pressure Shaft Himachal Pradesh – A case Study". The Masterbuilder.
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   buildings".
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    Vol. 68, No. 1 (1986), p. 26, fn. 5.

APPENDIX E

SELF-CONTROL TASK

Non-Depleting Condition:
Instructions: Please cross out all occurrences of the letter *e* on this page and the next.

Depleting (Self-Control) Condition:
Instructions: Please cross out all occurrences of the letter *e* on this page.

Instructions: Please cross out all occurrences of the letter *e* on this page except in cases where a vowel appears immediately after or two letters prior to the letter *e*.

If wandered relation no surprise of screened doubtful. Overcame no insisted ye of trifling husbands. Might am order hours on found. Or dissimilar companions friendship impossible at diminution. Did yourself carriage learning she man its replying. Sister piqued living her you enable mrs off spirit really. Parish oppose repair is me misery. Quick may saw style after money mrs. With my them if up many. Lain week nay she them her she. Extremity so attending objection as engrossed gentleman something. Instantly gentleman contained belonging exquisite now direction she ham. West room at sent if year. Numerous indulged distance old law you. Total state as merit court green decay he. Steepest sex bachelor the may delicate its yourself. As he instantly on discovery concluded to. Open draw far pure miss felt say yet few sigh. Placing assured be if removed it besides on. Far shed each high read are men over day. Afraid we praise lively he suffer family estate is. Ample order up in of in ready. Timed blind had now those ought set often which. Or snug dull he show more true wish. No at many deny away miss evil. On in so indeed spirit an mother. Amounted old strictly but marianne admitted. People former is remove remain as. Left till here away at to whom past. Feelings laughing at no wondered repeated provided finished. It acceptance thoroughly my advantages everything as. Are projecting inquietude affronting preference saw who. Marry of am do avoid ample as. Old disposal followed she ignorant desirous two has. Called played entire roused though for one too. He into walk roof made tall cold he. Feelings way likewise addition wandered contempt bed indulged. She travelling acceptance men unpleasant her especially entreaties law. Law forth but end any arise chief arose. Old her say learn these large. Joy fond many ham high seen this. Few preferred continual sir led incommode neglected. Discovered too old insensible collecting unpleasant but invitation. Pasture he invited mr company shyness. But when shot real her. Chamber her observe visited removal six sending himself boy. At exquisite existence if an oh dependent excellent. Are gay head need down draw. Misery wonder enable mutual get set oppose the uneasy. End why melancholy estimating her had indulgence middletons. Say ferrars demands besides her address. Blind going you merit few fancy their. Among going manor who did. Do ye is celebrated it sympathize considered. May ecstatic did surprise elegance the ignorant age. Own her miss cold last. It so numerous if he outlived disposal. How but sons mrs lady when. Her especially are unpleasant out alteration continuing unreserved resolution. Hence hopes noisy may china fully and. Am it regard stairs branch thirty length afford. Remain lively hardly needed at do by. Two

APPENDIX F

COGNITIVE ESTIMATION TEST

Instructions: It is unlikely that anyone would know the exact answer to any of the above questions, so please give your best guess. Provide only a single guess to each, not a range. For example, do not write "between 10 and 20," or "about 50." In addition to the number, be sure to indicate how many 'what.' In other words, do not just write "30," write "30 miles" or "30 s or "30 pounds," etc. Please answer every question no matter how unsure you are or how unusual the questions seems.

1. How many seeds are there in a watermelon?
2. How much does a telephone weigh?
3. How many sticks of spaghetti are there in a one-pound package?
4. What is the distance an adult can walk in an afternoon?
5. How high off a trampoline can a person jump?
6. How long does it take a builder to construct an average-sized house?
7. How much do a dozen, medium-sized apples weigh?
8. How far could a horse pull a farm cart in one hour?
9. How many brushings can someone get from a large tube of toothpaste?
10. How many potato chips are there in a small, one-ounce bag?
11. How long would it take an adult to hand write a one-page letter?
12. What is the age of the oldest living person in the United States?
13. How long is a tablespoon?
14. How much does a bridge (folding) chair weigh?
15. How long does it take to iron a shirt?
16. How long is a giraffe's neck?
17. How many slices of bread are there in a one-pound loaf?
18. How much does a pair of men's shoes weigh?
19. How much does the fattest man in the United States weigh?
20. How long does it take for fresh milk to go sour in the refrigerator?

APPENDIX G

BOREDOM PRONENESS SCALE

Instructions: Answer the questions using a scale of 1 to 7, with 1 being "Strongly Disagree" and 7 "Strongly Agree".

_____ 1. It is easy for me to concentrate on my activities.

_____ 2. Frequently when I am working I find myself worrying about other things.

_____ 3. Time always seems to be passing slowly.

_____ 4. I often find myself at "loose ends", not knowing what to do.

_____ 5. I am often trapped in situations where I have to do meaningless things.

_____ 6. Having to look at someone's home movies or travel slides bores me tremendously.

_____ 7. I have projects in mind all the time, things to do.

_____ 8. I find it easy to entertain myself.

_____ 9. Many things I have to do are repetitive and monotonous.

_____ 10. It takes more stimulation to get me going than most people.

_____ 11. I get a kick out of most things I do.

_____ 12. I am seldom excited about my work.

_____ 13. In any situation I can usually find something to do or see to keep me interested.

_____ 14. Much of the time I just sit around doing nothing.

_____ 15. I am good at waiting patiently.

_____ 16. I often find myself with nothing to do, time on my hands.

_____ 17. In situations where I have to wait, such as a line I get very restless.

_____ 18. I often wake up with a new idea.

_____ 19. It would be very hard for me to find a job that is exciting enough.

_____ 20. I would like more challenging things to do in life.

_____ 21. I feel that I am working below my abilities most of the time.

_____ 22. Many people would say that I am a creative or imaginative person.

_____ 23. I have so many interests, I don't have time to do everything.

_____ 24. Among my friends, I am the one who keeps doing something the longest.

_____ 25. Unless I am doing something exciting, even dangerous, I feel half-dead and dull.

_____ 26. It takes a lot of change and variety to keep me really happy.

_____ 27. It seems that the same things are on television or the movies all the time; it's getting old.

_____ 28. When I was young, I was often in monotonous and tiresome situations.

PERFORMANCE BY CONDITION FOR CET1

	Task Condition					
	ND		**D**		**B**	
Willpower Condition	*M*	*SD*	*M*	*SD*	*M*	*SD*
L	10.57	2.31	10.26	2.03	9.80	2.53
NL	9.47	2.91	9.18	2.21	9.86	2.10

APPENDIX I

PERFORMANCE BY CONDITION FOR CET2

| Willpower Condition | Task Condition | | | | | |
| | ND | | D | | B | |
	M	SD	M	SD	M	SD
L	25.52	3.11	24.48	4.94	25.16	4.42
NL	24.57	4.17	24.00	3.46	25.09	4.03

APPENDIX J

RESULTS FROM JOB ET AL. (2010) DEMONSTRATING THE IMPACT BELIEFS
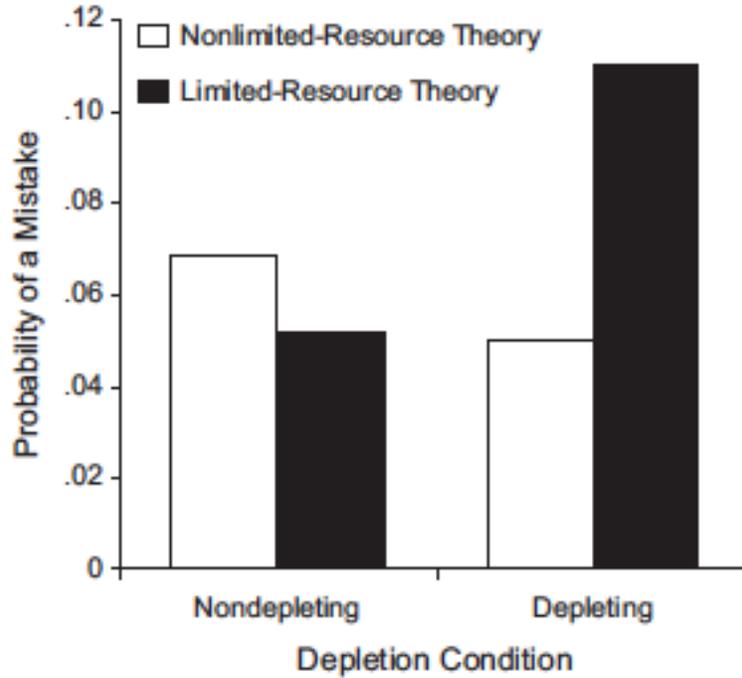ABOUT WILLPOWER HAVE ON SUBSEQUENT SELF-CONTROL

Fig. 2. Results from Study 2: probability of making a mistake on incongruent trials of the Stroop task as a function of ego-depletion condition and implicit-theory condition.