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INCREASED AVOIDANCE MOTIVATION AS A MECHANISM FOR SELF-CONTROL FAILURE

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF PSYCHOLOGY

BY

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This dissertation is dedicated to my wife, Ruby, and my children, Link and Ada.

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Abstract

Previous research has found that engaging in an act of self-control impairs further self-control attempts for a brief time. However, little is known about why this occurs or more specifically what the underlying mechanisms that mediate the effect of an initial self-control act on a later self-control act are. The current research proposed that an increase in avoidance motivation underlies subsequent self-control failure after prior self-control exertion. To examine this hypothesis, a pilot study and two additional studies were conducted. The pilot study examined the validity of a measure of avoidance motivation to be used in the current studies and further found tentative evidence that exercising self-control leads to an increase in avoidance motivation. Studies 1 and 2, however, failed to find evidence that exercising self-control leads to an increase in avoidance motivation further precluding any attempts at examining whether avoidance motivation mediates subsequent self-control failures. Studies 1 and 2 further failed to replicate well established findings in the self-control literature. Implications of the present research, possible explanations for the current results, and future directions are discussed.

Introduction

Self-control, defined as the capacity to alter one's responses in order to bring them in line with standards and goals, is vital for optimal human functioning in many life domains including achieving a healthy lifestyle, managing personal finances, and behaving in a pro-relational manner toward a close partner (Baumeister, Vohs, & Tice, 2007; Findley, Carvallo, & Bartak, 2014; Finkel & Campbell, 2001; Muraven & Shmueli, 2006; Ritter, Karremans, & Van Schie, 2010; Vohs & Faber, 2007). Prior research has found that when individuals engage in any act of self-control, they are subsequently less able to engage in further self-control attempts for a time (Baumeister et al., 2007; Baumeister, Bratslavsky, Muraven, & Tice, 1998; Hagger, Wood, Stiff, & Chatzisarantis, 2010). Indeed, the effect that exercising self-control subsequently leads to less successful self-control attempts has been examined in a wide variety of behavioral and cognitive domains. For instance, exercising self-control has been found subsequently to make romantic individuals less likely to respond constructively to a transgression committed by their partner presumably because responding constructively requires self-control (Finkel & Campbell, 2001). In a domain unrelated to romantic relationships, exercising self-control has also been found to lead subsequently to more impulsive spending (Vohs & Faber, 2007). Examples such as self-control exertion leading to decreased constructive behavior in romantic relationships and increased impulsive spending highlight a seemingly fragile and limited nature to self-control in that engaging in any act of self-control negatively impacts subsequent self-control attempts for a time. However, previous research examining self-control has mainly focused on the effect that prior self-control exertion has on various life outcomes (e.g.,

impulsive spending, destructive partner behavior) while ignoring the mechanisms that explain why exactly prior self-control exertion affects subsequent self-control attempts. Indeed, Inzlicht and Schmeichel (2012) argue that the mechanisms that mediate subsequent self-control failure after an initial self-control attempt are not well understood.

Despite a dearth of research examining the underlying processes involved in self-control failure, a limited amount of research has attempted to understand better these mechanisms by exploring decrements in blood glucose and increases in approach-motivated impulse strength as potential mediators (Gailliot et al., 2007; Schmeichel, Harmon-Jones, & Harmon-Jones, 2010). However, some researchers have questioned whether decrements in blood glucose actually underlie self-control failure (Beedie & Lane, 2012; Molden et al., 2012). Further, increases in approach-motivated impulse strength may successfully explain *many* instances of self-control failure, but they may not provide a sufficient explanation for *all* instances of self-control failure. Therefore, the current research explored a previously unexamined factor as a potential mediator. More specifically, the current research aimed to explore the possibility that exercising self-control leads to an increase in avoidance-motivated impulse strength, and that avoidance-motivated impulse strength mediates instances of self-control failure that approach-motivated impulse strength does not (and vice versa).

The Strength Model of Self-Control

Self-control has been a popular topic of study in the social psychological literature for the last decade and a half. During this time, a large body of research has indicated that self-control depends on a limited resource that becomes depleted with

repeated use (Baumeister et al., 2007; Baumeister et al., 1998; Hagger et al., 2010; Muraven & Baumeister, 2000; Muraven et al., 1998). More specifically, according to the strength model of self-control, when an individual engages in any act of self-control, that act consumes or draws from a limited resource leaving the individual in a state of "ego depletion" and prone to subsequent self-control failure. Baumeister et al. (1998) coined the term ego depletion to pay homage to Freud's (1910) conceptualization of the personality component (the ego) that regulates the desires of other personality components (id and superego). One of the first empirical demonstrations of the strength model showed that individuals who exerted self-control by resisting the temptation to eat desirable cookies were ego depleted and subsequently less likely to persist at completing an unsolvable anagram (Baumeister et al., 1998). Such findings view self-control metaphorically as a muscle that becomes fatigued with repeated exercise. Succinctly, this body of research suggests that self-control failure is not necessarily a result of simply not *wanting* to exert self-control; it is a matter of not *being able* to engage in self-control.

A large amount of research has provided supportive evidence for the strength model with approximately 100 studies replicating the ego depletion effect in different life domains (Inzlicht & Schmeichel, 2012). Further, a recent meta-analysis found the ego depletion effect to be of moderate-to-large size, $d^{+} = .62$ (Hagger et al., 2010). Thus, the strength model seems well supported and a valid means by which to explain self-control failure. However, despite the empirical evidence supporting the strength model, one lingering problem hampers its usefulness in explaining self-control failure. Virtually nothing is known about the nature of the limited resource itself. Research

examining the strength model indirectly infers that a limited energy reserve is being depleted based on the findings that engaging in self-control at time 1 causes individuals to engage in less self-control at time 2. Very little research has attempted to measure directly what is being depleted. Among this scant work is research examining the possibility that decrements in blood glucose underlie self-control failure. More specifically, Gailliot et al. (2007) found that engaging in self-control causes a decrease in blood glucose levels, lowered blood glucose levels result in decreased self-control, and consuming a glucose-laden beverage subsequently restores self-control. Thus, in line with the main premise of the strength model, Gailliot and colleagues (2007) findings seem to suggest that the notion of self-control as a muscle is more than just a metaphor. However, other researchers have challenged the mediating role of glucose in self-control failure. For example, Molden et al. (2012) attempted to replicate Gailliot and colleagues (2007) using more precise instruments to measure blood glucose levels. They found no reliable evidence that engaging in self-control depletes blood glucose levels. Further, they found that individuals who simply gargle (as opposed to consume) a glucose-laden substance show subsequent improvements in self-control ability. These researchers argue that although glucose may play some yet to be determined role, it is likely an oversimplification to assume that glucose is the actual limited resource involved in self-control failure. Thus, currently it is not conclusive whether decrements in blood glucose levels underlie self-control failure after a prior act of self-control (Molden et al., 2012).

Approach Motivation as a Mechanism of Self-Control Failure

Because of the uncertainty regarding blood glucose as a mediator, some researchers have suggested that factors other than glucose be examined as potential mediators (Inzlicht & Schmeichel, 2012; Inzlicht, Schmeichel, & Macrae, 2014; Schmeichel et al., 2010). These researchers argue that possible mediating factors need not be limited to physiological sources, but that psychological/motivational factors may also serve as potential mediators of self-control failure after a prior act of self-control. These researchers further argue that many instances of self-control can be construed as a competition between two opposing forces: self-control strength and the strength of the impulse itself. Therefore, self-control failure may be a result of decreased self-control strength (as the strength model suggests), increased impulse strength, or some combination of each. Additionally, these authors suggest that principles of revised reinforcement sensitivity theory can be used to explain theoretically what is occurring when one exercises self-control (revised RST; Corr, 2008; Gray & McNaughton, 2000). According to revised RST, behavior is mediated by three biological/psychological systems: the behavioral approach system (BAS) mediates approach responses to all appetitive/rewarding stimuli, the fight-flight-freeze system (FFFS) mediates avoidance reactions to all aversive stimuli, and the behavioral inhibition system (BIS) is responsible for keeping the BAS and FFFS in check by detecting and resolving conflict within and between them. Schmeichel et al. (2010) suggest that the BIS and BAS mirror the components involved in the self-control struggle. As previously mentioned the BAS mediates reactions to all appetitive stimuli and therefore can be likened to approach motivated impulse strength. BIS can be likened to self-control strength in that its primary responsibility is to detect and resolve conflict between and within the other

systems. For example, when confronted with an appetitive and rewarding stimulus, the BAS is activated and an individual is motivated to approach the stimulus. However, in life, individuals must often refrain from approaching rewarding stimuli because of other goals that the individual may have (e.g., a dieter refraining from eating a fattening donut). In such instances, the BIS detects a conflict (e.g., wanting to approach the donut vs. wanting to lose weight) and resolves the conflict (e.g., the dieter refrains from eating the donut). However, exercising self-control has been found to reduce temporarily BIS activation, rendering it less able to keep BAS activation in check (Inzlicht & Gutsell, 2007). Therefore, after exercising self-control, subsequent self-control failure could be a result of a decreased self-control mechanism (i.e., BIS), or increased motivation to approach and gratify appetitive impulses (i.e., BAS). Indeed, across three studies Schmeichel et al. (2010) found that exercising self-control causes a subsequent increase in approach-motivated impulse strength (i.e., increased BAS activation). More specifically, these authors found that exercising (versus not exercising) self-control leads to higher scores on the incentive sensitivity portion of the BIS/BAS scale (Carver & White, 1994), increased likelihood to bet on low-stakes (yet rewarding) gambling, and increased likelihood of perceiving rewarding stimuli (i.e., dollar signs) in an ambiguous scene. In other words, when an individual's self-control muscle is temporarily depleted, various impulses become more appealing and an individual is more motivated to approach and to gratify impulses leading to self-control failure. Therefore, an increase in approach motivation provides a viable mechanism by which a prior act of self-control may lead to subsequent self-control failure when the nature of the impulse is inherently *rewarding or appetitive*. It is important to note that

Schmeichel et al. (2010) do not argue against the basic tenet of the strength model by implying that self-control strength plays no role in self-control failure, but simply that some instances of self-control failure could also be a result of increased approach-motivated impulse strength. Therefore according to Schmeichel et al. (2010), various factors could be contributing to self-control failure, but previous research has been unable to assess other potential factors because it has been operating exclusively within the conceptual framework of the strength model by only focusing on the role of self-control strength in self-control failure. Thus given Schmeichel et al.'s (2010) findings, many instances of self-control failure could be attributed to decreased self-control strength *or* increased impulse strength.

Avoidance Motivation as a Mechanism of Self-Control Failure

Schmeichel and colleagues' (2010) findings regarding approach motivation as a potential mechanism for self-control failure provided a fruitful first step to being able to understand better what exactly is occurring when individuals fail in their self-control attempts after prior self-control exertion. However, self-control has been alluded also to involve overriding impulses to *avoid aversive stimuli* (Carver, 2005; De Ridder, De Boer, Lugtig, Bakker, and Van Hooft, 2011; Schmeichel et al., 2010; Vohs et al., 2008). In other words, not all impulses are approach-motivated in nature. For example, how does one account for a student who fails to exercise self-control by not working on a tedious research paper that is shortly due? Is the student failing to suppress the approach motivated impulse to do nothing (as Schmeichel et al., 2010 might suggest), or is the student failing to suppress the impulse to avoid working on the aversive paper? Intuition would suggest the latter explanation. Carver (2005) and Schmeichel et al. (2010) assert

that although impulses can be avoidance-motivated in nature, empirical work examining self-control has focused almost entirely on approach-motivated impulses. In other words, most researchers tend to examine instances of self-control that involve overriding an appetitive or rewarding stimulus (e.g., resisting the impulse to eat fattening food) as opposed to instances of overriding the impulse to avoid an aversive stimulus (e.g., resisting the impulse to give up in the middle of an uncomfortable and painful exercise routine, thus avoiding further discomfort). Despite that majority of research that has focused on examining instances of self-control that involve overriding an appetitive or rewarding stimulus, a limited number of studies examining the strength model of self-control have in fact examined instances of self-control that have been assumed to involve overriding the impulse to avoid aversive stimuli. For example, Oaten, Williams, Jones, & Zadro (2008) as well as Vohs et al. (2008) demonstrated that exercising self-control leads one subsequently to consume less of a bad tasting substance. This presumably occurs because self-control is needed to override the impulse to avoid drinking more of the aversive substance. Further, De Ridder et al. (2011) recently conducted a confirmatory factor analysis of the commonly used trait self-control scale (Tangney, Baumeister, & Boone, 2004) and found good evidence to support a two-factor structure of self-control that involves inhibiting appetitive stimuli (i.e., inhibitory self-control) as well as initiating effortful or aversive behavior (i.e., initiatory self-control). Thus, self-control can also involve overriding the impulse to an avoid aversive stimulus, such as consuming a bad tasting substance (Oaten et al., 2008; Vohs et al., 2008). Therefore, an increase in approach motivated impulse strength, as

demonstrated by Schmeichel et al. (2010), does not seem sufficient to be able to explain *all* instances of self-control failure.

If some instances of self-control failure do indeed involve overriding avoidance motivated impulses, then such instances could potentially be the result of an avoidance motivated impulse being left unchecked. Similar to how the BAS is regulated by the BIS and can lead individuals to be more likely to approach rewarding stimuli when left unchecked by the BIS, the Fight-flight-freeze system (FFFS), which mediates reactions to all aversive stimuli, can motivate individuals to avoid aversive stimuli when the BIS is weakened or deactivated (Corr 2008; Gray & McNaughton, 2000). The FFFS was originally conceptualized based on animal research demonstrating different responses to extremely aversive (i.e., life threatening) stimuli (Blanchard & Blanchard, 1990). This research revealed, for example, that rats will avoidantly respond to threatening stimuli in one of three different manners (i.e., fight, flight, freeze), depending upon characteristics of the external environment. If the threat is in the immediate proximity to the animal and there is no possibility for escape, then the animal will engage in a fight response. Further, if the threat is not escapable, and is not within immediate proximity, then the animal will engage a freeze response. Lastly, if the threat is escapable, and not within immediate proximity then a flight response will be invoked by the animal (Blanchard & Blanchard, 1990). The findings that used animal subjects were later replicated in a human sample in which participants showed the same pattern of avoidant responding to hypothetically presented scenarios of aversive stimuli (Blanchard, Hynd, Minke, Minemoto, & Blanchard, 2001). Gray and McNaughton (2000) proposed that the FFFS is the biological system that is responsible for controlling avoidance based

(i.e., fight, flight, freeze) responses in animals as well as humans. However, in many life instances, animals and individuals must inhibit the automatic response to avoid, and may even need to approach threatening stimuli (e.g., a starving predator that must approach a dead animal carcass that is surrounded by more dominant predators). To aid in this process, Gray and McNaughton (2000) proposed that the BIS is responsible for overriding an initial response to avoid a threatening stimulus and results in what they termed "defensive approach" toward the threatening stimulus. Thus, the BIS can keep FFFS responses in check by attenuating their strength and in some cases promoting an approach orientation toward the threatening stimuli. Conversely, when the BIS is weakened, then FFFS responses (similar to BAS responses) can subsequently strengthen. Thus, if a parallel is drawn between the FFFS and avoidance-motivated impulses, then it is possible that exercising self-control (BIS) will lead to increased motivation to avoid aversive stimuli (FFFS). It may be noted however, that the FFFS was conceptualized based on animal research that focused on avoidant reactions to life threatening or fearful stimuli. Although some instances of self-control may involve inhibiting the impulse to avoid a life threatening or fearful stimulus, many instances involve avoidance based motivations that are aversive in other respects (e.g., a student who fails to inhibit the impulse to avoid working on a tedious research paper). However, as previously mentioned, the FFFS mediates reactions to *all* aversive stimuli. More specifically, Gray & McNaughton (2000) argue that the FFFS evolved at some point from exclusively life threatening and fearful stimuli to also encompass all aversive stimuli that one can envision. This includes (but is not restricted to) innate and learned signals of punishment, frustration, and novel stimuli (Gray & McNaughton, 2000;

Smillie, Pickering, & Jackson, 2006). Corr (2008) further supported this assumption by discussing how the biological and psychological systems of revised RST provide a general foundation for how animals and humans approach and avoid stimuli. However, the nature of the specific stimuli that animals and humans approach and avoid can vary by species and circumstance. Further, Jackson (2009), in devising the only currently validated measure of revised RST, created items that reflect avoidance of both threatening and fearful stimuli (e.g., If I got scared in my bed at night, I would remain motionless) and other types of aversive stimuli (e.g., Sometimes I just freeze in *difficult* situations). Thus, it seems plausible that an increase in avoidance-motivated impulse strength could be the culprit for many instances of self-control failure regardless of whether the stimulus is life-threatening or aversive in other respects. This view is further supported by studies demonstrating that exercising self-control leads to increased *sensitivity* to aversive stimuli. For example, prior research has found that engaging in self-control leads to an increase in emotional reactivity (as measured by the amygdala) to negatively valenced stimuli, more distress in response to an upsetting film, and ratings of cold water as more painful (Baumeister et al., 2012; Wagner & Heatherton, 2012).

In summary, gaining a clear understanding of the factors that mediate the effect of engaging in self-control at time 1 on failure to exert self-control at time 2 has proven difficult for many researchers. Despite the promise that the glucose hypothesis holds, much more work needs to be conducted to clarify its role as a mechanism underlying self-control failure. Further, the hypothesis that engaging in self-control leads to an increase in approach motivation is valuable but limited in that it likely cannot explain

all instances of self-control failure. In addition to instances of self-control that involve overriding an approach-motivated impulse, researchers have speculated that many instances of self-control involve overriding avoidance-motivated impulses as well (Carver, 2005; De Ridder et al., 2011; Schmeichel et al., 2010; Vohs et al., 2008). To date though, no research has specifically demonstrated that an increase in avoidance motivation underlies such failures in self-control.

Overview of Present Research

The aim of the current research was twofold. First, the present research sought to examine another possible mediating mechanism (in addition to glucose and increased approach motivation) for self-control failure that occurs after having engaged in a prior act of self-control. In other words, the current research proposes that engaging in self-control subsequently leads to an increase in avoidance-motivated impulse strength. If this perspective is correct, increased avoidance motivation may underlie (mediate) self-control failure after prior self-control exertion (See Figure 1).

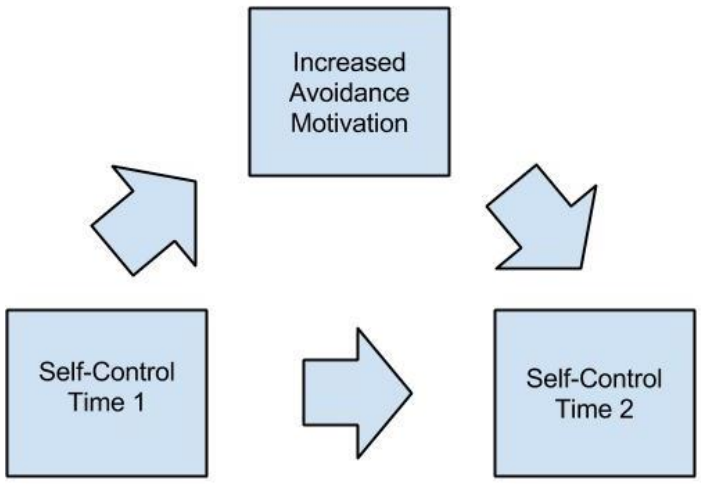


Figure 1. Proposed theoretical model of avoidance motivation as a mechanism for self-control failure.

Second, the current research sought to examine if the mediating effect of increased avoidance motivation is only specific to certain instances of subsequent self-control failure and not others. Thus, the current research addresses two unanswered questions in the self-control literature, 1) does an increase in avoidance motivation (but not approach motivation) mediate the effect of an initial act of self-control on a subsequent act of self-control when the subsequent act has been assumed in past research to involve overriding an avoidance-motivated impulse (e.g., the impulse to avoid a bad tasting substance), and 2) does an increase in approach motivation (but not avoidance motivation) mediate the effect of an initial act of self-control on a subsequent self-control act when the subsequent act has been assumed in past research to involve overriding an approach-motivated impulse (e.g., the impulse to consume fattening cookies)?

It was hypothesized in the current research that exercising self-control will lead to an increase in avoidance-motivated impulse strength. As displayed in Figure 2, it was further hypothesized that an increase in avoidance motivation (but not approach motivation) would mediate the effect of an initial self-control act on a subsequent self-control act that has been assumed to involve inhibiting the impulse to avoid something aversive (i.e., consuming a bad tasting substance).

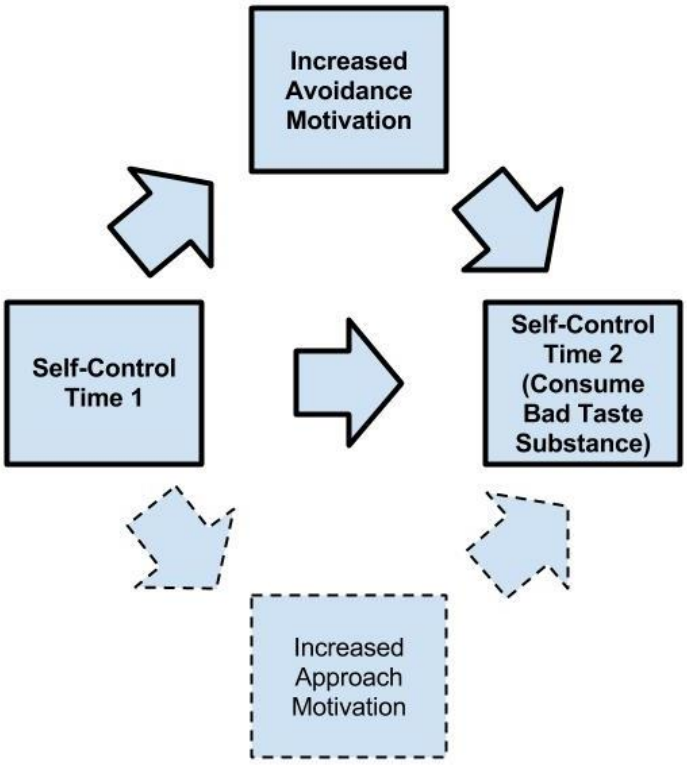


Figure 2. Hypothesized mediation effect of avoidance motivation (but not approach motivation) when subsequent self-control involves overriding avoidance-motivated impulse.

Lastly, as displayed in Figure 3, it was hypothesized that an increase in approach motivation (but not avoidance motivation) would mediate the effect of an initial self-control act on a subsequent self-control act that has been assumed to involve inhibiting the impulse to approach something rewarding (i.e., consuming fattening cookies).

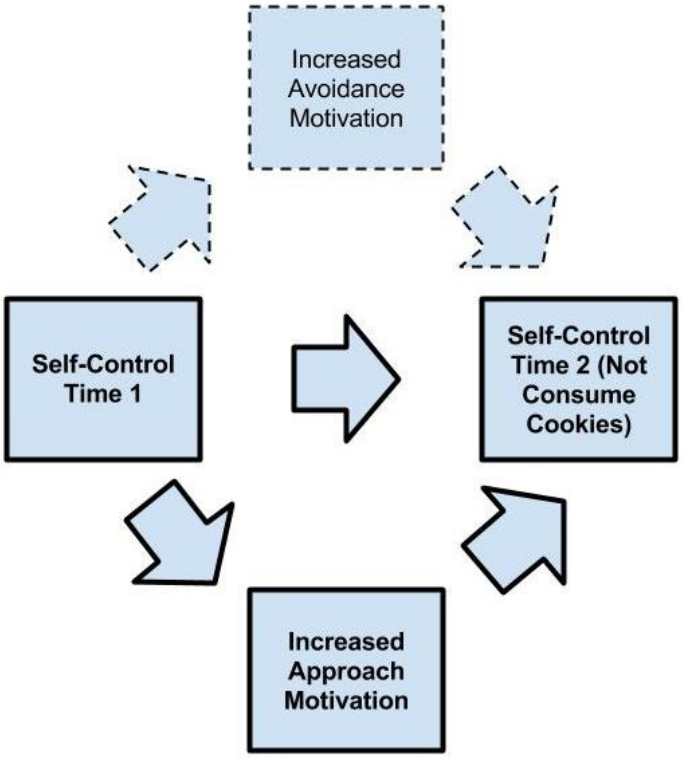


Figure 3. Hypothesized mediation effect of approach motivation (but not avoidance motivation) when subsequent self-control involves overriding approach-motivated impulse.

To test the hypotheses put forth in the current research, a pilot study and two additional studies were planned and conducted. The goal of the pilot study was to test the validity of an avoidance motivation measure to be used in the two subsequent studies. The pilot study was also designed to serve as an initial test of whether engaging in self-control leads to an increase in avoidance motivation. Study 1 was designed to replicate the effect that engaging in self-control leads to increased avoidance motivation while further examining if increased avoidance motivation (but not increased approach motivation) mediates a particular instance of self-control failure (i.e., failing to consume a bad tasting substance). Study 2 sought again to replicate the effect that engaging in self-control leads to increased avoidance motivation while additionally examining if an

increase in approach motivation (but not increased avoidance motivation) mediates a different instance of self-control (i.e., failing to resist eating appetizing cookies). If successful, the results would support the assumption that increased avoidance motivation underlies a certain instance of subsequent self-control failure, and increased approach motivation (as found by Schmeichel et al., 2010) underlies a different instance of subsequent self-control failure.

Pilot Study

The purpose of the pilot study was twofold. First, it tests the validity of a new avoidance motivation measure for specific use in Studies 1 and 2. Piloting an avoidance motivation measure was desired since current measures of avoidance motivation either 1) measure trait avoidance motivation which may be difficult to influence using a self-control manipulation, or 2) are behavioral measures that rely on reaction time measurements that could be simply assessing *sensitivity* to aversive stimuli as opposed to the actual *motivation to avoid* aversive stimuli. For instance, in a commonly used behavioral measure of avoidance motivation, participants push a joystick in response to negatively valenced words that are presented on a computer screen (Chen & Bargh, 1999). It is thought that the more quickly participants push the joystick away; the more motivated they are to avoid the negative words. However, it is difficult to differentiate whether the participants are just more sensitive to and recognize the negative words more quickly, or if they are actually more motivated to avoid the stimuli. Further, behavioral measures (such as the joystick task) require a significant amount of time to complete which may dampen the effect that an initial act of self-control has on subsequent acts, thus making it difficult to test a mediation model. Therefore, for the

purposes of the current research, a *brief* measure of *state* avoidance motivation that is *not confounded* with sensitivity to aversive stimuli was desired.

A second purpose of the pilot study was to test whether the avoidance motivation measure would be sensitive to (or at all affected by) a self-control manipulation. Indeed, if the current measure of avoidance motivation was affected by a self-control manipulation (and in the right direction), then this would provide some initial evidence that exercising self-control leads to an increase in avoidance motivation.

Method

Participants

Fifty-one participants (42 female) took part in the pilot study for partial course credit. Age ranged from 17 to 21 years (M = 18.35).

Procedure and Materials

Upon arrival for the study, participants first completed some distractor/filler questionnaires such as the Rosenberg Self-Esteem Scale (Rosenberg, 1965), and the Name Letter Test (i.e., rating liking for letters; Albers, Rotteveel, & Dijksterhuis, 2009). Embedded among these questionnaires was the trait Self-Control Scale (Tangney, Baumeister, & Boone, 2004), which is a 36-item measure that assesses dispositional self-control, α = .89. Ratings were made on a Likert scale ranging from 1 (do not agree at all) to 7 (agree completely). Sample items include "I am good at resisting temptation" and "I never allow myself to lose control". After completing the questionnaires, all participants completed a self-control manipulation. For this manipulation, all participants watched a six minute video (without sound) of an individual being interviewed. In the bottom corner of the screen various words appeared throughout the

interview. Participants in the self-control condition were instructed to focus their attention on the individual and refrain from viewing any of the words. They were further instructed that if they did happen to look at the words, they must redirect their attention to the individual as soon as possible. Having to refrain from viewing words that flash on the screen and redirecting attention requires self-control to accomplish. Participants in the no self-control condition were allowed to view freely the video as they pleased. This manipulation has been used in prior research as a means to successfully engage individuals in self-control (DeWall, Baumeister, Gailliot, & Maner, 2008; Finkel, DeWall, Slotter, Oaten, & Foshee, 2009; Fischer, Greitemeyer, & Frey, 2007; Vohs & Faber, 2007).

After the manipulation, participants indicated on a Likert scale ranging from 1 (not at all likely) to 7 (very likely) how likely they would be to *avoid in the present moment*, nine different aversive stimuli (e.g., a dangerous animal, a socially uncomfortable situation). The aversive stimuli were drawn from previously validated measures of trait avoidance motivation such as the BIS/BAS scale, the Jackson-5 scale, and the Sensitivity to Punishment and Sensitivity to Reward scale (Carver & White, 1994; Jackson, 2009; Torrubia, Avila, Molto, & Caseras, 2001). In order to demonstrate that self-control exertion increases the avoidance to avoid a variety of aversive stimuli, efforts were made to include stimuli that are aversive in different respects (e.g., dangerous stimuli, annoying stimuli, socially aversive stimuli, painful stimuli). After rating the various aversive stimuli, participants then completed some demographic questions as well as follow-up questions that asked participants how much they had to control their attention during the video task, how much effort they felt they exerted

during the video task, and how difficult it was to follow the given instructions for the video task. These questions were included as a manipulation check of the effectiveness of the self-control manipulation ($\alpha = .77$; data for these questions were only obtained for the later 35 participants because the questions were added after the study had been running for a time). Participants were then debriefed and thanked for their participation (See Appendix A for pilot study measures).

Results

Avoidance Motivation Measure

An examination of the participants' ratings to avoid the 9 aversive stimuli provided supportive evidence regarding their use as a means to assess avoidance motivation in the current studies. More specifically, the 9 items achieved all of the following desirable criteria. First, the 9 items demonstrated good reliability ($\alpha = .87$). Second, an exploratory factor analysis using Maximum Likelihood Estimation provided strong evidence for a single, latent factor underlying the 9 items (eigenvalue = 4.53 [accounting for 50.31% of the variance], eigenvalues for other potential factors at or below 1, scree plot visual examination revealed one factor well above the elbow with all other factors at or below the elbow). Also, as Table 1 shows, the 9 items loaded well on the latent factor (factor loadings ranging from .48 to .82).

Table 1

Factor Loadings for 9 Avoidance Motivation Items

Avoidance Motivation Item	Factor Loading
The ringing of a loud and annoying alarm	.74
A dangerous animal	.76
A frightening location	.66
A scary situation	.48
A socially uncomfortable situation	.70
A difficult situation	.61
A punishing stimulus	.52
Something that you don't like	.82
A painful stimulus	.62

Note. Loadings are for Maximum Likelihood Estimation. Principal Components Analysis yielded virtually identical results.

Third, when combined, the 9 items were not significantly correlated with the trait self-control scale (r = -.09, p = .52) providing some discriminant validity evidence (see Figure 4 for scatterplot). More specifically, for the purposes of the current research, it is important to specifically examine an avoidance-motivated measure that is relatively unrelated to self-control. In other words, some avoidance-motivated behaviors (e.g., avoiding work on a tedious research paper that is shortly due) are influenced both by the impulse that compels the behavior and the mechanism that controls it. However, other avoidance-motivated behaviors are unrelated to self-control in that individuals have less inclination to control them. Therefore, a measure that solely measures avoidance motivation (free from the influence of self-control) was desired to demonstrate that prior self-control exertion is increasing avoidance motivation and not just affecting subsequent self-control as has already been demonstrated by past work examining the strength model.

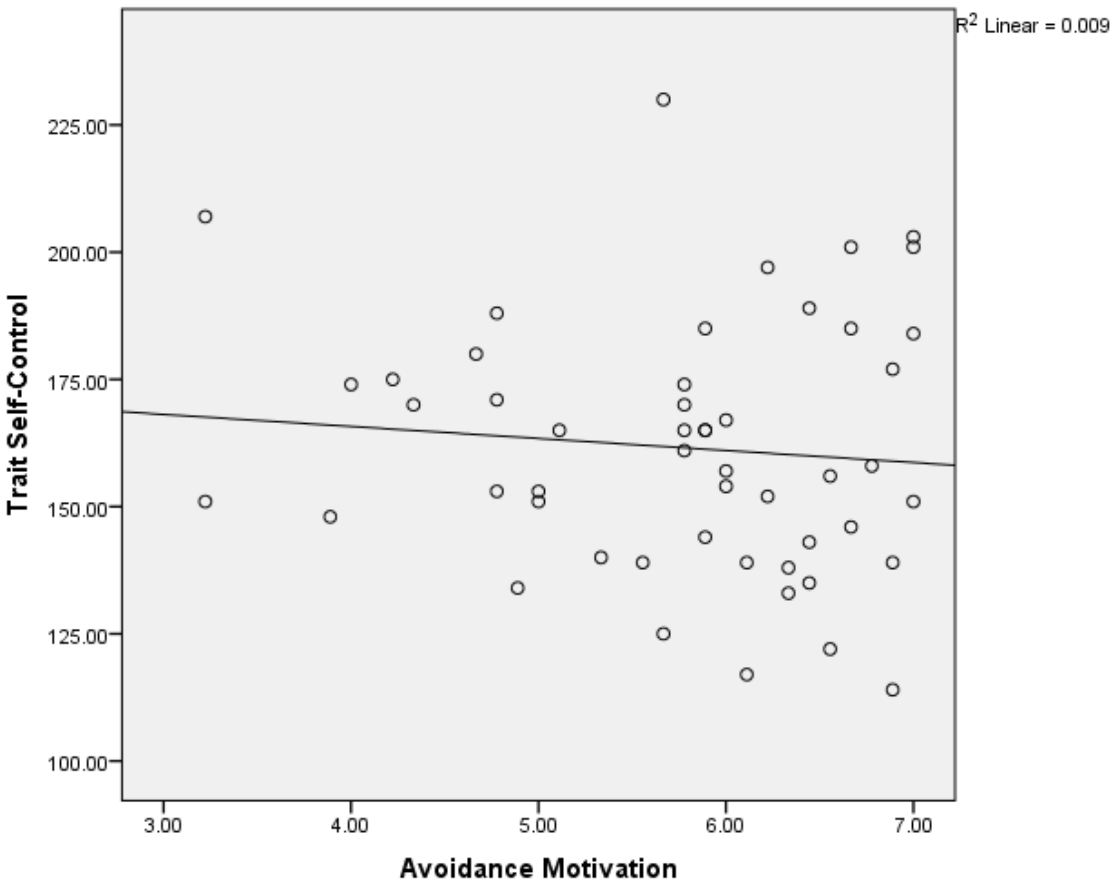


Figure 4. Bivariate scatterplot of Trait Self-Control and Avoidance Motivation.

Lastly, and important to the current research, when combined, the 9 items were affected by the self-control manipulation. Regarding the nature of the effect of the self-control manipulation on the combined 9 items, participants who exercised self-control scored higher (M = 6.10, SD = .72) on the combined 9-item measure than did participants who had not exercised self-control (M = 5.51, SD = 1.12) $F(1, 49) = 4.10$, $p < .05$, $d = .63$, suggesting that exercising self-control indeed leads to an increase in avoidance motivation. The mean differences between the self-control and no self-control conditions are visually displayed in Figure 5. This effect held even after entering trait

self-control as a covariate into the model, $F(1, 48) = 4.17$, $p < .05$ (although trait self-control was not significantly related to avoidance motivation).[1]

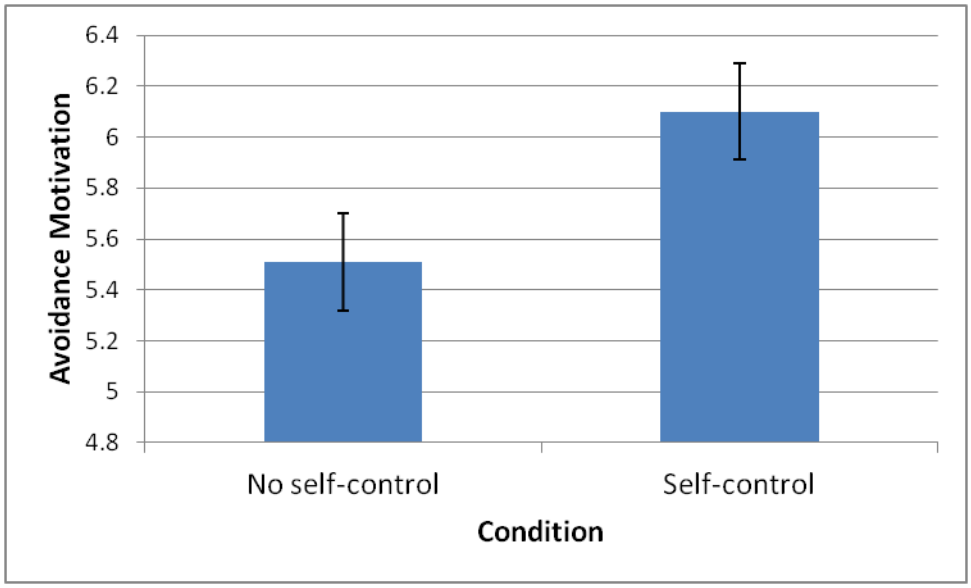


Figure 5. Effect of self-control manipulation on combined 9-item avoidance motivation measure in Pilot Study. Error Bars reflect Standard Error.

Self-Control Manipulation Check

To ensure that the self-control manipulation was effective at manipulating self-control, a one-way ANOVA was computed with the combined three manipulation check questions as the dependent variable. The results revealed that there was a significant difference between the no self-control ($M = 3.53$, $SD = 1.11$), and self-control ($M = 4.65$, $SD = 1.53$) conditions, $F(1, 33) = 6.07$, $p < .05$, $d = .84$. Thus, according to this analysis, the self-control condition exerted significantly more effort on the video task than did the no self-control condition, providing supportive evidence regarding the usefulness of the video task in manipulating self-control exertion.

Discussion

The results of the pilot study provided supportive evidence for the validity of a 9-item measure of state avoidance motivation for use in the current studies. More specifically, the 9 items demonstrated high reliability, loaded well on a single latent avoidance motivation factor, were not related to the trait self-control scale, and had high face validity since they were drawn from previously validated measures of trait avoidance motivation. Further, individuals who exercised self-control on a prior task, scored higher on the combined 9-item avoidance motivation measure providing an initial indication that when individuals exercise self-control, avoidance motivated-impulses become stronger. Because the 9 items seemed to be a valid measure of state avoidance motivation, and since they were found to be sensitive to a self-control manipulation, the 9 items were kept to serve as the measure of avoidance motivation in subsequent studies.

Although self-control exertion was found to affect scores on the avoidance motivation measure, the pilot study did not test if increased avoidance motivation mediates the effect of an initial self-control act on a subsequent self-control act. Studies 1 and 2 were designed and conducted to specifically address whether increased avoidance motivation serves a mediating function. More specifically, both Studies 1 and 2 were designed to include a subsequent measure of self-control after the completion of the avoidance motivation measure to test for mediation. However, Studies 1 and 2 differed in that the subsequent measure of self-control involved the overriding of either an avoidance-motivated impulse (Study 1) or an approach-motivated impulse (Study 2). Study 1 was aimed at examining if an increase in avoidance motivation (but not

approach motivation) would mediate the effect of an initial act of self-control on a subsequent self-control act that involves overriding an avoidance-motivated impulse. Conversely, Study 2 was aimed at testing if an increase in avoidance motivation does not (but approach motivation does) mediate the effect of an initial self-control act on a subsequent self-control act that involves overriding an approach-motivated impulse. Thus, Studies 1 and 2 were designed to give more concrete evidence that increased avoidance motivation mediates certain instances of subsequent self-control failure.

Study 1

Though the pilot study provided tentative evidence that exercising self-control leads to an increase in avoidance motivation, it did not test whether an increase in avoidance motivation actually mediates the effect of an initial act of self-control on a subsequent act of self-control. Study 1 was designed specifically to examine whether an increase in avoidance motivation (but not approach motivation) mediates the effect of an act of self-control on a subsequent act of self-control when the subsequent self-control act appears on the surface to involve overriding an avoidance-motivated impulse. Study 1 was also designed to include a different manipulation of self-control than that employed in the pilot study. More specifically, the self-control manipulation used in Study 1 was designed to have a no self-control condition as well as two separate self-control conditions. Although not hypothesized, the possibility exists that an increase in avoidance motivation may only occur (or is more pronounced) when an individual has previously exercised self-control only by overriding an avoidance-motivated impulse on the initial task. Thus, increased avoidance motivation may only serve a mediating role when the initial self-control act and the subsequent self-control

act both involve overriding an avoidance motivated impulse. Such a possibility would be in line with research arguing that homeostatic systems exist to keep physiological and psychological process at a set point (Cannon, 1932; Cummins, 2000; Gargiulo & Stokes, 2009; Rodolfo, 2000). For instance, homeostatic systems have been found to aid in maintaining subjective well-being near a set point even in the face of adverse life situations that may cause temporary decrements (Cummins, 2000; Gargiulo & Stokes, 2009). Applying the same logic to self-control, it is possible that when individuals exert self-control by overriding an avoidance-motivated impulse (thus decreasing the strength of that specific avoidance-motivated impulse), a homeostatic system is activated that strengthens subsequent avoidance-motivated impulses in order to maintain a relative level of equilibrium for avoidance motivation. However, if an individual exercises self-control by overriding an approach-motivated impulse on an initial task, subsequent avoidance-motivated impulses may not be strengthened.

Therefore, in order to test the additional possibility that homeostatic processes may be occurring when individuals exercise self-control, two self-control conditions (i.e., overriding an avoidance-motivated impulse and overriding an approach-motivated impulse) were included in addition to a no self-control condition. As previously discussed, this effect was not hypothesized, but was still of interest to test. Subsequently, participants completed measures of avoidance and approach motivation. Lastly, participants completed a subsequent self-control task that appears to involve overriding an avoidance-motivated impulse (consuming a bad tasting substance). It was hypothesized that exercising self-control (regardless of whether it involves overriding an approach- or avoidance-motivated impulse) would lead to an increase in both

avoidance and approach motivation (the former outcome replicating the pilot study and the latter outcome replicating Schmeichel et al., 2010), but that only avoidance motivation would mediate the effect of the initial self-control task on the subsequent self-control task.

Method

Participants

Ninety-eight (72 female) participants took part in the study. Age ranged from 18 to 33 years (M = 19.40). The sample was composed of 70.4% Caucasian, 9.2% Asian, 6.1% African American, 5.1% Hispanic, 4.1% Middle Eastern, and 5.1% indicated 'Other' as their ethnicity or did not specify.

Procedure and Materials

Before arriving for the study, all participants were instructed not to eat or drink any substance for at least three hours prior to study participation. This was done to ensure that the stimuli in one of the self-control conditions (i.e., appetizing cookies that were to be resisted) were as appealing as possible in order to increase the likelihood that participants were exercising self-control. Upon arrival, and similar to the pilot study, participants first completed the trait Self-Control Scale, α = .85 (Tangney et al., 2004) embedded among some filler/distractor questionnaires (questionnaire assessing attitudes toward art, Name Letter Test; Albers et al., 2009). After completing the questionnaires, participants were randomly assigned to one of three conditions: no self-control, self-control overriding an avoidance-motivated impulse, and self-control overriding an approach-motivated impulse. Participants in all three conditions were instructed to complete a writing task in which they wrote for 5 minutes about whatever came to their

mind. For participants in the no self-control condition, this was the extent of the instructions that they were given. Simply writing down thoughts has been shown in prior research not to require self-control (Gailliot et al., 2006; Muraven, Collins, & Nienhaus, 2002; Stillman, Tice, Fincham, & Lambert, 2009; Vohs & Schmeichel, 2003). For participants in the self-control (overriding approach motivation) condition, a bowl of appetizing cookies was placed in front of them while they completed the writing task. Participants in this condition were given the cover story that the writing task was interested in examining thought formation while hungry. More specifically, they were told that the reason they had to fast for three hours prior to study participation was in order to induce a state of hunger for the writing task so the thoughts they write down could later be examined. They were asked to avoid eating the cookies if possible so the results of the task would not be affected, but were told that they could choose to eat the cookies if they could not stand their hunger anymore. Thus, the participants had to exert self-control in order to avoid eating the cookies. Participants in the self-control (overriding avoidance motivation) condition were instructed to hold their non-dominant hand straight out in front of them and in an upright (parallel to the ground) position while they completed the writing task with their dominant hand. They were given the cover story that the task was interested in examining the thoughts they write down while having to exert themselves physically. Prior research has shown that both having to resist eating appetizing cookies, and holding one's arm upright while completing another task requires self-control exertion (Geeraert & Yzerbyt, 2007; Stucke & Baumeister, 2006). Although resisting cookies and holding ones arm upright both require self-control, they appear to involve overriding different types of impulses. More

specifically, having to resist eating an appetizing food requires overriding an approach-motivated impulse (wanting to approach and eat the food), and holding ones arm in an uncomfortable position involves overriding an avoidance-motivated impulse (wanting to avoid further discomfort by letting the arm down).

After the self-control manipulation, participants completed the 9-item measure of avoidance motivation ($\alpha = .88$), that was examined in the pilot study. Similar to the pilot study, participants indicated on a Likert scale ranging from 1 (not at all likely) to 7 (very likely) how likely they would be to *avoid in the present moment* various aversive stimuli. In addition to the measure of avoidance motivation, participants also completed the BAS subscale of the BIS/BAS scale to assess approach motivation ($\alpha = .91$). The BAS subscale is a well-validated, 13-item measure of approach motivation (Carver & White, 1994), and was used by Schmeichel et al. (2010) to demonstrate that exercising self-control leads to an increase in approach motivation. For the current study, participants were instructed to indicate on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree) how much they agreed with each statement (e.g., If I wanted something, I would go all-out to get it; If I saw a chance to get something that I want, I would move on it right away) based on how they felt in the present moment. The presentation of the measures of avoidance motivation and approach motivation were counterbalanced.

Participants then completed the measure of subsequent self-control. For this task, participants were seated at a table with 20 small plastic cups. Each cup contained one ounce of a bad-tasting substance made by combining water, vinegar, and a small amount of orange kool-aid mix. Participants were then given the following instructions:

"This task concerns motivation. In front of you are 20 plastic cups each containing a drink that does not taste good to most people. However, it is not harmful. We will give you a nickel for every ounce you drink. How much you drink is up to you." Participants were then allowed to consume as many ounces of the drink as they desired. This task has been used in prior research to assess subsequent self-control because the more ounces that are consumed, the more self-control the individual is thought to be exerting. (Oaten et al., 2008; Vohs et al., 2008).

Lastly, participants completed some demographics questions as well as some follow up questions. Among the follow up items were questions asking their dislike for vinegar, their opinion of the taste of the drink, and how thirsty they were. These questions were included to use as potential covariates when examining how many ounces of the bad tasting substance participants consumed. Also, participants were asked how much effort they had to exert for the self-control manipulation, how difficult they found it to complete the self-control manipulation, and how difficult they found it to follow instructions for the self-control manipulation. These three questions were included to serve as a manipulation check of the effectiveness of the self-control manipulation, $\alpha = .76$. Participants were then debriefed on the nature of the study, paid according to how much of the bad tasting drink they consumed, and thanked for their participation (see Appendix B for Study 1 measures).

Results

Self-Control Exertion and Avoidance Motivation

To examine if exercising self-control leads to an increase in avoidance motivation, a one-way ANOVA was computed with the 9-item avoidance motivation

measure as the dependent variable. The results revealed that there was no difference between the no self-control (M = 5.72, SD = 1.07), self-control overriding approach (M = 5.38, SD = .91), and self-control overriding avoidance (M = 5.27, SD = 1.60) conditions on the avoidance motivation measure, $F(2, 95) = 1.15$, $p = .32$. Further, examining other variables (i.e., trait self-control, gender, and approach motivation) as potential covariates and moderators did not yield a significantly different effect between the no self-control and self-control conditions, all ps > .25.

Self-Control Exertion and Approach Motivation

To examine if the self-control manipulation had an effect on approach motivation, a one-way ANOVA was computed with the BAS subscale as the dependent variable. Contrary to prior research (i.e., Schmeichel et al., 2010), The results revealed that there was no difference between the no self-control (M = 5.50, SD = .63), self-control overriding approach (M = 5.18, SD = .90), and self-control overriding avoidance (M = 5.23, SD = 1.22) conditions on the approach motivation measure, $F(2, 95) = 1.13$, $p = .33$. Further, examining other variables (i.e., trait self-control, gender, and avoidance motivation) as potential covariates and moderators did not yield a significantly different effect between the no self-control and self-control conditions, all ps > .13.

Order Effects Analysis

Since the measures of avoidance motivation and approach motivation were counterbalanced, as a supplementary analysis, I tested whether order effects were present and contaminating the ability to detect an effect of the self-control manipulation on either avoidance or approach motivation. In other words, it may have been possible that the self-control manipulation was having an effect on avoidance motivation only

when the avoidance motivation measure was presented before the approach motivation measure (and vice versa). In order to examine if order was indeed affecting the results, a 3 (self-control overriding avoidance vs. self-control overriding approach vs. no self-control) X 2 (avoidance motivation measure first vs. approach motivation measure first) factorial ANOVA was computed for both the avoidance motivation dependent variable and the approach motivation dependent variable. For the avoidance motivation dependent variable, the results revealed that there was not a significant interaction between the self-control condition variable and the presentation of the avoidance and approach motivation measures variable on avoidance motivation scores, $F(2, 92) = .12$, $p = .89$. In other words, there was no difference in the effectiveness of the self-control manipulation on avoidance motivation depending on whether the avoidance motivation measure was presented before or after the approach motivation measure. For the approach motivation dependent variable, there was also no significant interaction between the self-control condition variable and the presentation of the avoidance and approach motivation measures variable on approach motivation scores, $F(2, 92) = 1.29$, $p = .28$. In other words, there was no difference in the effectiveness of the self-control manipulation on approach motivation depending on whether the approach motivation measure was presented before or after the avoidance motivation measure.

Self-Control Exertion and Bad Tasting Substance Consumed

To examine if the self-control manipulation affected the amount of bad tasting substance consumed, a one-way ANOVA was computed with the ounces of bad tasting substance as the dependent variable. Contrary to prior research (i.e., Oaten et al., 2008; Voh et al., 2008), the results revealed no difference between the no self-control (M =

4.92, *SD* = 6.00), self-control overriding approach (*M* = 3.88, *SD* = 6.17), and self-control overriding avoidance (*M* = 5.20, *SD* = 7.10) conditions, $F(2, 95) = .40$, $p = .67$. Further, examining other variables (i.e., trait self-control, gender, dislike for vinegar, opinion of the taste of the drink, thirst) as potential covariates and moderators did not yield a significantly different effect between the no self-control and self-control conditions, all *p*s > .10.[2]

Self-Control Manipulation Check

To test whether the self-control manipulation was effective at manipulating self-control, a one-way ANOVA was computed with the combined three manipulation check questions as the dependent variable. The results revealed that there was an overall significant difference among the three self-control conditions, $F(2, 95) = 3.78$, $p < .05$, $\eta^2 = .01$. Post Hoc tests to examine which conditions differed from each other revealed that participants in the no self-control condition reported exerting significantly less effort on the manipulation (*M* = 2.20, *SD* = 1.16) than did participants in the self-control overriding avoidance condition (*M* = 3.08, *SD* = 1.17), $p = .02$. The self-control overriding approach condition (*M* = 2.67, *SD* = 1.43) did not significantly differ from the no self-control condition ($p = .26$) or the self-control overriding avoidance condition ($p = .38$).

Discussion

Unlike the pilot study, Study 1 failed to find any evidence that exercising self-control leads to an increase in avoidance motivated-impulses. In addition, Study 2 failed to replicate prior research that has found that exercising self-control leads to increases in approach-motivated impulses (Schmeichel et al., 2010) as well as decreased

consumption of a bad tasting substance (Oaten et al., 2008; Vohs et al., 2008). Because of the inability to uncover these findings, Study 1 was unable to examine the additional hypothesis that an increase in avoidance motivation (but not approach motivation) mediates the effect of an initial act of self-control on another act of self-control when the latter act appears to involve overriding an avoidance motivated impulse. The lack of evidence for both the current hypotheses as well as previously established findings regarding self-control, approach motivation, and consumption of a bad tasting substance suggest the possibility that other factors may have negatively influenced the results (e.g., the self-control manipulation may have been unsuccessful at manipulating self-control exertion). Indeed, although the manipulation check assessed in Study 1 found an overall significant difference between the experimental conditions in terms of how much effort participants felt they exerted, follow up analyses revealed that only the self-control overriding avoidance condition (as opposed to the self-control overriding approach condition) was successful. However, both the self-control overriding approach and overriding avoidance conditions were unable to have an effect on any other outcomes including avoidance motivation, approach motivation, and bad tasting drink consumed. Thus, it seems plausible that the self-control manipulation used in Study 1 may simply have been unable to manipulate self-control exertion successfully.

Study 2

Like Study 1, Study 2 was aimed at replicating the finding of the pilot study by demonstrating that exercising self-control leads to an increase in avoidance motivation, and that exercising self-control also leads to an increase in approach motivation (replicating Schmeichel et al., 2010). Additionally, Study 2 was designed to examine if

increased approach motivation (but not increased avoidance motivation) mediates the effect of an initial self-control act on a subsequent self-control act that involves overriding an approach-motivated impulse. Since it was hypothesized that initial self-control exertion of any type would increase both approach and avoidance motivation, Study 2 employed only two conditions (no self-control vs. self-control). Self-control was manipulated by use of the same self-control manipulation (i.e., watching video task) that was used in the pilot study. Further, to differentiate empirically the mechanisms underlying acts of self-control that involve overriding approach-motivated impulses and overriding impulses to avoid aversive stimuli; Study 2 was designed to assess whether increased avoidance motivation does not mediate the effect of self-control at time 1 on self-control at time 2 when the subsequent measure of self-control is one that has been assumed in past research to involve suppressing the impulse to approach a rewarding stimulus (i.e., resisting the temptation to eat cookies). Conversely, I expected increased approach motivation to mediate this relationship.

Method

Participants

One-hundred and seventeen participants (76 female) took part in the study. Age ranged from 17 to 26 years (M = 18.74). The sample was composed of 63.2% Caucasian, 7.7% Asian, 12% African American, 6.8% Hispanic, and 10.3% indicated 'Other' as their ethnicity or did not specify.

Procedure and Materials

Similar to Study 1, before arrival, all participants were instructed to not eat or drink any substance for at least three hours prior to study participation. This was done to

ensure that participants were matched on hunger levels so the dependent measure for Study 2 (i.e., cookie consumption) would not be adversely affected. Upon arrival, and similar to the Pilot Study and Study 1, participants first completed the trait Self-Control Scale, $\alpha = .84$ (Tangney et al., 2004) embedded among other questionnaires (questionnaire assessing attitudes toward art, Name Letter Test; Albers et al., 2009). After this, participants were randomly assigned to either a no self-control or self-control condition by way of the same video manipulation that was used in the Pilot Study (DeWall et al., 2008; Vohs & Faber, 2007). Subsequently, participants then completed the same measure of avoidance motivation, $\alpha = .88$, that was used in Study 1, as well as the BAS subscale of the BIS/BAS scale, $\alpha = .90$, that was also used in Study 1 (Carver & White, 1994). The presentation of the measure of avoidance motivation and the BAS subscale were again counterbalanced. After completion of the measures of avoidance and approach motivation, participants completed a dependent measure of subsequent self-control. For this measure, participants were presented with a bowl containing 35 bite-sized cookies. Participants were instructed that they would be taste-testing the cookies. More specifically, they were instructed to eat as many cookies as they needed in order to accurately judge the taste and quality of the cookies. They were also given a form to rate the cookies along various dimensions (e.g., taste, likelihood of purchasing, enjoyment experienced while tasting). Participants were given 7 minutes to complete this task. The amount of cookies consumed indicated the amount of self-control participants engaged in (i.e., more cookies consumed indicates lower self-control). This task has been used in prior research as a valid measure of subsequent self-control (Baumeister, DeWall, Ciarocco, & Twenge, 2005). Participants then completed the

concern for dieting subscale of the Restraint Scale (Herman, Polivy, Pliner, Threlkeld, & Munic, 1978) which assesses individuals' concern for food consumption and dieting, $\alpha = .79$. This measure was included as a potential covariate when examining the amount of cookies consumed in order to provide a more sensitive measure of subsequent self-control. Sample items include "Do you eat sensibly in front of others and splurge alone" and "How conscious are you of what you are eating". Participants then completed some demographics questions as well as some follow up questions. Among these were questions asking participants the last time they had eaten food, how hungry they were during the study, and self-reported weight. These questions were included to use as potential covariates when examining the amount of cookies consumed. Questions that asked participants how much they had to control their attention during the video task, how much effort they felt they exerted during the video task, how difficult it was to complete the video task, and how difficult it was to follow the given instructions for the video task were also included. These questions were included as a manipulation check of the effectiveness of the self-control manipulation ($\alpha = .77$). Participants were then thanked for their participation and debriefed on the nature of the study (see Appendix C for Study 2 measures).

Results

Self-Control Exertion and Avoidance Motivation

To examine if the self-control manipulation had an effect on avoidance motivation, a one-way ANOVA was computed with the 9-item avoidance motivation measure as the dependent variable. The results revealed that there was no difference between the self-control ($M = 5.35$, $SD = 1.25$) and no self-control ($M = 5.59$, $SD =$

1.03) conditions on the avoidance motivation measure, $F(1, 115) = 1.31$, $p = .26$. Further, examining other variables (i.e., trait self-control, gender, and approach motivation) as potential covariates and moderators did not yield a significantly different effect between the no self-control and self-control conditions, all *p*s > .22.

Self-Control Exertion and Approach Motivation

To examine if the self-control manipulation had an effect on approach motivation, a one-way ANOVA was computed with the BAS portion of the BIS/BAS Scale as the dependent variable. Contrary to prior research (i.e., Schmeichel et al., 2010), the results revealed that there was no difference between the self-control ($M = 5.07$, $SD = 1.02$) and no self-control ($M = 5.17$, $SD = .90$) conditions on approach motivation, $F(1, 115) = .31$, $p = .58$. Further, examining other variables (i.e., trait self-control, gender, and avoidance motivation) as potential covariates and moderators did not yield a significantly different effect between the no self-control and self-control conditions, all *p*s > .31.

Order Effects Analysis

Like Study 1, since the measures of avoidance motivation and approach motivation were counterbalanced, as a supplementary analysis, I tested whether order effects were present and contaminating the ability to detect an effect of the self-control manipulation on either avoidance or approach motivation. In order to examine if order effects were indeed affecting the results, a 2 (self-control vs. no self-control) X 2 (avoidance motivation measure first vs. approach motivation measure first) factorial ANOVA was computed for both the avoidance motivation dependent variable and the approach motivation dependent variable. For the avoidance motivation dependent

variable, the results revealed that there was not a significant interaction between the self-control condition variable and the order variable on avoidance motivation scores, $F(1, 113) = .56$, $p = .46$. In other, words, there was no difference in the effectiveness of the self-control manipulation on avoidance motivation depending on whether the avoidance motivation measure was presented before or after the approach motivation measure. For the approach motivation dependent variable, there was not a significant interaction between the self-control condition variable and the presentation of the avoidance and approach motivation measures variable on approach motivation scores, $F(1, 113) = 2.57$, $p = .11$. In other words, there was no difference in the effectiveness of the self-control manipulation on approach motivation depending on whether the approach motivation measure was presented before or after the avoidance motivation measure.

Self-Control and Cookies Consumed

To examine if the self-control manipulation affected the amount of cookies consumed, a one-way ANOVA was computed with the amount of cookies consumed as the dependent variable. To calculate the amount of cookies consumed, a pre-test weight was taken with all 35 cookies in the bowl, and was then again weighed after the study session was complete. The difference in the weight (in grams) between the pre- and post-test measurements comprised the amount of cookies consumed. Contrary to prior research (i.e., Baumeister et al., 2005), the results revealed no difference between the self-control ($M = 31.60$, $SD = 22.43$) and no self-control ($M = 33.83$, $SD = 20.37$) conditions in the amount of cookies consumed, $F(1, 115) = .32$, $p = .57$. Further, examining other variables (i.e., trait self-control, gender, dieting concerns, participant

weight, self-reported taste, likelihood of buying the tested cookies, enjoyment while tasting the cookies, hunger during study session, liking for cookies, frequency of eating cookies, time elapsed since last meal) as potential covariates and moderators did not yield a significantly different effect between the no self-control and self-control conditions, all *p*s > .30.[3]

Self-Control Manipulation Check

To assess whether the self-control manipulation was effective at manipulating self-control, a one-way ANOVA was computed with the combined four manipulation check questions as the dependent variable. The results revealed that there was not a significant difference between the no self-control (M = 3.99, SD = 1.14), and self-control (M = 3.87, SD = 1.24) conditions, $F(1, 110) = .29$, $p = .59$.

Discussion

Study 2, like Study 1, failed to find any evidence that exercising self-control leads to an increase in avoidance-motivated impulses. In addition, Study 2 failed to replicate prior research that has found that exercising self-control leads to increases in approach motivated impulses (Schmeichel et al., 2010) as well as greater consumption of an unhealthy food (Baumeister et al., 2005). Because of the inability to establish significant findings for the preliminary analyses, Study 2 was further unable to examine the hypothesis that an increase in approach motivation (but not avoidance motivation) mediates the effect of an initial act of self-control on another act of self-control when the latter act appears to involve overriding an approach-motivated impulse. Similar to Study 1, the lack of evidence for both the current hypotheses as well as previously established findings regarding self-control, approach motivation, and cookie

consumption also suggest the possibility of other factors may have negatively influenced the results. Like Study 1, Study 2 may have suffered from the self-control manipulation being unable to manipulate self-control exertion successfully. This assumption is supported by the manipulation check in Study 2 failing to find a significant difference between the self-control and no self-control conditions in the amount of effort that participants felt they exerted while completing the video task.

General Discussion

A substantial amount of prior research has demonstrated that engaging in an act of self-control impairs further acts of self-control for a brief time (Baumeister et al., 2007; Baumeister et al., 1998; Hagger et al., 2010). Despite this knowledge, however, little is known about the factors that underlie or mediate the effect of an initial act of self-control on subsequent self-control acts. The current work proposed that increases in avoidance-motivated impulse strength may mediate the effect of an initial self-control act on a subsequent self-control act. In other words, the current research hypothesized that exercising self-control leads to an increase in avoidance motivation and an increase in avoidance motivation mediates certain self-control outcomes.

Despite the current predictions, the current work only provided tentative evidence that avoidance motivation indeed plays a mediating role. More specifically, the pilot study found that exercising self-control on an initial task leads to an increase in avoidance motivation. However, the pilot study did not attempt to examine if increased avoidance motivation mediates the effect of an initial self-control act on subsequent self-control acts. Study 1 was conducted to examine if increased avoidance motivation (but not increased approach motivation) indeed mediates the effect of an act of self-

control on a subsequent act that involves overriding an avoidance-motivated impulse. Similarly, Study 2 was conducted to examine if increased approach motivation (but not increased avoidance motivation) mediates the effect of an act of self-control on a subsequent act that involves overriding an approach-motivated impulse. However, both Studies 1 and 2 failed to replicate the results of the pilot study that previously found that exercising self-control leads to an increase in avoidance motivation. A failure to find evidence that exercising self-control leads to an increase in avoidance motivation further precluded any attempts at testing whether increased avoidance motivation mediates the effect of an initial act of self-control on subsequent self-control attempts. A failure to replicate the findings of the pilot study may suggest that increased avoidance motivation is not a plausible mediating factor underlying some acts of self-control. However, it is important to note that Studies 1 and 2 also failed to replicate well established findings in the self-control literature including previous research that demonstrates that exercising self-control leads to an increase in approach motivation (Schmeichel et al., 2010), an increase in consumption of an appetizing food (i.e., cookies; Baumeister et al., 2005), and a decrease in consumption of an aversive tasting drink (Oaten et al., 2008; Vohs et al., 2008). A failure to replicate well established findings in the self-control literature point to the possibility that other factors may have negatively influenced the results of Studies 1 and 2.

Explanations for Current Results

When assessing the null results obtained in Studies 1 and 2 for the current hypotheses, as well as the previously established findings in the self-control literature

(i.e., self-control exertion affecting approach motivation, cookie and aversive tasting substance consumption), a number of possible explanations can be considered.

First, the inability to obtain any significant results could have been due to a lack of power. Indeed, having sufficient power is a key component to any study design and a lack of power can lead to an inability to detect an effect that may actually exist (Rossi, 2013). However, for Studies 1 and 2, insufficient power seems like an unlikely explanation given that prospective power analyses were conducted beforehand to ensure that adequately sized samples were obtained for the reported analyses. More specifically, prospective power analyses recommended obtaining samples sizes of approximately 95 participants for Study 1 and 80 participants for Study 2. Given that both studies had sample sizes larger than the recommendations of the prospective power analyses (n = 98 for Study 1 and n = 117 for Study 2), a lack of power seems like an unlikely explanation for why null results were obtained.

Second, exercising self-control may not actually lead to an increase in avoidance motivation, contrary to what the current theorizing suggests. However, it might be premature to dismiss avoidance motivation based on the overall pattern of results obtained for the current research. More specifically, the results of Studies 1 and 2 did not only fail to find an effect of the self-control manipulations on avoidance motivation, but the manipulations also did not have an effect on other outcomes that have been reliably demonstrated in past research (i.e., approach motivation, cookie consumption, bad tasting drink consumption) to be affected by self-control exertion (Baumeister et al., 2005; Oaten et al., 2008; Schmeichel et al., 2005; Vohs et al., 2008). An inability to replicate established findings in the self-control literature seems to point to the

possibility that the self-control manipulations used in Studies 1 and 2 were unsuccessful in eliciting varying amounts of self-control among participants. Such an assumption is supported by the manipulation checks in Studies 1 and 2 that did not find strong support for the effectiveness of the self-control manipulations. However, if the manipulations were indeed unsuccessful in eliciting varying amounts of self-control among participants, why would the manipulations have been ineffective only in Studies 1 and 2 and not the pilot study (especially since the same manipulation was used in both the pilot study and Study 2)? One possibility is that by having participants fast for three hours prior to study participation (as was only the case in Studies 1 and 2) forced the participants to exercise a considerable amount of self-control right before arriving for the study. In other words, by having to resist consuming any food or substance before study participation, participants may have already been engaging in a substantial amount of self-control. Thus, all the participants may have been relatively low in self-control at the onset of the study and a manipulation to further decrease their self-control capacity may have been ineffective. Indeed, comparing the mean ounces of bad tasting substance consumed for the no self-control condition in Study 1 ($M = 4.92$) with the no self-control condition in a prior study ($M = 7.68$) conducted by Vohs et al. (2008) shows a potentially substantial difference in the amount of self-control had by participants who were not randomly assigned to exert self-control. Therefore, having participants fast just prior to study participation may have dampened the effectiveness of the self-control manipulations.

Another possibility for why Studies 1 and 2 failed to uncover any significant findings could be due to the presence (or lack of) various channel factors. Channel

factors are small, seemingly insignificant, variables in the environment that can channel an individual's behavior in a certain direction (Nahmias, 2007). For example, in examining whether certain attitudes for obtaining a flu shot actually increase the rate in which flu shots are obtained, Leventhal, Singer, and Jones (1965) found that simply having a positive attitude toward flu shots is only predictive of actual vaccination if an individual is given information (e.g., map, hours of availability) regarding how to obtain a flu shot. Further, Ross and Nisbett (1991) describe an experiment in which asking individuals to contribute to a food drive occurs at a higher rate when the individuals are asked in a very personalized manner as opposed to simply being asked. Thus, the presence of certain (seemingly insignificant) situational factors, can channel behavior toward desired (or undesired) outcomes. Conversely, without the presence of certain channel factors, many behaviors may be unlikely to occur. In the current research, the presence (or absence) of channel factors may have adversely affected the results. More specifically, both Studies 1 and 2 required participants to complete a number of tasks (e.g., writing thoughts, resisting cookies, holding arm upright, drinking a bad tasting substance, taste testing cookies) which was administered by a research assistant. The research assistant administered study sessions in which more than one participant participated at the same time, thus requiring the research assistant to direct their attention from one participant to the next which may have led to the research assistant not being able to devote sufficient attention to each participant while completing the tasks. Thus, many of the participants may have been unmotivated to complete the various tasks properly because they felt very little demand from the research assistant. Thus, having only one participant per session, may have been a necessary channel

factor to allow the research assistant to devote sufficient attention causing the participant to feel more motivated to complete the tasks properly. Further, for the subsequent measures of self-control in both Studies 1 and 2 (i.e., consuming a bad tasting substance and taste testing cookies), participants may not have been given enough incentive to complete the tasks properly. More specifically, in Study 1 it may have been necessary to offer more than a nickel to channel participants' behavior to drink more of the bad tasting substance than what participants actually consumed. Because the incentive may not have been strong enough, this may have caused a floor effect with the data distribution. Likewise, in Study 2, it may have been necessary to provide more appetizing cookies than what were used in the study (the cookies were store bought as opposed to freshly baked) in order to channel the participants' behavior to consume cookies. Indeed, an examination of the overall means for the number of ounces of bad tasting drink consumed in Study 1 (M = 4.61) and the amount of cookies consumed in Study 2 (M = 32.75 grams equating to about 5 cookies) seem to indicate some degree of a floor effect for both measures. The presence of floor effects may have led to difficulty in being able to detect mean differences between the various experimental groups.

Another possibility for why Studies 1 and 2 failed to find a significant increase in avoidance motivation, and failed to replicate established findings in the self-control literature, may be due to the simple possibility that obtaining significant effects using standard self-control paradigms may be more difficult than previously thought. Although there are countless published studies that have been successful at replicating the effect that exercising self-control at time one decreases self-control at time two,

there is concern among some researchers that the effect is not as robust as originally assumed (Kurzban, 2014). More specifically, concern has been expressed that standard self-control manipulations (e.g., the video task used in the current research) are often unable to create a difference among experimental conditions. A significant number of the published experiments in the self-control literature may simply reflect an instance of the *file-drawer problem* that plagues so many other literatures (Loannidis, 2005; Rosenthal, 1979; Spellman, 2012). According to Rosenthal (1979), published studies reflect only a proportion of all the research that is actually conducted by researchers. Many (possibly even the majority) of experiments are never published because they produce null results for a variety of reasons, thus, inflating the actual effect size of any given phenomenon. Only publishing experiments that find significant effects raises the possibility that the self-control literature (like many literatures) may not be immune to the file-drawer problem. Indeed, the null results obtained in Studies 1 and 2 can potentially be explained by the effect size for the self-control manipulations not being as large as has been assumed by past research, thus making it more difficult to obtain significant findings in any given experiment.

Lastly, recent research has found the self-control depletion effect to only work among certain types of people. For instance, Job, Dweck, and Walton (2010) found that self-control manipulations are ineffective among people who implicitly believe that their ability to exert self-control is unlimited. Conversely, Job et al., (2010) found that individuals who implicitly believe that self-control is limited can be affected by a self-control manipulation. Additionally, Gropel, Baumeister, and Beckmann (2014) recently provided evidence that state-oriented individuals (individuals who are hesitant to take

action and tend to conserve resources) do not shows signs of ego depletion after initial self-control exertion. Thus, it is possible that for Studies 1 and 2, a large number of participants implicitly believed that self-control is unlimited, or had state-oriented personalities which would make the self-control manipulations less effective. However, since no measures were included in the current studies to assess individuals' lay theories regarding self-control or whether such individuals have state-oriented personalities, such possibilities could not be directly assessed.

Implications, Limitations, and Future Directions

Although the results for Studies 1 and 2 failed to find any evidence regarding the hypotheses that exercising self-control leads to an increase in avoidance motivation, and that avoidance motivation mediates certain self-control outcomes, the pilot study provided some indication that exercising self-control leads to an increase in avoidance motivation. Although more work is needed to replicate the effect found in the pilot study before any certain conclusions can be made, the possibility that exercising self-control leads to an increase in avoidance motivation has the potential to have important theoretical implications for our current understanding of self-control failure. As previously discussed, an understanding of which factors mediate the effect of an initial self-control act on a subsequent self-control act has not been well established in the self-control literature. Increased avoidance motivation offers one possibility that may help clarify what exactly is occurring when individuals fail to exercise self-control after having already exercised self-control. Also, a better theoretical understanding of what is occurring when individuals fail in their self-control attempts may lead to discovering more practical means by which to prevent self-control failure.

Given the importance of obtaining a better theoretical understanding of which mechanisms are underlying self-control failure after prior self-control exertion, future research should continue to examine if increased avoidance motivation mediates the effect of an initial self-control act on subsequent self-control acts. More specifically, future research should attempt to examine if self-control exertion leads to an increase in avoidance motivation using a variety of populations. The pilot study (as well as Studies 1 and 2) suffered from the limitation of having a sample that is not very generalizable to the general population. Thus, obtaining a more representative sample would increase the generalizability of the pilot study results. Also, as previously discussed, if self-control manipulations are not as robust as originally assumed and may only work among certain populations (e.g., individuals who believe that self-control is limited, and individuals who are not state-oriented), examining a variety of populations may increase the likelihood of better understanding the effect that avoidance motivation may serve as a mediator of self-control failure.

Another limitation with the current research is that the finding that self-control increases avoidance motivation in the pilot study, was uncovered using a self-report measure. Although a self-report measure was purposely used in the current studies, future research could attempt to formulate a novel method by which to assess avoidance motivation using a behavioral measure that still allows for the testing of mediational models. Although the avoidance motivation measure was self-report, the pilot study tested and found good evidence for its use as a means to assess avoidance motivation in the current research. In other words, the pilot study found that by asking participants how likely they would be to avoid various aversive stimuli in the present moment, a

reliable index of state avoidance motivation can be assessed. More specifically, the avoidance motivation items were found in the pilot study to have good reliability, load well on a single latent factor, have strong face validity, not correlate with the trait self-control scale, and were affected by a self-control manipulation. Thus, it is plausible to assess avoidance motivation at a state level using the items found in the pilot study. Although the avoidance motivation items seem adequate for the current research, the pilot study was not specifically designed as an extensive validation of a state avoidance motivation measure to be used by other researchers. However, the results of the pilot study provide a potential first step in validating a state avoidance motivation measure for general use. Future research could extend upon the findings of the pilot study by attempting to validate the current avoidance motivation items using larger-scale samples that allow for the use of more thorough statistical tests such as confirmatory factor analysis (Joreskog, 1969). In addition, specifically designed validation studies could also include a wider range of measures (e.g., trait avoidance motivation, behavioral measures of avoidance motivation) to better determine convergent, divergent, and predictive validity. As previously mentioned though, the results of the pilot study provide a promising first step.

Conclusions

Complementing previous research that has attempted to examine blood glucose and increases in approach motivation as potential factors that underlie self-control failure after initial self-control exertion (Gailliot et al., 2007; Schmeichel et al., 2010), the current research attempted to examine if increases in avoidance motivation underlie certain failures in self-control. Although, the current results were unable to give a clear

indication of whether increased avoidance motivation underlies self-control failure, the pilot study provided an initial indication that avoidance motivation may play a role in self-control failure. Thus, the current work provides both a theoretical and empirical first step for future research to continue examining the possible role that avoidance motivation may serve as an underlying mechanism for why individuals fail in their self-control attempts after prior self-control exertion.

Footnotes

[1]An inspection of variable distributions for non-normality and outliers revealed that the combined nine item avoidance motivation measure had a small to moderate degree of negative skew. A log transformation was able to normalize the variable. However, results obtained from analyses using the transformed avoidance motivation measure were virtually the same. Thus, statistics using the original avoidance motivation measure were reported for each analysis.

[2]An inspection of variable distributions for non-normality and outliers revealed that the avoidance motivation measure had a small to moderate degree of negative skew, the approach motivation measure had a small to moderate degree of negative skew, and the cups consumed variable had a moderate to substantial degree of positive skew. A log transformation was able to fix the skew in each variable. However, results obtained from analyses using the transformed variables were virtually the same as when using the original variables. Thus for simplicity sake, statistics using the original variables were reported for each analysis.

[3]An inspection of variable distributions for non-normality and outliers revealed that the avoidance motivation measure had a small to moderate degree of negative skew, and the cookies consumed variable had a small to moderate amount of positive skew. A log transformation was able to fix the skew in the avoidance motivation measure, and a square root transformation helped the skew for the cookies consumed dependent variable. However, results obtained from analyses using the transformed variables were virtually the same as when using the original variables. Thus for simplicity sake, statistics using the original variables were reported for each analysis as opposed to listing the transformed variables.

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Appendix A – Pilot Study Measures

Rosenberg Self-Esteem Scale

You will read a series of questions that correspond to a standard measure of the self-concept. Please evaluate how much you agree or disagree with each question and click or press on the corresponding number.

1 disagree strongly
2 disagree
3 disagree a little
4 neutral
5 agree a little
6 agree
7 strongly agree

1. I feel that I am a person of worth, at least on an equal basis with others.
2. I feel that I have a number of good qualities.
3. All in all, I am inclined to feel that I am a failure.
4. I am able to do things as well as most other people.
5. I feel I do not have much to be proud of.
6. I take a positive attitude toward myself.
7. On the whole, I am satisfied with myself.
8. I wish I could have more respect for myself.
9. I certainly feel useless at times.
10. At times I think I am no good at all.

Trait Self-Control Scale

Please indicate how much each of the following statements reflects how you typically are.

1 Not at all
2 none
3 none
4 none
5 none
6 none
7 Very much

1. I am good at resisting temptation.

2. I have a hard time breaking bad habits.

3. I am lazy.

4. I say inappropriate things.

5. I never allow myself to lose control.

6. I do certain things that are bad for me, if they are fun.

7. People can count on me to keep on schedule.

8. Getting up in the morning is hard for me.

9. I have trouble saying no.

10. I change my mind fairly often.

11. I blurt out whatever is on my mind

12. People would describe me as impulsive.

13. I refuse things that are bad for me.

14. I spend too much money.

15. I keep everything neat.

16. I am self-indulgent at times.

17. I wish I had more self-discipline.

18. I am reliable.

19. I get carried away by my feelings.

20. I do many things on the spur of the moment.

21. I don't keep secrets very well.

22. People would say that I have iron self-discipline.

23. I have worked or studied all night at the last minute.

24. I'm not easily discouraged.

25. I'd be better off if I stopped to think before acting.

26. I engage in healthy practices.

27. I eat healthy foods.

28. Pleasure and fun sometimes keep me from getting work done.

29. I have trouble concentrating.

30. I am able to work effectively toward long-term goals.

31. Sometimes I can't stop myself from doing something, even if I know it is wrong.

32. I often act without thinking through all the alternatives.

33. I lose my temper too easily.

34. I often interrupt people.

35. I sometimes drink or use drugs to excess.

36. I am always on time.

Name Letter Test

In this part of the study, we would like you to simply rate some letters and pictorial symbols based on how much you like them.

Please use the 1 (dislike very much) to 9 (like very much) scale to report how much you LIKE each of the following letters. Please TRUST YOUR INTUITION and work quickly, making your ratings according to your GUT FEELINGS.

1 Dislike very much
2 none
3 none
4 none
5 Neither like nor dislike
6 none
7 none
8 none
9 Like very much

A	B	C	D	E	F	G
H	I	J	K	L	M	N
O	P	Q	R	S	T	U
V	W	X	Y	Z		

Self-Control Manipulation

Self-Control Condition: You will now watch a 6-minute video clip (without audio) of a woman being interviewed by an off-camera interviewer. This task involves nonverbal assessments of personality. Please watch the video clip as you will later be making first impression judgments of the interviewee.

While watching the video clip, PLEASE DO NOT READ OR LOOK AT ANY WORDS THAT MAY APPEAR ON THE SCREEN. REDIRECT YOUR GAZE TO THE WOMAN BEING INTERVIEWED IF YOU FIND YOURSELF LOOKING AT THE WORDS. IT IS IMPORTANT THAT YOU TRY TO ONLY LOOK AT THE WOMAN BEING INTERVIEWED.

No Self-Control Condition: You will now watch a 6-minute video clip (without audio) of a woman being interviewed by an off-camera interviewer. This task involves nonverbal assessments of personality. Please watch the video clip as you will later be making first impression judgments of the interviewee.

Avoidance Motivation Items

General Instructions presented at beginning

Next, using the given 1 - 7 scale, please indicate how likely you would be to AVOID each of the following stimuli RIGHT NOW (that is, at the PRESENT MOMENT):

Instructions presented with each item

How likely would you be to AVOID the following stimulus RIGHT NOW (that is, at the PRESENT MOMENT):

1	2	3	4	5	6	7
Not at all likely						Very Likely

1- The ringing of a loud and annoying alarm
2- A dangerous animal
3- A frightening location
4- A scary situation
5- A socially uncomfortable situation
6- A difficult situation
7- A punishing stimulus
8- Something that you don't like
9- A painful stimulus

Demographics

What is your sex?

1 male
2 female

What is your relationship status?

1 Dating (not exclusive, allowed to date other people)
2 Dating (exclusive)
3 Engaged
4 Married
5 Not in a relationship

Do you have any children?

1 yes
2 no

What is your classification at OU?

1 Freshman
2 Sophomore
3 Junior
4 Senior

What is your ethnicity?

1 African American
2 Asian
3 Caucasian
4 Latino/Hispanic
5 Middle Eastern
6 Other

Is English your first language?

1 yes
2 no

Were you born in the U.S.?

1 yes
2 no

Where were you born?

What is your age?

Follow-up Questions

Rate the degree to which you had to control your attention for the video viewing task.

1 Extremely little control necessary
2 Very little control necessary
3 Little control necessary
4 A moderate amount of control necessary
5 Quite a bit of control necessary
6 A lot of control necessary
7 Extreme control necessary

How much effort did you have to put into completing the video viewing task?

1 No effort at all
2 none
3 none
4 Moderate amount of effort
5 none
6 none
7 An extreme amount of effort

How difficult did you find it to follow the instructions given for viewing the video?

1 Not at all difficult
2 Very slightly difficult
3 Slightly difficult
4 Somewhat difficult
5 Moderately difficult
6 Quite difficult
7 Extremely difficult

Appendix B – Study 1 Measures

Trait Self-Control Scale

Please indicate how much each of the following statements reflects how you typically are.

1 Not at all
2 none
3 none
4 none
5 none
6 none
7 Very much

1. I am good at resisting temptation.

2. I have a hard time breaking bad habits.

3. I am lazy.

4. I say inappropriate things.

5. I never allow myself to lose control.

6. I do certain things that are bad for me, if they are fun.

7. People can count on me to keep on schedule.

8. Getting up in the morning is hard for me.

9. I have trouble saying no.

10. I change my mind fairly often.

11. I blurt out whatever is on my mind

12. People would describe me as impulsive.

13. I refuse things that are bad for me.

14. I spend too much money.

15. I keep everything neat.

16. I am self-indulgent at times.

17. I wish I had more self-discipline.

18. I am reliable.

19. I get carried away by my feelings.

20. I do many things on the spur of the moment.

21. I don't keep secrets very well.

22. People would say that I have iron self-discipline.

23. I have worked or studied all night at the last minute.

24. I'm not easily discouraged.

25. I'd be better off if I stopped to think before acting.

26. I engage in healthy practices.

27. I eat healthy foods.

28. Pleasure and fun sometimes keep me from getting work done.

29. I have trouble concentrating.

30. I am able to work effectively toward long-term goals.

31. Sometimes I can't stop myself from doing something, even if I know it is wrong.

32. I often act without thinking through all the alternatives.

33. I lose my temper too easily.

34. I often interrupt people.

35. I sometimes drink or use drugs to excess.

36. I am always on time.

Attitudes toward Art Questions

We will now ask you some questions about your experience with art. Please answer each question as honestly and accurately as possible.

1 Not at all
2 none
3 none
4 none
5 none
6 none
7 Extremely

How important is art in your life?

How much do you like art in general?

How much do you like theater?

How much do you like painting?

How much do you like photography?

How much do you like sculpture?

To what extent would you describe yourself as an artist?

Have you ever taken an art class?

1 Yes

2 No

To what extent would you say that you are knowledgeable about the aesthetics valued in one or more types of art?

To what extent would you say that you are knowledgeable about the aesthetics valued in photography, specifically?

To what extent would you describe yourself as good at solving problems relative to others that you know?

To what extent do you feel that you think outside the box relative to others you know?

To what extent are you able to lose yourself in a task without worrying about societal norms regarding how the task should be done?

To what extent would you describe yourself as creative?

Name Letter Test

In this part of the study, we would like you to simply rate some letters and pictorial symbols based on how much you like them.

Please use the 1 (dislike very much) to 9 (like very much) scale to report how much you LIKE each of the following letters. Please TRUST YOUR INTUITION and work quickly, making your ratings according to your GUT FEELINGS.

1 Dislike very much
2 none
3 none
4 none
5 Neither like nor dislike
6 none
7 none
8 none
9 Like very much

A	B	C	D	E	F	G
H	I	J	K	L	M	N
O	P	Q	R	S	T	U
V	W	X	Y	Z		

Self-Control Manipulation

No Self-Control Condition: Next, is a writing task that examines how thoughts are formed. For this task, please write on the provided piece of paper whatever comes to mind for the next 5 minutes. Anything you write is completely anonymous.

Self-Control (Overriding Approach): Next, is a writing task that examines how thoughts are formed. More specifically, this task examines the effect of hunger on thought formation. To do this, you were asked to not eat anything for 3 hours prior to the study in order to induce a state of hunger. Now while hungry, we ask that you please write on the provided piece of paper whatever comes to mind for the next 5 minutes. Anything you write is completely anonymous. In addition, a bowl of cookies will be put on the table just in case you are feeling sick and absolutely cannot stand your hunger anymore. If you feel that this is the case for you, then you can help yourself to the cookies. However, if possible, we ask that you refrain from eating any cookies so as to not affect the results of the writing task.

Self-Control (Overriding Avoidance): Next, is a writing task that examines how thoughts are formed. More specifically, this task examines the effect of physical exertion on thought formation. For this task, please write on the provided piece of paper whatever comes to mind for the next 5 minutes. Anything you write is completely anonymous. In addition, while writing down your thoughts, please hold your non-dominant hand straight in front of you (upright at a 90 degree angle, parallel from the floor) and keep it held in this position as much as possible throughout the duration of the writing task. If your arm becomes tired and you absolutely cannot stand it anymore, you may temporarily bring your arm down. However, we ask that you lift it to the upright position again as soon as possible as to not affect the results of the task.

Avoidance Motivation Items

General Instructions presented at beginning

Next, using the given 1 - 7 scale, please indicate how likely you would be to AVOID each of the following stimuli RIGHT NOW (that is, at the PRESENT MOMENT):

Instructions presented with each item

How likely would you be to AVOID the following stimulus RIGHT NOW (that is, at the PRESENT MOMENT):

1	2	3	4	5	6	7
Not at all likely						Very Likely

1- The ringing of a loud and annoying alarm
2- A dangerous animal
3- A frightening location
4- A scary situation
5- A socially uncomfortable situation
6- A difficult situation
7- A punishing stimulus
8- Something that you don't like
9- A painful stimulus

Approach Motivation

Instructions

Next, using the given 1 - 7 scale, please indicate how much you agree with each statement based on how you FEEL RIGHT NOW (that is, at the PRESENT MOMENT):

1	2	3	4	5	6	7
Strongly disagree						Strongly agree

1-If I got something I want, I would feel excited and energized.

2-If I was doing well at something, I would love to keep at it.

3-If a good thing happened to me, it would affect me strongly.

4-It would excite me to win a contest.

5-If I saw an opportunity for something that I like, I would get excited right away.

6-If I wanted something, I would go all-out to get it.

7-I would go out of my way to get things I want.

8-If I saw a chance to get something that I want, I would move on it right away.

9-If I was to go after something, I would use a “no holds barred” approach.

10-I would do things for no other reason than that that they might be fun.

11-I crave excitement and new sensations.

12-I would be willing to try something new if I think it would be fun.

13-I would act on the spur of the moment.

Drinking Bad Tasting Substance Task (Subsequent Measure of Self-Control)

Instructions

This task concerns motivation. In front of you are 20 plastic cups each containing a drink that does not taste good to most people. However, it is not harmful. We will give you a nickel for every ounce you drink (each little cup is one ounce), and each one is identical. How much you drink is up to you.

Demographics

What is your sex?

1 male
2 female

What is your relationship status?

1 Dating (not exclusive, allowed to date other people)
2 Dating (exclusive)
3 Engaged
4 Married
5 Not in a relationship

Do you have any children?

1 yes
2 no

What is your classification at OU?

1 Freshman
2 Sophomore
3 Junior
4 Senior

What is your ethnicity?

1 African American
2 Asian
3 Caucasian
4 Latino/Hispanic
5 Middle Eastern
6 Other

Is English your first language?

1 yes
2 no

Were you born in the U.S.?

1 yes
2 no

Where were you born?

What is your age?

Follow-up Questions

How much effort did you have to exert in order to complete the 5-minute writing task as instructed?

1 No effort at all
2 none
3 none
4 Moderate amount of effort
5 none
6 none
7 An extreme amount of effort

How difficult did you find it to complete the 5-minute writing task as instructed?

1 Not at all difficult
2 Very slightly difficult
3 Slightly difficult
4 Somewhat difficult
5 Moderately difficult
6 Quite difficult
7 Extremely difficult

How difficult did you find it to follow the instructions given for the 5-minute writing task?

1 Not at all difficult
2 Very slightly difficult
3 Slightly difficult
4 Somewhat difficult
5 Moderately difficult
6 Quite difficult
7 Extremely difficult

Please indicate how thirsty you were when you arrived for the study.

1 Not at all thirsty
2 none
3 none
4 none
5 none
6 none
7 Extremely thirsty

How much do you like or dislike the taste of vinegar?

1 Extremely Dislike
2 none
3 none
4 Neither Dislike or Like
5 none
6 none
7 Extremely Like

What was your opinion of the taste of the drink?

1 Extremely Bad Taste
2 none
3 none
4 none
5 none
6 none
7 Extremely Good Taste

Appendix C – Study 2 Measures

Trait Self-Control Scale

Please indicate how much each of the following statements reflects how you typically are.

1 Not at all
2 none
3 none
4 none
5 none
6 none
7 Very much

1. I am good at resisting temptation.

2. I have a hard time breaking bad habits.

3. I am lazy.

4. I say inappropriate things.

5. I never allow myself to lose control.

6. I do certain things that are bad for me, if they are fun.

7. People can count on me to keep on schedule.

8. Getting up in the morning is hard for me.

9. I have trouble saying no.

10. I change my mind fairly often.

11. I blurt out whatever is on my mind

12. People would describe me as impulsive.

13. I refuse things that are bad for me.

14. I spend too much money.

15. I keep everything neat.

16. I am self-indulgent at times.

17. I wish I had more self-discipline.

18. I am reliable.

19. I get carried away by my feelings.

20. I do many things on the spur of the moment.

21. I don't keep secrets very well.

22. People would say that I have iron self-discipline.

23. I have worked or studied all night at the last minute.

24. I'm not easily discouraged.

25. I'd be better off if I stopped to think before acting.

26. I engage in healthy practices.

27. I eat healthy foods.

28. Pleasure and fun sometimes keep me from getting work done.

29. I have trouble concentrating.

30. I am able to work effectively toward long-term goals.

31. Sometimes I can't stop myself from doing something, even if I know it is wrong.

32. I often act without thinking through all the alternatives.

33. I lose my temper too easily.

34. I often interrupt people.

35. I sometimes drink or use drugs to excess.

36. I am always on time.

Attitudes toward Art Questions

We will now ask you some questions about your experience with art. Please answer each question as honestly and accurately as possible.

1 Not at all
2 none
3 none
4 none
5 none
6 none
7 Extremely

How important is art in your life?

How much do you like art in general?

How much do you like theater?

How much do you like painting?

How much do you like photography?

How much do you like sculpture?

To what extent would you describe yourself as an artist?

Have you ever taken an art class?

1 Yes

2 No

To what extent would you say that you are knowledgeable about the aesthetics valued in one or more types of art?

To what extent would you say that you are knowledgeable about the aesthetics valued in photography, specifically?

To what extent would you describe yourself as good at solving problems relative to others that you know?

To what extent do you feel that you think outside the box relative to others you know?

To what extent are you able to lose yourself in a task without worrying about societal norms regarding how the task should be done?

To what extent would you describe yourself as creative?

Name Letter Test

In this part of the study, we would like you to simply rate some letters and pictorial symbols based on how much you like them.

Please use the 1 (dislike very much) to 9 (like very much) scale to report how much you LIKE each of the following letters. Please TRUST YOUR INTUITION and work quickly, making your ratings according to your GUT FEELINGS.

1 Dislike very much
2 none
3 none
4 none
5 Neither like nor dislike
6 none
7 none
8 none
9 Like very much

A	B	C	D	E	F	G
H	I	J	K	L	M	N
O	P	Q	R	S	T	U
V	W	X	Y	Z		

Self-Control Manipulation

Self-Control Condition: You will now watch a 6-minute video clip (without audio) of a woman being interviewed by an off-camera interviewer. This task involves nonverbal assessments of personality. Please watch the video clip as you will later be making first impression judgments of the interviewee.

While watching the video clip, PLEASE DO NOT READ OR LOOK AT ANY WORDS THAT MAY APPEAR ON THE SCREEN. REDIRECT YOUR GAZE TO THE WOMAN BEING INTERVIEWED IF YOU FIND YOURSELF LOOKING AT THE WORDS. IT IS IMPORTANT THAT YOU TRY TO ONLY LOOK AT THE WOMAN BEING INTERVIEWED.

No Self-Control Condition: You will now watch a 6-minute video clip (without audio) of a woman being interviewed by an off-camera interviewer. This task involves nonverbal assessments of personality. Please watch the video clip as you will later be making first impression judgments of the interviewee.

Avoidance Motivation Items

General Instructions presented at beginning

Next, using the given 1 - 7 scale, please indicate how likely you would be to AVOID each of the following stimuli RIGHT NOW (that is, at the PRESENT MOMENT):

Instructions presented with each item

How likely would you be to AVOID the following stimulus RIGHT NOW (that is, at the PRESENT MOMENT):

1	2	3	4	5	6	7
Not at all likely						Very Likely

1- The ringing of a loud and annoying alarm
2- A dangerous animal
3- A frightening location
4- A scary situation
5- A socially uncomfortable situation
6- A difficult situation
7- A punishing stimulus
8- Something that you don't like
9- A painful stimulus

Approach Motivation

Instructions

Next, using the given 1 - 7 scale, please indicate how much you agree with each statement based on how you FEEL RIGHT NOW (that is, at the PRESENT MOMENT):

1	2	3	4	5	6	7
Strongly disagree						Strongly agree

1-If I got something I want, I would feel excited and energized.

2-If I was doing well at something, I would love to keep at it.

3-If a good thing happened to me, it would affect me strongly.

4-It would excite me to win a contest.

5-If I saw an opportunity for something that I like, I would get excited right away.

6-If I wanted something, I would go all-out to get it.

7-I would go out of my way to get things I want.

8-If I saw a chance to get something that I want, I would move on it right away.

9-If I was to go after something, I would use a “no holds barred” approach.

10-I would do things for no other reason than that that they might be fun.

11-I crave excitement and new sensations.

12-I would be willing to try something new if I think it would be fun.

13-I would act on the spur of the moment.

Cookie Consumption (Subsequent Self-Control Measure)

Now, we will ask you to complete a taste-testing task. You will be given a bowl full of cookies and a form with which to rate the cookies along various dimensions. You will have 7 minutes to eat as many cookies as you need in order to judge the cookies.

Again, please eat as many cookies as you need in order to judge the cookies.

Please rate how sweet the cookies are.

1	2	3	4	5	6	7
Not at all sweet						Extremely sweet

Please rate how salty the cookies are.

1	2	3	4	5	6	7
Not at all salty						Extremely salty

Please rate how bitter the cookies are.

1	2	3	4	5	6	7
Not at all bitter						Extremely bitter

Please rate how sour the cookies are.

1	2	3	4	5	6	7
Not at all sour						Extremely sour

Please rate the smell of the cookies.

1	2	3	4	5	6	7
Unpleasant						Extremely Pleasant

Please rate the texture of the cookies.

1	2	3	4	5	6	7
Extremely Soft						Extremely Hard

Please rate the overall taste of the cookies.

1	2	3	4	5	6	7
No taste						Extremely Tasty

Please indicate how likely you would be to buy these cookies.

1	2	3	4	5	6	7
Not at all likely						Extremely likely

Please rate how much you enjoyed tasting the cookies.

1	2	3	4	5	6	7
Did not enjoy						Enjoyed quite a bit

Demographics

What is your sex?

1 male
2 female

What is your relationship status?

1 Dating (not exclusive, allowed to date other people)
2 Dating (exclusive)
3 Engaged
4 Married
5 Not in a relationship

Do you have any children?

1 yes
2 no

What is your classification at OU?

1 Freshman
2 Sophomore
3 Junior
4 Senior

What is your ethnicity?

1 African American
2 Asian
3 Caucasian
4 Latino/Hispanic
5 Middle Eastern
6 Other

Is English your first language?

1 yes
2 no

Were you born in the U.S.?

1 yes
2 no

Where were you born?

What is your age?

How much do you currently weigh (in pounds)?

Follow-up Questions

Rate the degree to which you had to control your attention for the video viewing task.

1 Extremely little control necessary
2 Very little control necessary
3 Little control necessary
4 A moderate amount of control necessary
5 Quite a bit of control necessary
6 A lot of control necessary
7 Extreme control necessary

How much effort did you have to put into completing the video viewing task?

1 No effort at all
2 none
3 none
4 Moderate amount of effort
5 none
6 none
7 An extreme amount of effort

How difficult did you find it to complete the video viewing task?

1 Not at all difficult
2 Very slightly difficult
3 Slightly difficult
4 Somewhat difficult
5 Moderately difficult
6 Quite difficult
7 Extremely difficult

How difficult did you find it to follow the instructions given for viewing the video?

1 Not at all difficult
2 Very slightly difficult
3 Slightly difficult
4 Somewhat difficult
5 Moderately difficult
6 Quite difficult
7 Extremely difficult

How many hours prior to arriving for the study did you last eat?

Please indicate how hungry you were when you arrived for the study.

1 Not at all hungry
2 none
3 none
4 none
5 none
6 none
7 Extremely hungry

Dieting Concerns Subscale of Restraint Scale

Please answer the following questions using the given 1-5 scales.

1- How often are you dieting?

1 Never
2 Rarely
3 Sometimes
4 Often
5 Always

2- Would a weight fluctuation of 5 pounds affect the way you live your life

1 Not at all
2
3
4
5 Very Much

2- Do you eat sensibly in front of others and splurge alone?

1 Never
2 Rarely
3 Sometimes
4 Often
5 Always

3- Do you give too much time and thought to food?

1 Never
2 Rarely
3 Sometimes
4 Often
5 Always

4- Do you have feelings of guilt after overeating?

1 Never
2 Rarely
3 Sometimes
4 Often
5 Always

5- How conscious are you of what you are eating?

1 Not at all
2 Slightly
3 Moderately
4 Very much
5 Extremely