BIG THOUGHTS, SMALL WANTS: THE IMPACT OF MENTAL CONSTRUAL ON IMPULSE STRENGTH

A Thesis

by

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ABSTRACT

The way people mentally represent objects and events influences self-control; high-level construals, made up of abstract, global features, assist self-control, while low-level construals, made up of concrete, proximal features, hinder self-control. Previous research has assumed that high-level construals enhance self-control by increasing the salience of long-term goals (Fujita, Trope, Liberman, & Levin-Sagi, 2006). However, self-control is determined by not only a person's ability to override an impulse, but also the motivational force that compels the impulse (impulse strength). The current investigation examined how mental construal affects visceral and need states (e.g., hunger) that determine impulse strength and undermine self-control. It was predicted that high-level construals would diminish the subjective intensity of hunger states, while low-level construals would intensify these feelings. Overall results showed that construal level did not impact subjective hunger states, and subsequently impulse strength, however exploratory findings revealed a relationship between construal level, eating tendencies, and subjective hunger. For restricted eaters, a high-level construal (versus a low-level construal) led to greater subjective hunger. For normal eaters, a high-level construal attenuated feelings of hunger. These results were attributed to the high-level construal's influence on mood state. The current research provides a more comprehensive account of how mental construal impacts self-control and emphasizes the important role of impulse strength in self-regulation.

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1. INTRODUCTION

1.1 BACKGROUND

Self-control refers to the capacity persons have to override or alter their predominant response tendencies. People's health, careers, and relationships depend in part on their capacity for self-control. Understanding self-control has broad implications for improving people's lives. The purpose of this investigation is to examine how abstract thinking influences the subjective intensity of visceral states that elicit impulses and undermine self-control. Visceral states can be understood as a "range of negative emotions (e.g., anger, fear), physical drive states (e.g., hunger, thirst, sexual desire), and feeling states (e.g., pain) that grab people's attention and motivate them to engage in specific behaviors" (Loewenstein, 2000, p. 426). Visceral states are the primary determinate of impulses, or automatic tendencies to approach and avoid environmental stimuli, that are largely determined by visceral states. It is argued that thinking abstractly (high-level construal) diminishes the subjective intensity of visceral states and subsequently impulse strength.

1.1.1 *Construal Level*

Research shows that the way in which people mentally represent goals and goal objects has an effect on self-control outcomes. According to construal level theory (CLT), objects and events may be mentally represented at either high levels, in terms of their global, abstract features, or low levels, in terms of their proximal and subordinate features (Fujita, 2008; Trope & Liberman, 2003). For example, exercise can be construed as staying healthy and active (high level) or as running 5 miles on the

treadmill and doing 30 push-ups (low level). The construal level activated is associated with an event's psychological distance, the distance an object is in time, space, social distance, and hypotheticality. Using a modified Stroop task, Bar-Anan, Liberman, Trope, and Algom (2007) demonstrated that these dimensions of psychological distance are interrelated and that psychological distance as a form of meaning is processed automatically. In relation to construal level, greater psychological distance is associated with higher construal levels (Trope & Liberman, 2010). Events that are less psychologically distant are able to be mentally represented at a low-level with concrete, detailed features, while events that are more psychologically distant are mentally represented more abstractly at a high-level. For example less psychological distance, and thus a relatively low-level construal, would be associated with thinking about a future vacation that is to occur next week versus next year (time). While the construal level activated typically depends on an event's psychological distance, construal level also emphasizes the extent of psychological distance (Trope & Liberman, 2010).

Research on CLT shows that the level of abstraction at which an event is represented has a significant influence on behavior regarding those events. For example, regarding person perception, abstract, high-level construals increase the tendency to stereotype the self and others because these construals encourage categorization into broad categories (McCrea, Wieber, & Myers, 2011). Mental construal has also been shown to influence negotiation outcomes, with high-level construals allowing opposing parties to focus on their broad goals and concede on minor issues (Henderson & Trope, 2009). Applying CLT to the domain of self-control, Fujita and colleagues found that

construing a self-control situation at a low-level often leads to self-control failure because short-term rewards (i.e., the appetitive nature of stimuli) are more salient in these construals (Fujita, Trope, Liberman, & Levin-Sagi, 2006). High-level construals, on the other hand, often lead to effective self-control, since global concerns in the situation (i.e., one's long term goals) are given more weight in the construals. For example, in one study, participants were asked to engage in a painful handgrip task for as long as possible and were told that the longer they engaged in the task, the more accurate the task feedback would be (Fujita et al., 2006, Study 2). Participants led to adopt a high-level construal held the handgrip for significantly longer than those with a low-level construal. The authors concluded that high-level construal participants exerted better self-control than low-level construal participants because high construal levels led participants to emphasize the broad, superordinate goal of engaging in the task for as long as possible. While previous research has assumed that high-level construals enhance self-control by increasing the salience of long-term goals, I aim to examine the hypothesis that high-level (versus low-level) construals may also help self-control by reducing the subjective intensity of visceral states.

1.1.2 *Self-Control*

Self-control can be thought of as a struggle between two opposing forces: the motivational force that compels an impulse versus the person's capacity to override that impulse (Inzlicht & Schmeichel, 2012; see also Heatherton & Wagner, 2011; Hofmann, Friese, & Strack, 2009; Strack & Deutsch, 2004). Self-control prevails when impulses are weak and control is strong. Impulses are largely affective responses elicited when

external stimuli are processed according to current visceral and need states, the properties of the stimuli, and individual learning history (Hofmann, Friese, & Strack, 2009). Stimuli that can appease unpleasant visceral states evoke positive affective reactions that are associated with behavioral schemas to approach. Unless consciously inhibited, these inclinations to approach a rewarding stimulus can lead to impulsive behavior that may contradict one's long-term goals. Impulses, therefore, are rooted in visceral experience and are inherently affective.

As a whole, past research on impulses (i.e., desire) has not been clear about what impulses are, that is, whether impulses are affective reactions to environmental stimuli, visceral and need states shaping those reactions, or motivations to approach and avoid the stimuli. Clarification is particularly important given that these components are distinct. For example hunger states do not always result in affective reactions, as a stimulus must be present to instigate a response. Likewise, affective reactions are not always due to visceral states, since environmental stimuli can produce affective responses while in a neutral, homeostatic state. Furthermore, approach-avoidance tendencies are not always affective. While approach-avoidance motivation and affect for the most part naturally co-occur, with positive stimuli eliciting approach responses and negative stimuli eliciting avoidance, research shows that motivation and affect are orthogonal. For example, approach-avoidance motor cues do not invariably alter affective reactions to a stimulus (Centerbar & Clore, 2006). Additionally, negative stimuli can elicit avoidance responses (i.e., flight), as well as approach responses (i.e., fight) (Harmon-Jones, Harmon-Jones, & Price, 2013; Wilkowski & Robinson, 2006).

For clarification purposes, in the present investigation I consider impulses to be largely automatic tendencies to approach or avoid environmental stimuli, which are predominately determined by internal visceral states.

Research has not thoroughly examined the impact of construal level on visceral experience and impulse strength; however, there is reason to expect a relationship, particularly due to the hedonic nature of impulses. Despite the distinction between affect and motivation, approach-avoidance impulses are primarily affective. It is possible that mental construal is involved with these affect-laden impulses given the relationship between general affect and construal level/psychological distance established in prior theory and research. For example, Loewenstein's dual-process model, as a whole, suggests a link between distance and affective reactions. According to this model, affective motivation, which is comprised of emotions and physical drive states, is related to the temporal and non-temporal proximity (i.e., psychological distance) of reward and cost stimuli (Loewenstein & O'Donoghue, 2007). Moreover, empirical findings point to a link between the *degree* of affective responding and psychological distance. For example, people experience more intense affect when events are presented as occurring closer to, as opposed to further from, the present (Ekman & Lundberg, 1971). Relatedly, it has been demonstrated that feeling emotionally intense about an event diminishes the psychological distance of the event (Van Boven, Kane, McGraw, & Dale, 2010). In this study, participants perceived events as less psychologically distant when they described those events emotionally rather than neutrally. The authors posit that people rely on a natural association between emotionality and proximal events in making these

inferences. As a whole, this prior research indicates a correlation between affective intensity and mental construal/psychological distance, with strong affect associated with low-level construals and psychological proximity. Indeed, in response to the apparent trend in the literature between strong affect and proximity, Chang and Pham (2012) recently argued that the affective system is "inherently anchored in the present" (p. 42).

Other research points to construal level and psychological distance having a direct, causal impact on affective intensity, with low-level construals and psychological proximity increasing affective reactions and high-level construals and psychological distance attenuating affective reactions. For example, Wong and Bagozzi (2005) demonstrated that cultures differ in the intensity of their emotional reactions to ethical scenarios involving in-group and out-group members due to differences in psychological distance with the group members. Williams, Stein, and Galguera (2014) found that greater social distance (i.e., psychological distance) led to experiencing less pleasure from positive experiences and that both increased social distance and abstract thinking (i.e., high-level construals) made negative events feel less painful. Williams and Bargh (2008) obtained similar results in examining the effect of spatial distance on responses to and judgments of emotion-laden stimuli (e.g., violent video clips) and they subsequently concluded that spatial distance "mutes the emotional aspects of events" (p. 305). Particularly noteworthy is their finding that greater spatial distance influenced judgments of affective stimuli but did not alter judgments of non-affective stimuli. More specifically, spatial distance, versus spatial closeness, led to lower caloric estimations of unhealthy foods (affective stimuli) but did not influence predictions for healthy foods

(non-affective). These findings suggest that distance has a specific influence on affective responses rather than a generalized influence on features of future events. Consistent with these findings on spatial distance, Mühlberger, Weiser, Pauli, and Neumann (2008) found that affective stimuli presented as moving closer towards observers (decreasing in distance) increased observers' reported arousal. As a whole, this body of research demonstrates that low-level concrete construals seem to increase affective intensity while high-level abstract construals attenuate affective intensity. These effects, however, have not yet been studied in the context of self-control.

1.2 PRESENT STUDY

Given that impulses are essentially affective responses to rewarding stimuli, previous research showing that construal level alters affective intensity suggests that construal level may also impact impulse strength. If so, it is likely that the impact on impulse strength is due to the changes in subjective visceral experience because visceral states are the primary determinant of impulses. Visceral states are local, concrete, and contextual, since they are grounded in one's current, bodily state and fluctuate depending on current needs. They are characterized by an "attention-narrowing" – as the strength of a visceral drive increases, attention becomes increasingly focused on the self and one's current state, on the present, and on activities associated with the visceral state (Buck, 1999; Loewenstein, 1996; Van Boven & Loewenstein, 2003). Insofar as visceral states are low-level features of an event, high-level construals should diminish their salience, and subsequently their intensity, and thus influence behavior. Consistent with this proposition, a series of embodiment studies found that high-level construals

eliminate the influence of contextual body cues (e.g., fatigue) on judgments, demonstrating that high-level construals help to "divorce" the mind from the body (Maglio & Trope, 2012). Similarly, Kivetz and Simonson (2002) found that when outcomes were psychologically distant, people were more likely to indulge because their guilt was dampened (see also Kivetz & Kivetz, 2006). Hence, psychological distance weakened affective feedback.

1.2.1 *Hypothesis*

The present research will examine the extent to which construal levels affect self-control by influencing visceral experience. I argue that high-level construals diminish the subjective intensity of visceral states and that this change helps to explain why high-level construals enhance self-control. Low-level construals, on the other hand, should intensify these states and lead to subsequent impairments in self-control. These findings would suggest that construal level influences self-control not only by impacting the salience of long term goals and short-term rewards, as has previously been argued, but also the salience of internal need states. While this hypothesis holds for visceral states generally, the current study focuses on hunger as a visceral state. Hunger was chosen for the present study for multiple reasons. First, hunger states are universal, such that when deprived of food, all people will experience the state and will experience it as aversive. Additionally, hunger is directly tied with a specific desirable behavior (consumption) that is an important area of self-control research. Third, hunger states are relatively easy to manipulate and measure in laboratory settings as compared to other visceral states such as sexual desire and pain. Finally, as is discussed in more detail below, hunger can

be assessed implicitly by measuring evaluations of food-related stimuli. If high-level construals diminish the subjective intensity of hunger states, then, as compared to hungry people with low-level construals, hungry people with high-level construals should report being less hungry, have less positive evaluations of food-related stimuli, and consume less unhealthy snack food.

2. METHOD

2.1 PARTICIPANTS

Participants were 103 undergraduate students (49.5% female) who participated in the study for partial course credit in their introductory and upper-level psychology courses. Participants signed up for the study using an online subject pool system. One participant was removed due to a failure to follow preparation instructions. Participants completed the study at individual computer stations and were randomly assigned to either a high-level construal condition (n = 51) or low-level construal condition (n = 52).

2.2 PROCEDURE

All participants were asked to refrain from eating or drinking anything but water 3 hours prior to the study when they signed up for the study on the SONA system. Participants received an email reminding them of these instructions the night before their experimental session. Upon arriving at the lab, participants were told that the purpose of the study was to better understand the relationship between personality, thoughts, and emotions and that their mood state would be assessed several times throughout the study. Participants then completed a series of questionnaires and behavioral tasks on the computer and on paper.

2.2.1 *Prior Mood State*

Participants completed a questionnaire on the computer to assess their state at the beginning of the study (see Appendix B-3). They were asked to rate the extent to which they currently felt various mood states (e.g., happy, sad, hostile) and visceral and physical states (e.g., hunger, thirst, fatigue) on a 7-point Likert scale.

2.2.2 *Construal Level Task*

In order to manipulate construal level, participants completed a short paper and pen task used in previous research to induce a high or low-level construal (see Appendix B-1 and B-2) (Fujita et al., 2006). In this task, people are asked to generate either superordinate categories (high-level construal) or subordinate examples (low-level construal) for a number of words. For example, participants in a high-level construal condition would be asked to provide a broader category for the exemplar word *mountain* ("landscape" would be one appropriate response). Participants in a low-level construal condition would be provided with the category *mountain* and asked to generate an example of a mountain ("Everest" would be an appropriate response). There were 30 items participants answered for this task.

2.2.3 *Mood State*

Participants completed a mood questionnaire identical to the mood assessment completed at the start of the study (see Appendix B-3). This explicit measure of participants' current mood and visceral and physical states served as one of the main dependent variables.

2.2.4 *Affective Misattribution Procedure*

While explicit measures hold greater predictive validity when people have adequate self-regulatory resources and can take controlled, deliberate action, implicit measures are often stronger predictors of impulsive behavior when resources are limited (Friese, Hofmann, & Wänke, 2008). Implicit tasks that measure affective reactions to stimuli are particularly useful in studying impulses because impulses are reflexive

approach and avoidance responses stemming from the affective processing of stimuli (Friese et al., 2008; Hofmann, Friese, & Strack, 2009). Prior studies, therefore, have often utilized implicit tasks that measure affective reactions to stimuli in order to assess impulse strength (e.g., IAT: Friese et al., 2008; EAST: Hoefling & Strack, 2008; affective priming: Papies, Stroebe, & Aarts, 2009). These studies show that stronger impulses are associated with people reporting more positive affective evaluations of temptation-related stimuli and weaker impulses are associated with less positive affective evaluations of tempting stimuli. For example, Seibt, Hafner, and Deutsch (2007) found that food deprivation led to positive automatic evaluations of food-related stimulus words in an adapted Implicit Association Task (Greenwald, McGhee, & Schwartz, 1998) and greater impulsive approach behavior towards the stimuli.

The present study utilized an adapted version of the Affective Misattribution Procedure (AMP) similar to that used in previous research to assess impulse strength (Friese & Hofmann, 2009; Hofmann, Friese, & Roefs, 2009; Hofmann, van Koningsbruggen, Stroebe, Ramanathan, & Aarts, 2010; Payne, Cheng, Govorun, & Stewart, 2005). In the AMP, participants are presented with an affective prime (a real-life image), followed by a neutral symbol (Chinese pictograph). Participants are asked to ignore the real-life image and to rate how appealing they find the symbol that follows. The logic of the task is that affective reactions to the prime are misattributed to the neutral symbol.

In the current study, the affective primes consisted of 26 positive images and 26 negative images taken from the International Affective Picture System (IAPS) and used

regularly in the AMP task (IAPS; Lang, Bradley, & Cuthbert, 1995), as well as a set of 40 dessert images (see Appendix B-12). The neutral symbols consisted of a set of 200 Chinese pictographs, which have been regularly used as neutral stimuli for the AMP (e.g., Payne et al., 2005; Payne, McClernon, & Dobbins, 2007) and are available as downloadable research materials on Keith Payne's laboratory website (http://www.unc.edu/~bkpayne/materials.html; Payne, n.d.) (see Appendix B-13). Pictographs were randomly paired with the affective primes. Participants completed 6 practice trials and 72 test trials (24 positive prime, 24 negative prime, 24 dessert prime). The order of the stimuli in each trial was as follows: prime image (75 ms.), a blank screen (125 ms.), pictograph (100 ms.), and backmask. Upon seeing the backmask, participants indicated the extent to which they liked the pictograph on a scale from 1 (*not at all*) to 7 (*very much*).

2.2.5 *Taste Test*

To examine the behavioral consequences of the impact of construal level on subjective hunger, participants were given the opportunity to sample an unhealthy snack food (Skittles candy) as part of a purported "taste test." Participants were provided with two bowls, each containing a different flavor of Skittles, and a product survey asking them to describe and rate the candies (see Appendix B-4). Participants were given explicit instructions that they could sample as much of the snacks as they liked. The bowls were weighed prior to and after the task. The weight difference represents the amount of food they consumed.

2.2.6 *Personality Questionnaires*[1]

Self Control. Individual differences in trait self-control impact self-regulatory outcomes (Schmeichel & Zell, 2007). More specifically, recent research has found that impulses exert a stronger influence on behavior in people low in trait self-control versus high trait self-control (Friese & Hofmann, 2009). To account for these dispositional influences in the current study, participants completed the Barratt Impulsivity Scale (BIS-10; Barratt, 1985) (see Appendix B-5), consisting of 34 items such as, "I plan tasks carefully" and "I make up my mind quickly." Participants also completed the 13-item Brief Self-Control Scale (BSCS; Tangney, Baumeister & Boone, 2004) (see Appendix B-6), including items like "I have a hard time breaking bad habits" and "I refuse things that are bad for me." Additionally, they completed the Approach-Avoidance Temperament Questionnaire (AATQ; Elliot & Thrash, 2010) (see Appendix B-7), a 12-item measure used to assess differences in sensitivity towards positive/reward stimuli (approach temperament) and negative/punishment stimuli (avoidance temperament). The AATQ includes approach temperament items such as "Thinking about the things I want really energizes me" and "I'm always on the lookout for positive opportunities and experiences," and avoidance temperament items such as "By nature, I am a very nervous person" and "When it looks like something bad could happen, I have a strong urge to escape it."

[1] There were no significant effects of construal level on any of the personality measures, suggesting that the measures were not sensitive to situational factors.

State Awareness. People naturally vary in the extent to which they are generally aware of their physical and mood state (Stephan et al., 2003). Consistent with emotion theories emphasizing perception of internal states in affective and emotional experience (e.g., Damasio, 1994; James, 1884; Schachter & Singer, 1962), research shows that individual differences in interoceptive awareness significantly impact behavior. For example, interoceptive awareness has been shown to affect self-regulation related to physical exertion (Herbert, Ulbrich, & Schandry, 2007). Interoception has also been linked to consumption behavior generally (Herbert, Muth, Pollatos, & Herbert, 2012), as well as food consumption specifically (Herbert, Blechert, Hautzinger, Matthias, & Herbert, 2013; Herbert & Pollatos, 2014; Pollatos et al., 2008). Given the effects of interoceptive awareness in the literature, it is possible that differences in interoceptive awareness may influence participants' self-reported mood and physical state, as well as the implicit and behavioral measures in the current study. To account for baseline differences in interoceptive awareness, participants completed the Body Consciousness Scale (Miller, Murphy, & Buss, 1981) (see Appendix B-8), which assesses dispositional awareness of internal sensations and of observable aspects of the body. The 15-item Body Consciousness Scale is made up of three subscales, private body consciousness (e.g., "I am quick to sense the hunger contractions of my stomach"), public body consciousness (e.g., "I think a lot about my body build") and body competence (e.g., "I'm light on my feet compared to most people"). Participants also completed the Mood Awareness Scale (MAS; Swinkels & Giuliano, 1995) (see Appendix B-9) to account for baseline differences in awareness of one's mood state. The 10-item Mood Awareness

Scale consists of the mood monitoring subscale (e.g., “I find myself thinking about my mood during the day”) and mood labeling subscale (e.g., “I have trouble explaining my feelings”). These two subscales would control for differences in participants’ tendency to focus on their mood and their ability to report their emotional states.

Eating Tendencies. Ample research shows that dieting often leads to difficulties regulating food intake (Gorman & Allison, 1995; Polivy & Herman, 1985). As compared to normal eaters, restrained eaters have different implicit evaluations of tempting foods (Hoefling & Strack, 2008; Hofmann et al., 2010; Papies et al., 2009) and experience greater self-control failure with unhealthy foods (Hofmann, Adriaanse, Vohs, & Baumeister, 2013). To account for differences in current dieting habits, participants were asked whether they were currently dieting. Additionally, participants completed the Three-Factor Eating Questionnaire (TFEQ-R21; Tholin, Rasmussen, Tynelius, & Karlsson, 2005) (see Appendix B-10). The TFEQ-R21 contains 21 items grouped into three subscales, the cognitive restraint subscale (e.g., “I deliberately take small helpings to control my weight”), the emotional eating subscale (e.g., “I start to eat when I feel anxious”) and the uncontrolled eating subscale (e.g., “Sometimes when I start eating, I just can’t seem to stop”).

Demographics. Participants lastly provided responses to a number of demographic questions (see Appendix B-11). Information on participants’ general health was also collected, such as the amount of sleep they got the previous night, stressful events that occurred that day, and whether they were suffering from a cold.

2.2.7 *Debriefing*

Upon completing the experiment, participants were asked debriefing questions in order to probe for suspicion and control for extraneous variables related to the dependent variables. Specifically, participants were asked about their general liking of Skittles candy and their familiarity with Chinese characters. Finally, participants were thoroughly debriefed (see Appendix B-14) and granted study credit for participating in the experiment.

3. RESULTS

3.1 PRELIMINARY ANALYSES

3.1.1 *Baseline Hunger*

Participants entered the study hungry. One participant did not follow instructions to refrain from eating 3 hours prior to the study and was therefore removed from the sample of participants. Participants reported having eaten on average 5.78 hours before (*SD* = 2.04). Additionally, they reported an average hunger level of 4.73 (*SD* = 1.87) prior to the manipulation.

3.1.2 *Demographic Characteristics*

Analyses were conducted to examine whether gender and dieting status had an impact on the main dependent measures. Specifically, independent samples t-tests were conducted on self-reported hunger, implicit evaluations of dessert stimuli on the AMP, and eating on the taste test, with gender as a between-subjects variable. Participants' gender had no effect on self-reported hunger, $t(99) = 1.54$, $p = .13$, $d = .31$, implicit evaluations of desserts, $t(96) = -1.30$, $p = .20$, $d = -.26$, or amount eaten, $t(99) = 1.68$, $p = .10$, $d = .34$. See Table 1 for means and associated standard deviations.

Independent samples t-tests were also conducted on these measures self-reported hunger, evaluations of dessert stimuli, and amount eaten, with dieting status as a between-subjects variable. Dieting status had no effect on self-reported hunger, $t(99) = -.85$, $p = .40$, $d = -.18$, evaluations of desserts, $t(96) = .28$, $p = .78$, $d = .07$, or amount eaten $t(99) = -.62$, $p = .54$, $d = -.14$. See Table 2 for means and associated standard deviations.

3.1.3 *Correlations*

Table 3 depicts associations between all predictor variables. Participants' self-reported hunger prior to the construal manipulation was considered their *hunger at time 1* and their self-reported hunger after the manipulation was considered their *hunger at time 2*. Hours since participants had last eaten was marginally associated with their hunger at time 1, but was not related to any of the other main dependent variables. Regarding the relationships between the main dependent variables, hunger at time 1 was strongly correlated with hunger at time 2. Participants' implicit evaluations of dessert stimuli on the AMP were marginally correlated with hunger at time 2. There was no relationship between implicit evaluations of desserts and amount eaten during the taste test.

While restrained eating, measured using the Three Factor Eating Questionnaire (TFEQ-R21; Tholin et al., 2005), was not correlated with hunger at time 2, it was positively associated with the amount participants ate on the taste test. Additionally, it was related to reactions to affective stimuli, with more restrained eating associated with greater positive evaluations of dessert images and positive images. There was no significant relationship between restrictive eating and evaluations of negative images**.** Surprisingly, differences in interoceptive awareness, assessed with the Body Consciousness Scale (Miller et al., 1981), were not related to reported hunger, evaluations of affective stimuli, or amount eaten. Mood awareness, measured with the Mood Awareness Scale (MAS; Swinkels & Giuliano, 1995), was generally associated with self-control tendencies and interoceptive awareness.

Trait self-control, measured using the Brief Self-Control Scale (BSCS; Tangney et al., 2004), was correlated with trait impulsivity and approach-avoidance temperament. It was also correlated with restrained eating, such that greater self-control was negatively associated with uncontrolled eating, a subscale of the restrained eating measure.

3.2 MAIN ANALYSES

3.2.1 *Subjective Hunger*

To ensure that baseline hunger did not vary between construal level conditions, an independent samples t-test was conducted on participants' hunger at time 1, with construal level (high or low) as a between-subjects factor. There were no significant differences between conditions in hunger level at the beginning of the study, $t(100) = -.63$, $p = .53$, $d = -.13$. High-level construal participants and low-level construal participants were similarly hungry (see Figure 1 for means and associated standard errors).

In order to examine whether high-level construals, as compared to low-level construals, attenuate feelings of hunger, a one-way ANOVA was conducted on participants' reported hunger at time 2 with construal level (high or low) as a between-subjects factor. To control for baseline differences in hunger level, hunger at time 1 was included in the analysis as a covariate. There was no significant effect of construal level on reported hunger at time 2, $F(1, 99) = 2.01$, $p = .16$, $\eta_p^2 = .02$. More specifically, contrary to our main hypothesis, participants led to adopt a high-level construal reported feeling just as hungry as participants led to adopt a low-level construal. Figure 1 depicts means and associated standard errors.

3.2.2 *Implicit Evaluations*

In order to examine whether high level construal diminished positive evaluations of desserts on the AMP, participants' liking of Chinese pictographs preceded by negative images, positive images, and dessert images were averaged such that each participant had a mean liking for negative pictographs, positive pictographs, and dessert pictographs. A repeated-measures ANOVA was conducted on mean liking ratings, with prime type (positive, negative, dessert) as a within-subjects variable, and construal level condition (high or low) as a between-subjects variable. Overall, there was a main effect of prime type, $F(2, 194) = 24.22$, $p < .001$, $\eta_p^2 = .20$, suggesting that participants' liking of pictographs varied as a function of type of prime. Pairwise comparisons demonstrated that pictographs primed with positive images ($M = 4.42$, $SD = .69$) had significantly higher liking ratings than pictographs primed with negative images ($M = 3.81$, $SD = .86$), $t(98) = -5.10$, $p < .001$, $d = -.51$. This represents a replication of previous research utilizing this task. Similarly, pictographs primed with dessert images ($M = 4.48$, $SD = .85$) were liked significantly more than negative primes ($M = 3.81$, $SD = .86$), $t(98) = -5.26$, $p < .001$, $d = -.53$. Liking ratings of pictographs with positive and dessert images were not significantly different, $t(98) = -1.05$, $p = .30$, $d = -.11$. Results also revealed no main effect of construal level on liking of pictographs; liking did not vary as a function of a high or low-level construal, $F(1, 97) = .25$, $p = .62$, $n^2 = .00$.

Contrary to the main hypothesis, the interaction effect of prime type and construal level on pictograph liking was not significant, $F(2, 194) = .39$, $p = .68$, $n^2 = .00$. Means are depicted in Figure 2.

3.2.3 *Consumption*

In order to examine the downstream effects of the impact of construal level on subjective hunger states a one-way ANOVA was conducted on the total amount of Skittles eaten (weight in grams), with construal level condition (high or low) as a between-subjects factor. In order to control for general liking of Skittles, Skittles liking was included in the analysis as a covariate. Contrary to the hypothesis, there were no significant differences in amount consumed and participants with a high-level construal (M = 21.59, SD = 16.89) and low-level construal (M = 16.44, SD = 13.77) ate similar amounts, $F(1, 96) = 2.93$, $p = .09$, $\eta_p^2 = .03$.

3.3 POST-HOC ANALYSES

3.3.1 *Construal Level and Mood*

Since construal level has been shown to impact affective state (Labroo & Patrick, 2009; Williams et al., 2014) and affect is associated with self-regulation and eating behavior (Baumeister, Heatherton, & Tice, 1994; Macht, 2008), participants' reported mood states following the construal level manipulation were analyzed. Post-hoc analyses revealed significant effects of the construal level manipulation on the valence of participants' mood. A reliability analysis on 14 reported negative mood states (distressed, outraged, downhearted, hostile, disgusted, sad, upset, repulsed, mad, depressed, angry, unhappy, annoyed, and sickened) prior to the manipulation ($\alpha = .93$) and after the construal manipulation ($\alpha = .95$) showed high internal reliability. Ratings were averaged to create an index of negative affect prior to (M = 1.68, SD = .81) and after (M = 1.51, SD = .81) the manipulation, with higher scores indicating greater

negative affect. A one-way ANOVA was conducted on negative affect with construal level condition (high or low) as a between-subjects factor. Reported negative affect at time 1 was included as a covariate. There was a significant effect of construal level on negative mood states, with high-level construal participants reporting greater negative mood (M = 1.64, SD = .87) than low-level construal participants (M = 1.38, SD = .73), $F(1, 99) = 4.81$, $p = .03$, $\eta_p^2 = .05$. Negative mood state did not predict hunger at time 2, affective reactions to dessert stimuli, positive images and negative images on the AMP, or snack food consumption.

3.3.2 *Construal Level, Evaluations of Desserts, and Dieting*

Analyses were conducted in order to follow up on the finding that high-level construals led participants to experience greater negative affect than low-level construals. Dieters often have difficulty regulating their eating when experiencing emotional distress (Herman, Polivy, Lank, & Heatherton, 1987). Thus, post-hoc analyses were conducted to explore the relationship between construal level, participants' dieting status, and implicit evaluations of dessert-related stimuli on the AMP. A two-way ANOVA was conducted on participants' liking of dessert stimuli, with current dieting status (dieting or not dieting) and construal level (high or low) as between-subjects factors. There was no main effect of construal level on liking of dessert stimuli, $F(1, 94) = .46$, $p = .50$, $\eta_p^2 = .01$, and no main effect of dieting on liking of dessert stimuli, $F(1, 94) = 0.25$, $p = .62$, $\eta_p^2 = .00$. However, results yielded a significant interaction between construal level and dieting status on liking of dessert stimuli, $F(1, 94) = 5.14$, $p = .03$, $\eta_p^2 = .05$. Follow-up analyses revealed that for participants currently dieting, a high-level

construal led to more positive evaluations of desserts, as compared to a low-level construal, $t(27)= -2.43$, $p = .02$, $d = -.90$. When participants were not dieting, however, participants with a high-level construal reported similar liking of dessert stimuli as low-level construal participants, $t(67) = 1.35$, $p = .18$, $d = .33$. Means and associated standard errors are depicted in Figure 3.

3.3.3 *Construal Level, Evaluations of Dessert, and Restrained Eating*

Based on the finding that dieting status moderated the effect of construal level on reactions to dessert stimuli, restrained eating (a construct related to dieting) was similarly analyzed as a moderator of the effect. Post-hoc analyses were conducted in order to explore the relationship between restrained eating, construal level, and implicit evaluations of dessert images on the AMP. A linear regression was conducted on participants' evaluations of dessert stimuli, with construal level (high or low) and restrained eating scores as independent predictors. The overall model was significant, $R^2 = 4.77$, $F(3, 93) = 7.90$, $p < .001$. There was no main effect of construal condition, $\beta = -.07$, $t(93) = -.72$, $p = .47$, or restrained eating, $\beta = .08$, $t(93) = .59$, $p = .56$, on liking of dessert stimuli. Results showed a significant interaction effect, $\beta = .40$, $t(93) = 3.16$, $p = .002$. Analyses revealed the simple slope for low restrained eating (-1 SD) was significant, $\beta = -.63$, $t = -2.77$, $p = .01$. For normal eaters, those with a high-level construal reported less positive evaluations of dessert stimuli than those with a low-level construal. The slope for high restrained eating (+1 SD) was not significant, $\beta = .38$, $t = 1.71$, $p = .09$. For restrained eaters, construal level did not influence liking of dessert stimuli. Means are depicted in Figure 4.

3.3.4 *Construal Level, Evaluations of Desserts and Trait Self-Control*

Based on prior research showing a relationship restrained eating and individual differences in self-control (Williams & Ricciardelli, 2000) exploratory analyses were conducted to investigate the relationship between construal level, trait self-control and evaluations of dessert stimuli. A regression was conducted on evaluations of dessert stimuli on the AMP, with construal level (high or low) and trait self-control as independent predictors. The overall model was significant, $R^2 = .09$, $F(3, 94) = 2.90$, $p = .04$. There was no main effect of construal level on evaluations of desserts, $\beta = -.03$, $t(94) = -.25$, $p = .80$, and no main effect of trait self-control on evaluations, $\beta = .12$, $t(94) = .84$, $p = .41$. There was a significant interaction between construal level and trait self-control on dessert evaluations, $\beta = -.37$, $t(94) = -2.51$, $p = .01$. Follow-up analyses revealed that the simple slope for low trait self-control (-1 SD) was not significant, $\beta = .37$, $t = 1.56$, $p = .12$. The slope for high trait self-control was significant. $\beta = -.48$, t = -2.00, $p = .05$. For participants high in trait-self control, a high-level construal led to less positive evaluations of dessert stimuli, as compared to a low-level construal. For participants low in trait self-control, construal level had no effect on dessert evaluations. Means are depicted in Figure 5.

4. DISCUSSION

4.1 MAIN FINDINGS

The goal of the present study was to explore how mental construal influences subjective hunger states. Prior research on construal level theory has established that high-level construals assist self-control by emphasizing long-term, superordinate concerns in self-control contexts. However, self-control outcomes are determined not only by deliberative, goal-oriented behavior, but also by the strength of impulses threatening those goals. The current study investigated whether high-level construals impact impulse strength, specifically by altering the salience of internal need states. It was predicted that a high-level construal, as compared to a low-level construal, would lead to diminished feelings of hunger, less positive evaluations of desserts, and less consumption of unhealthy snack food. Contrary to these predictions, a high-level construal showed no general impact on participants' self-reported hunger, evaluations of dessert stimuli, or amount of unhealthy snack food eaten on a taste test.

There are a few methodological explanations for why construal level did not have any influence on the measures of subjective hunger and subsequent impulse strength. First, there is reason to suspect that the specific construal level manipulation used was problematic and did not effectively alter participants' mindsets for the entire study. Results show that the construal level task affected mood state; participants who completed the high-level construal task reported greater negative affect (e.g., downhearted, unhappy) than participants who completed the low-level version of the task. While not significant, high-level construal participants in the current study also ate

slightly more than low-level construal participants, a finding that is inconsistent with the construal level literature (Fujita et al., 2006). Prior research has established that negative affect impairs self-regulation, such that people prioritize regulating their mood over other long-term concerns (Muraven & Baumeister, 2000), and regulating often involves engaging in hedonic behaviors (e.g., eating) that people usually attempt to control (Tice & Bratslavsky, 2000). Thus, any beneficial effects of a high-level construal on impulse strength may have been eliminated by participants' negative mood in the high-level construal condition.

While some research has shown that high-level abstract construals are associated with positive affect (Labroo & Patrick, 2009; Williams et al., 2014), specific high-level construal manipulation used in the present study (category-exemplar task) may have negatively influenced participants' mood due to its difficulty. In the task, high-level construal participants are asked to provide broad categories for a list of words, while low-level construal participants are asked to generate specific examples for those words. It may have been more challenging and frustrating for participants to provide broader categories than specific examples, which could have reduced their mood. Future studies should evaluate participants' perception (e.g., difficulty level, enjoyment) of the specific construal tasks employed in order to control for possible effects of construal level on mood and self-regulatory resources.

Another potential concern regarding the construal level manipulation relates to the manipulation's power. The category-exemplar task that was used is a mindset manipulation intended to lead people to adopt an abstract or concrete processing style.

According to Freitas, Gollwitzer, and Trope (2004), engaging in abstract processing in one task results in an increased accessibility of this particular form of processing that will subsequently be applied to a following task. Consequently, construal level manipulations are subtle manipulations with fleeting effects. The weakness of the construal level manipulation, in combination with the study's hour-long duration, may have resulted in participants' abstract or concrete mindsets fading before the study was complete. The inclusion of a construal manipulation check at the end of the study, such as the Behavior Identification Form (BIF; Vallacher & Wegner, 1989; see Liberman & Trope, 1998, Study 1), would permit researchers to assess if the manipulation lasted throughout the entire study.

An alternative position regarding the ineffectiveness of the construal level task relates to the theoretical distinction between construal level and mindfulness. Mindfulness can be defined as attention to one's present experience and openness and acceptance of moment-to-moment experiences (Bishop et al., 2004; Kabat-Zinn, 1990). Research shows that mindfulness has an array of physical and psychological benefits, including healthier eating habits. For example, one study found that participants who performed mindful attention training, in which they learned to view their reactions to stimuli as fleeting mental events rather than as real experiences (a core aspect of mindfulness), had less automatic approach tendencies to unhealthy food (Papies, Barsalou, & Custers, 2012). This mindful attention training was also found to reduce the impact of hunger on the attractiveness of unhealthy foods and subsequently led to less unhealthy food choices (Papies, Pronk, Keesman, & Barsalou, 2014). It is possible that

in the current study, the low-level construal task led participants to engage in mindful attention, such that participants viewed their feelings of hunger, liking of desserts, and inclinations to eat food during the taste test, as fleeting mental events. This mindful attention effect would counter any influence of construal level on the main dependent measures.

In regards to the main dependent variables, the self-report measure immediately following the construal manipulation may have been problematic. Asking participants to consciously attend to their current physical state may have counteracted the construal manipulation by bringing high-level construal participants down to a low-level. It is important to consider the related possibility that experiencing visceral states alone, without instructions to report them, may induce a low-level construal. As discussed previously, visceral states are contextual and concrete and as their strength increases, attention becomes increasingly focused on the self (Loewenstein, 1996). Simply experiencing hunger may have led participants to adopt a low-level construal. Indeed, the majority, if not all, of the existing research on construal level and self control does not include manipulations of need state.

The Affective Misattribution Procedure and other implicit measures are likely the most effective means of assessing impulse strength (Hofmann, Friese, & Strack, 2009). As opposed to explicit self-report measures, implicit tasks that measure affective reactions to appetitive stimuli capture the hedonic and automatic aspects of impulses. While the AMP is one such task, the results suggest that the AMP may have been problematic in the current study. According to prior theory and research, experiencing a

particular need state (e.g., hunger) leads people to evaluate stimuli that can alleviate those need states (e.g., food) more positively than other objectively positive stimuli unrelated to the need state (Seibt et al., 2007). However, participants in the current study reported similar liking for positive and dessert images. One possible explanation is that the AMP in general may not be sensitive to changes in need state. While previous studies have examined impulses resulting from visceral states using other implicit tasks, such as the IAT and EAST (Seibt et al., 2007), the AMP itself has never been used in the context of visceral states; impulses have only been assessed with the AMP at baseline hunger levels. Thus, it is unknown whether hunger should in fact lead to more positive evaluations of food stimuli on the AMP. Including a satiated condition in future studies would be informative of the AMP's sensitivity to changes in need state.

A more plausible explanation for the results is that the specific set of dessert stimuli used in the AMP did not work effectively. While the set of dessert images had previously been used as stimuli in explicit tasks, the images had not been used before in implicit tasks. It is possible that the set of dessert images are sufficient for measuring deliberative responses, but are not effective in triggering automatic approach tendencies. Future studies employing the AMP should use images that are reliable stimuli of implicit measures.

4.2 EXPLORATORY FINDINGS

Although overall the predicted effects were not significant, the data revealed a few trends that do help to provide a better understanding of the impact of mental construal on impulse strength. The study showed that people's everyday eating

tendencies influence the effect of construal level on impulse strength. For participants who were on a diet, a high-level construal, as compared to a low-level construal, led to greater liking of dessert images. For participants who were not currently dieting, high and low-level construals led to similar evaluations of dessert images.

Although these findings are inconsistent with a priori predictions, they are appropriate considering the impact of the construal manipulation on mood valence, specifically that the high-level construal task impaired participants' mood. There is a well-established relationship between emotional distress, restrained eating habits, and overeating, such that restrained eaters often overeat when experiencing negative emotions and stress (Greeno & Wing, 1994; Heatherton & Baumeister, 1991; Heatherton & Wagner, 2011; Schachter, Goldman, & Gordon, 1968). For example, neuroimaging research has found that emotional distress in dieters increases brain activity in areas representing the reward value of appetitive stimuli (Wagner, Boswell, Kelley, & Heatherton, 2012). Accordingly, negative affect often leads dieters, as compared to non-dieters, to eat more (Heatherton, Herman, & Polivy, 1991; Herman & Polivy, 1975). In the current study, it is possible that all participants who completed the high-level construal task experienced negative affect, but those who were currently dieting had difficulty regulating this affect and therefore responded more positively to dessert stimuli.[2] It should be noted that the negative affect experienced by both construal level

[2] The small sample size of participants who were dieting (n = 29) should be noted.

conditions was relatively slight, as shown by the low mean values of self-reported negative affect.

Results also showed that participants' evaluations of desserts varied based on whether participants were restrained eaters as well. For normal eaters, the effect of construal level on evaluations of desserts was consistent was initial predictions, such that high-level construals led to less positive evaluations of desert stimuli, while low-level construals led to more positive evaluations. However restrained eaters, those with the tendency to restrict their food intake to control their body weight (Herman & Mack, 1975; Stunkard & Messick, 1985), had similar evaluations of dessert stimuli regardless of their construal level. One way to interpret these findings involves the relationship between self-regulatory resources and restrained eating. Numerous studies have established an association between restrictive eating and limited regulatory resources (Muraven & Baumeister, 2000; Polivy, 1996). It is possible that in the current study, high-level construals attenuated feelings of hunger and impulses for participants who had ample regulatory resources, but did not for participants who had limited resources.

Post- hoc analyses support the idea that self-regulatory resources are involved in the relationship between construal level, restrained eating and dieting, and visceral experience. The results showed that high-level construals only benefited participants with high trait self-control, as opposed to low trait self-control. Specifically, for participants with high trait self-control, high-level construals diminished positive evaluations of dessert stimuli.

Collectively, these exploratory findings on participants' implicit evaluations of desserts provide a cohesive narrative for how mental construal influences visceral experience and impulse strength based on everyday eating behavior. Participants who were not restricting or dieting, and who subsequently had better regulatory resources, were able to effectively regulate negative affect induced by the high-level construal task. High-level construals therefore benefited them by attenuating feelings of hunger and impulse strength. Participants with limited regulatory resources, as a result of dieting and restrictive eating, were unable to regulate their negative affect from the construal level task, making the high-level construal task detrimental.

4.3 SIGNIFICANCE AND FUTURE DIRECTIONS

The findings of the present investigation provide a more comprehensive understanding of how mental construal influences self-control. Specifically, the study demonstrates that construal level affects self-control by altering not only the salience of long-term or short-term features of an event, but also subjective hunger states that shape impulses. While self-control is jointly determined by the strength of automatic impulses and one's capacity to override those impulses, impulses have been largely ignored in past research (Baumeister & Heatherton, 1996; Inzlicht & Schmeichel, 2012). Thus, the current study broadly contributes to the literature on self-control by highlighting the need for a greater emphasis on understanding impulse. Moving forward, notions of "impulse" and "desire" should be accounted for in empirical research and theoretical models of self-regulation.

As the distinction between self-control strength and impulse strength has not been emphasized in prior construal level research, further research could distinguish between the effects of construal level on self-control strength and on impulse strength, and their separate contributions to the overall effect of construal on self-control behavior. Research exploring potential boundary conditions for the effect of construal on visceral intensity would also be particularly informative. For example, do high-level construals attenuate visceral states, such as hunger, regardless of their objective intensity? In other words, will a high-level construal similarly influence objectively strong visceral states (e.g., extreme hunger) and weak visceral states (e.g., slight hunger)? It is possible that high-level construals do not have an effect on intense visceral drives. Additionally, future research should explore the impact of construal level on visceral states unrelated to eating behavior. Pain and sexual arousal would be particularly interesting visceral states to study, as these states seem especially gut-driven, biologically based responses to environmental stimuli (Buss, 1994). Examining other visceral and affective states would also open new avenues for understanding other construal level effects, such as effects on moral decision making, which are highly influenced by visceral experience (e.g., feelings of disgust).

5. CONCLUSIONS

How does abstraction influence self-control? The findings suggest that while high-level construals do not have a generalized influence on visceral experience, they may interact with stable differences in self-control ability and eating habits to impact the subjective intensity of visceral states that determine impulse. This suggests that depending on the circumstances, construal level affects self-control not only by signaling deliberative goal-oriented action, but also by altering visceral experience.

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APPENDIX A

FIGURES AND TABLES

Table 1

Subjective hunger, implicit evaluations of desserts, and amount eaten as a function of gender

	Self-Reported Hunger		Evaluations of Dessert Stimuli		Amount Eaten	
	M	SD	M	SD	M	SD
Male	4.94	1.87	4.36	.92	21.18	15.91
Female	4.34	2.06	4.58	.77	16.00	14.96

Note. There were no significant differences between male and female participants on any of the dependent measures.

Table 2

Subjective hunger, implicit evaluations of desserts, and amount eaten as a function of dieting status

	Self-Reported Hunger		Evaluations of Dessert Stimuli		Amount Eaten	
	M	SD	M	SD	M	SD
Dieting	4.38	2.13	4.51	.66	17.10	12.88
Not Dieting	4.75	1.92	4.45	.93	19.22	16.60

Note. There were no significant differences between dieters and non-dieters on any of the dependent measures.

Table 3

Correlations among predictor variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Hours since eaten	_____														
2. Hunger at Time 1	.18*	___													
3. Hunger at Time 2	.16	.90***	___												
4. Evaluations of dessert stimuli	.09	.12	.18*	___											
5. Evaluations of positive stimuli	.19*	.15	.21**	.74***	___										
6. Evaluations of negative stimuli	-.18	-.03	-.02	-.10	-.17	___									
7. Amount consumed	-.04	.13	.15	-.09	-.06	.00	___								
8. Liking of skittles	.03	-.03	.04	.33***	.25***	-.07	.18	___							
9. Trait Self-Control	.02	.21**	.15	-.15	-.02	-.19*	-.07	-.14	___						
10. Approach Temperament	-.01	.17	.16	.20**	.21**	-.26***	.05	.11	.17	___					
11. Avoidance Temperament	.13	-.13	-.02	.17	.20**	-.22**	-.00	.15	-.23**	.04	___				
12. Trait Impulsivity	-.07	-.27***	-.18	.19*	.11	.03	.04	.11	-.68***	-.01	.18*	___			
13. Restrictive Eating	.01	-.05	.07	.34***	.31***	-.13	.20**	.15	-.19*	.25***	.37***	.22**	___		
14. Uncontrolled Eating	.02	.02	.12	.33***	.24**	-.15	.34***	.29***	-.24**	.26***	.28***	.26***	.81***	___	
15. Body Consciousness	-.02	.08	.11	-.03	.02	-.15	.07	.05	.02	.13	.09	.03	.18	.21**	___
16. Mood Awareness	.02	.14	.05	-.01	-.00	-.04	-.15	.01	.20**	.02	.13	-.38***	-.08	-.08	.20**

Note. *$p \leq .07$. **$p \leq .05$. ***$p \leq .01$.

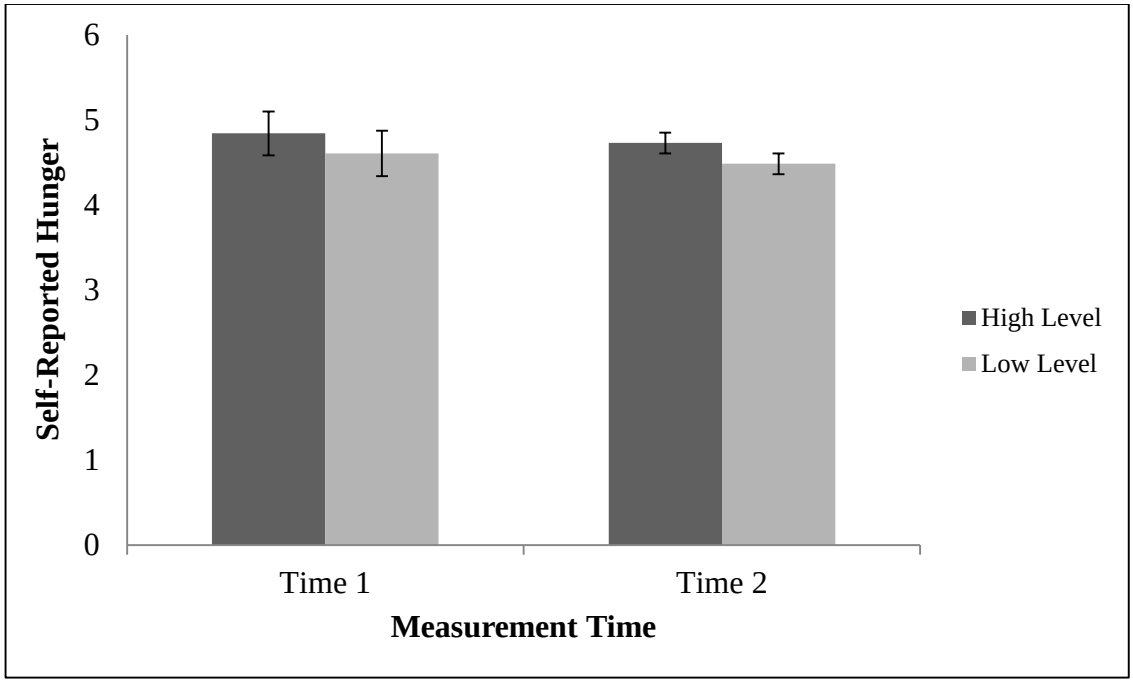


Figure 1. Subjective hunger as a function of construal level, prior to and after the construal manipulation. There were no differences in baseline hunger levels between construal level conditions prior to the construal manipulation (Time 1). After the manipulation (Time 2), participants with a low-level construal and high-level construal reported similar hunger levels. Bars represent standard errors.

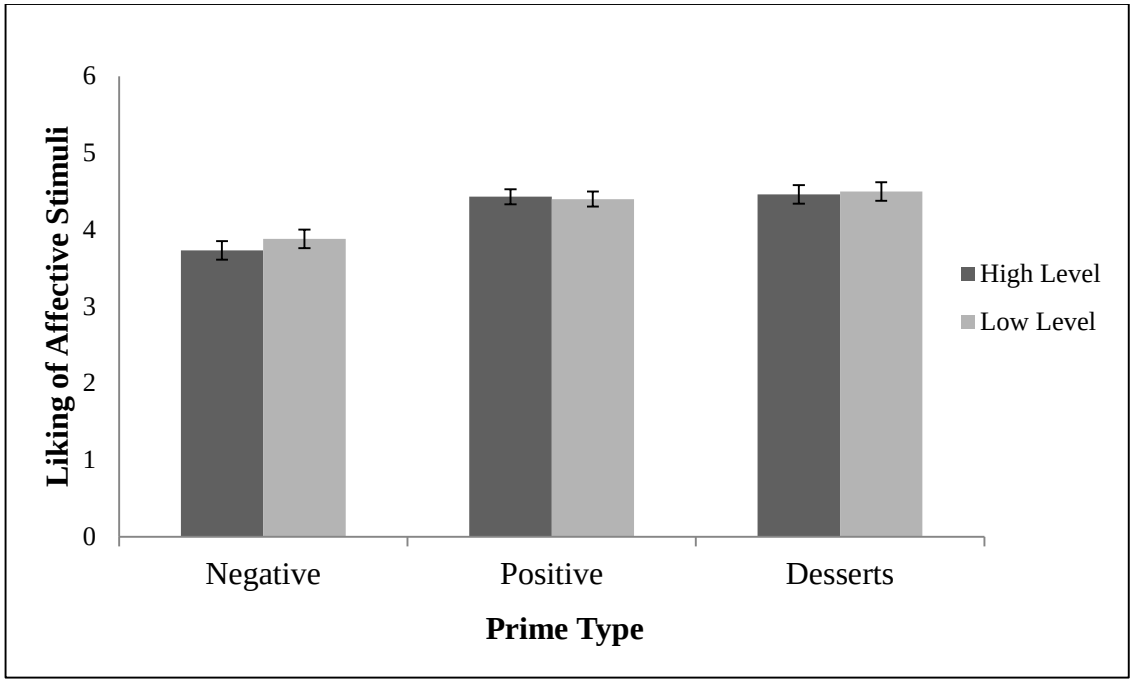


Figure 2. Implicit evaluations of affective stimuli on the Affective Misattribution Procedure as a function of prime type and construal level. Participants with a high-level construal and low-level construal had similar positive evaluations of dessert stimuli. Bars represent standard errors.

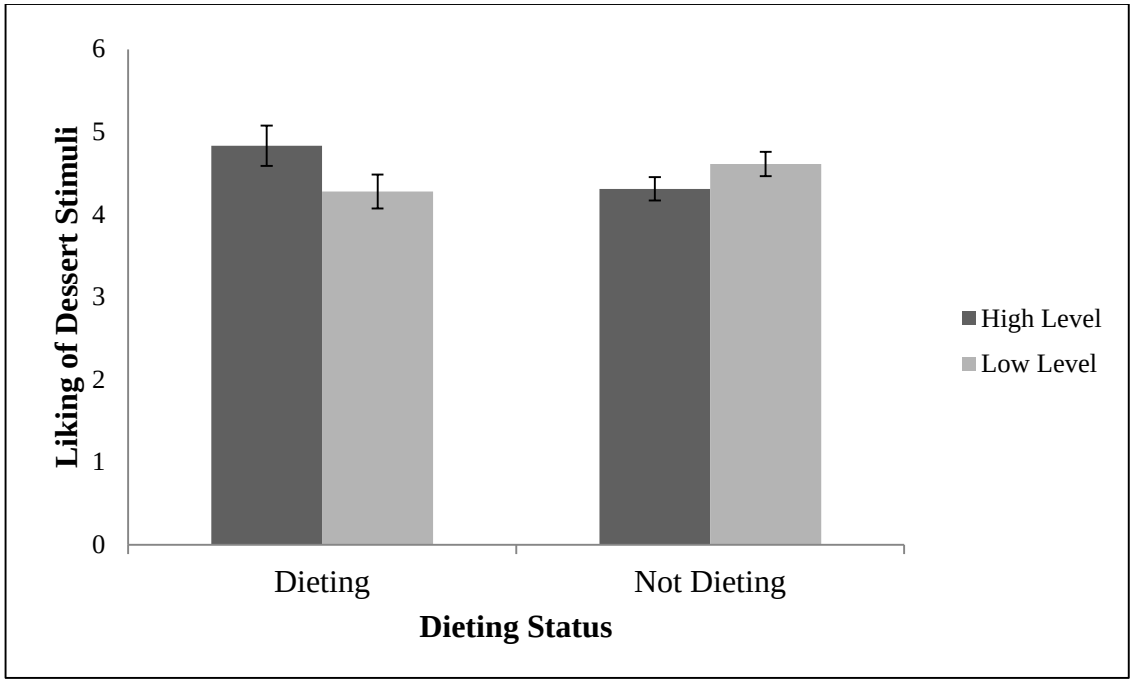


Figure 3. Implicit evaluations of dessert stimuli on the Affective Misattribution Procedure as a function of dieting status and construal level. For dieters, high-level construals led to more positive evaluations of the dessert stimuli and low-level construals led to less positive evaluations of stimuli. Construal level did not influence evaluations of dessert stimuli for participants who were not currently dieting. Bars represent standard errors.

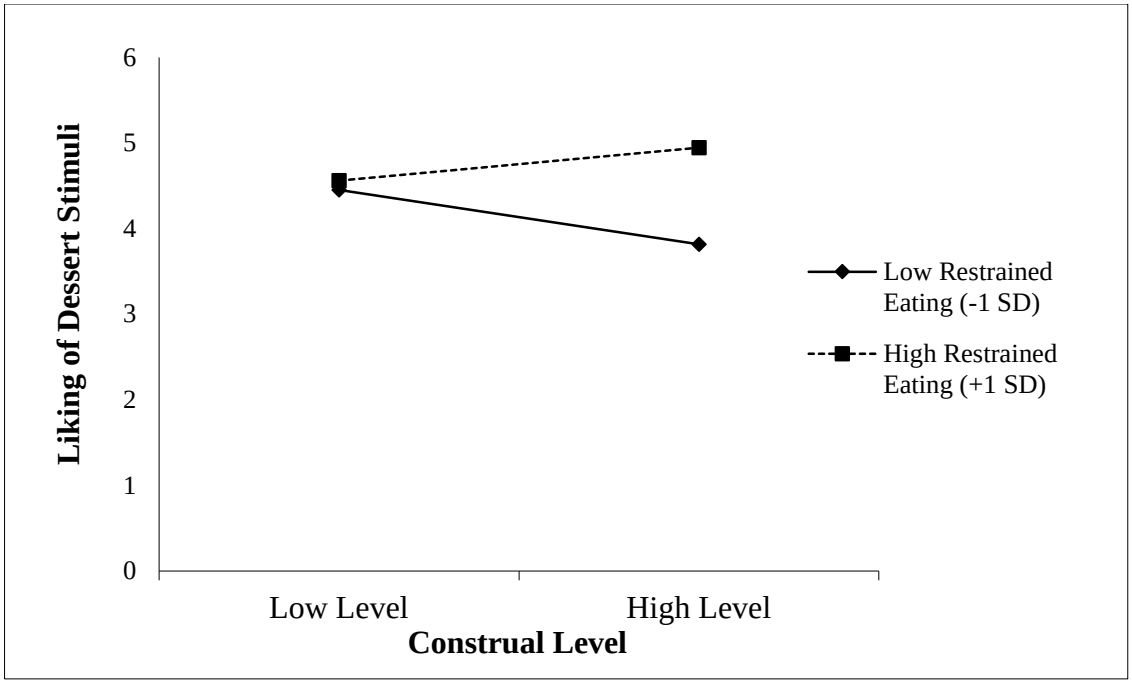


Figure 4. Implicit evaluations of dessert stimuli on the Affective Misattribution Procedure as a function of restrained eating and construal level. Restrained eating moderated the effect of construal on implicit evaluations. For normal eaters, high-level construals led to less positive evaluations of dessert stimuli and low-level construals led to more positive evaluations of dessert stimuli. For restrained eaters, construal level did not influence evaluations of dessert stimuli.

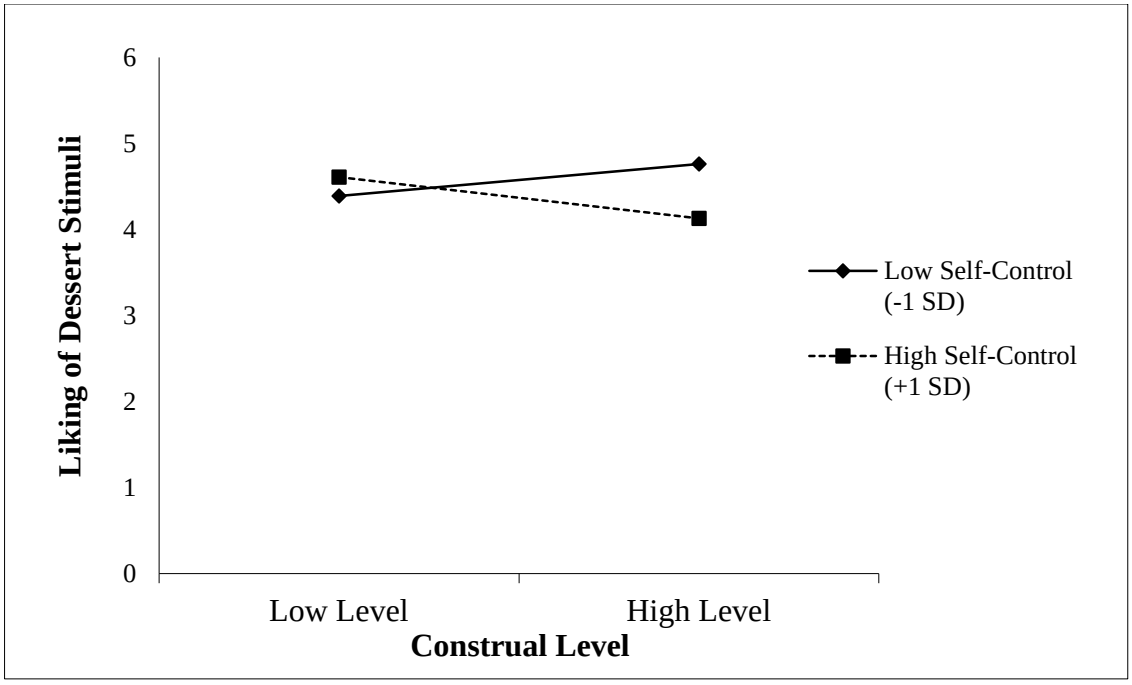


Figure 5. Implicit evaluations of dessert-related stimuli on the Affective Misattribution Procedure as a function of trait self-control and construal level. Trait self-control moderated the effect of construal on implicit evaluations. For participants high in trait self-control, high-level construals led to less positive evaluations of dessert stimuli and low-level construals led to more positive evaluations of dessert stimuli. For participants with low trait self-control, construal level did not influence evaluations of desserts.

APPENDIX B

MATERIALS

B-1: CATEGORY/EXEMPLAR TASK - LOW-LEVEL CONSTRUAL

This task is an exercise having to do with thinking about categories and examples. In each question below, you will be provided with a category and will be asked to provide an example of something that belongs to it.

For instance: "An example of a SKYSCRAPER is *the Empire State Building"*

1. An example of an ACTOR is … _____
2. An example of a BEER is … _____
3. An example of a BOOK is … _____
4. An example of a CANDY is … _____
5. An example of a COIN is … _____
6. An example of a COLLEGE is … _____
7. An example of a COMPUTER is ... _____
8. An example of a DANCE is … _____
9. An example of a GAME is … _____
10. An example of a KING is … _____
11. An example of LUNCH is … _____
12. An example of MAIL is … _____
13. An example of MATH is … _____
14. An example of a MOUNTAIN is … _____
15. An example of a MOVIE is … _____
16. An example of a NEWSPAPER is … _____
17. An example of a PAINTING is … _____
18. An example of PASTA is … _____

19. An example of a PHONE is … _____

20. An example of a PROFESSOR is … _____

21. An example of a RESTAURANT is … _____

22. An example of a RIVER is … _____

23. An example of a SENATOR is … _____

24. An example of a SHOE is … _____

25. An example of a SINGER is … _____

26. An example of a SOAP OPERA is … _____

27. An example of a SODA is … _____

28. An example of a SPORT is … _____

29. An example of a TREE is … _____

30. An example of a WHALE is … _____

B-2: CATEGORY EXEMPLARY TASK: HIGH LEVEL CONSTRUAL

This task is an exercise having to do with thinking about categories and examples. In each question below, you will be provided with an example of some category and will be asked to identify a broader category that the item belongs to.

For instance: "A SKYSCRAPER is an example of *a building"*

1. An ACTOR is an example of … _____
2. A BEER is an example of … _____
3. A BOOK is an example of … _____
4. A CANDY is an example of … _____
5. A COIN is an example of … _____
6. A COLLEGE is an example of … _____
7. A COMPUTER is an example of … _____
8. A DANCE is an example of … _____
9. A GAME is an example of … _____
10. A KING is an example of … _____
11. LUNCH is an example of … _____
12. MAIL is an example of … _____
13. MATH is an example of … _____
14. A MOUNTAIN is an example of … _____
15. A MOVIE is an example of … _____
16. A NEWSPAPER is an example of … _____
17. A PAINTING is an example of … _____
18. PASTA is an example of … _____

19. A PHONE is an example of … _____

20. A PROFESSOR is an example of … _____

21. A RESTAURANT is an example of … _____

22. A RIVER is an example of … _____

23. A SENATOR is an example of … _____

24. A SHOE is an example of … _____

25. A SINGER is an example of … _____

26. A SOAP OPERA is an example of … _____

27. A SODA is an example of … _____

28. A SPORT is an example of … _____

29. A TREE is an example of … _____

30. A WHALE is an example of … _____

B-3: MOOD STATE QUESTIONNAIRE

This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate number in the space next to that word. Indicate to what extent you feel this way currently. Use the following scale to record your answers:

1 2 3 4 5 6 7
Not at all Very Much

_____ Cheerful	_____ Annoyed	_____ Unhappy
_____ Distressed	_____ Motivated	_____ Excited
_____ Eager	_____ Sickened	_____ Repulsed
_____ Outraged	_____ Entertained	_____ Mad
_____ Nauseous	_____ Enthusiastic	_____ Interested
_____ Joyful	_____ Sad	_____ Calm
_____ Alert	_____ Energetic	_____ Happy
_____ Downhearted	_____ Angry	_____ Determined
_____ Disgusted	_____ Lively	_____ Depressed
_____ Hostile	_____ Upset	_____ Attentive
_____ Tired	_____ At ease	_____ Hungry
_____ Thirsty	_____ Physically chilly	_____ Physically warm
_____ Tired		

B-4: TASTE TEST

Product Evaluation

There are two bowls in front of you (A and B). Each bowl is full of a typical snack food. Please use the spoons in each bowl to sample the food items. Feel free to try as much as you like to evaluate the items.

Please look carefully at the two snacks.

For each one, please list the one word or phrase that best describes how it **looks**.

A: _____

B: _____

Please touch the snacks.

For each one, please list the one word or phrase that best describes how it **feels**.

A: _____

B: _____

Please taste the two snacks.

For each one, please list the one word or phrase that best describes how it **tastes**.

A: _____

B: _____

If the two snacks were equally priced, how strong of a preference would you have based on the look, feel, and taste of each? (Circle a number.)

1	2	3	4	5	6	7
Strongly prefer A	Somewhat prefer A	Slightly prefer A	No preference	Slightly prefer B	Somewhat prefer B	Strongly prefer B

How much money do you feel a large, standard size bag of each snack is worth?

A: _____

B: _____

B-5: BARRATT IMPULSIVITY SCALE

People differ in the ways they act and think in different situations. This is a test to measure some of the ways in which you act and think. Read each statement and circle the appropriate number on the right side of the page. Do not spend too much time on any statement. Answer quickly and honestly.

	1 Rarely/never	2 Occasionally	3 Often	4 Almost always/always
1. I plan tasks carefully. ……	1	2	3	4
2. I do things without thinking…….	1	2	3	4
3. I make up my mind quickly.	1	2	3	4
4. I am happy-go-lucky.	1	2	3	4
5. I don't "pay attention".	1	2	3	4
6. I have "racing" thoughts.	1	2	3	4
7. I plan trips well ahead of time.	1	2	3	4
8. I am self-controlled.	1	2	3	4
9. I concentrate easily.	1	2	3	4
10. I save regularly.	1	2	3	4
11. I "squirm" at plays or lectures.	1	2	3	4
12. I am a careful thinker.	1	2	3	4
13. I plan for job security.	1	2	3	4
14. I say things without thinking.	1	2	3	4
15. I like to think about complex problems.	1	2	3	4
16. I change jobs.	1	2	3	4

17. I act “on impulse”.	1	2	3	4
18. I get easily bored when solving thought problems.	1	2	3	4
19. I have regular health check ups.	1	2	3	4
20. I act on the spur of the moment.	1	2	3	4
21. I am a steady thinker.	1	2	3	4
22. I change residences.	1	2	3	4
23. I buy things on impulse.	1	2	3	4
24. I can only think about one problem at a time.	1	2	3	4
25. I change hobbies.	1	2	3	4
26. I walk and move fast.	1	2	3	4
27. I solve problems by trial-and-error.	1	2	3	4
28. I spend or charge more than I earn.	1	2	3	4
29. I talk fast.	1	2	3	4
30. I have extraneous thoughts when thinking.	1	2	3	4
31. I am more interested in the present than the future	1	2	3	4
32. I am restless at the theater or lectures.	1	2	3	4
33. I like puzzles.	1	2	3	4
34. I am future oriented.	1	2	3	4

B-6: BRIEF SELF-CONTROL SCALE

Please answer the following items as they apply to you. There are no right or wrong answers. Please choose a number, 1 through 5, that best represents what you believe to be true about yourself for each question. Use the following scale to refer to how much each question is true about you.

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5

Not at all like me	Sometimes like me	Very much like me

_____ 1. I have a hard time breaking bad habits.

_____ 2. I am lazy.

_____ 3. I say inappropriate things.

_____ 4. I do certain things that are bad for me, if they are fun.

_____ 5. I refuse things that are bad for me.

_____ 6. I wish I had more self-discipline.

_____ 7. I am good at resisting temptation.

_____ 8. People would say that I have iron self-discipline.

_____ 9. I have trouble concentrating.

_____ 10. I am able to work effectively toward long-term goals.

_____ 11. Sometimes I can't stop myself from doing something, even if I know it's wrong.

_____ 12. I often act without thinking through all the alternatives.

_____ 13. Pleasure and fun sometimes keep me from getting work done.

B-7: APPROACH-AVOIDANCE TEMPERAMENT SCALE

Please indicate how much you agree or disagree with each of the following statements by writing a number in the space provided. All of your responses are anonymous and confidential. Please select numbers according to the following scale:

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5---------- 6 ---------- 7

Strongly disagree Neutral Strongly agree

_____ 1. By nature, I am a very nervous person.

_____ 2. Thinking about the things I want really energizes me.

_____ 3. It doesn't take much to make me worry.

_____ 4. When I see an opportunity for something I like, I immediately get excited.

_____ 5. It doesn't take a lot to get me excited and motivated.

_____ 6. I feel anxiety and fear very deeply.

_____ 7. I react very strongly to bad experiences.

_____ 8. I'm always on the lookout for positive opportunities and experiences.

_____ 9. When it looks like something bad could happen, I have a strong urge to escape.

_____ 10. When good things happen to me, it affects me very strongly.

_____ 11. When I want something, I feel a strong desire to go after it.

_____ 12. It is easy for me to imagine bad things that might happen to me.

B-8: BODY CONSCIOUSNESS SCALE

Please indicate how much you agree or disagree with each of the following statements by writing a number in the space provided. All of your responses are anonymous and confidential. Please select numbers according to the following scale:

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5---------- 6

Strongly disagree Strongly agree

_____ 1. I am sensitive to internal bodily tensions.

_____ 2. I know immediately when my mouth or throat gets dry.

_____ 3. I can often feel my heart beating.

_____ 4. I am quick to sense the hunger contractions of my stomach.

_____ 5. I'm very aware of changes in my body temperature.

_____ 6. When with others, I want my hands to be clean and look nice.

_____ 7. It's important for me that my skin looks nice … for example, has no blemishes.

_____ 8. I am very aware of my best and worst facial features.

_____ 9. I like to make sure that my hair looks right.

_____ 10. I think a lot about my body build.

_____ 11. I'm concerned about my posture.

_____ 12. For my size, I'm pretty strong.

_____ 13. I'm better coordinated than most people.

_____ 14. I'm light on my feet compared to most people.

_____ 15. I'm capable of moving quickly.

B-9: MOOD AWARENESS SCALE

Please indicate how much you agree or disagree with each of the following statements by writing a number in the space provided. All of your responses are anonymous and confidential. Please select numbers according to the following scale:

1	2	3	4	5	6
Disagree Very Much	Disagree Moderately	Disagree Slightly	Agree Slightly	Agree Moderately	Agree Very Much

_____ 1. I have a hard time labeling my feelings.

_____ 2. I'm usually "tuned in" to my emotions.

_____ 3. I find myself thinking about my mood during the day.

_____ 4. I am sensitive to changes in my mood.

_____ 5. I have trouble explaining my feelings.

_____ 6. On my way home from work or school, I find myself evaluating my mood.

_____ 7. Right now I know what kind of mood I'm in.

_____ 8. I often evaluate my mood.

_____ 9. I'm never really sure what I'm feeling.

_____ 10. I don't pay much attention to my moods.

B-10: THREE-FACTOR EATING QUESTIONNAIRE

This section contains statements and questions about eating habits and feelings of hunger.

Please indicate how much you agree with each of the following statements, or how true it is about you. Write a number (0-4) to indicate your answer using the following scale:

1	2	3	4
Definitely True	Mostly True	Mostly False	Definitely False

_____ 1. I deliberately take small helpings to control my weight.

_____ 2. I begin eating when I feel anxious.

_____ 3. Sometimes when I start eating, I just can't seem to stop.

_____ 4. When I feel sad, I often eat too much.

_____ 5. There are some foods I don’t eat, because they make me fat.

_____ 6. Being with someone who is eating, often makes me also want to eat.

_____ 7. When I feel tense or stressed, I often feel I need to eat.

_____ 8. I often feel so hungry that my stomach feels like a bottomless pit.

_____ 9. I'm always so hungry that it’s hard for me to stop eating before finishing all of the food on my plate.

_____ 10. When I feel lonely, I console myself by eating.

_____ 11. I consciously restrict how much I eat during meals to avoid gaining weight.

_____ 12. When I smell appetizing food or see a delicious dish, I find it very difficult not to eat - even if I’ve just finished a meal.

_____ 13. I am always sufficiently hungry to eat at any time.

_____ 14. If I feel nervous, I try to calm myself down by eating.

_____ 15. When I see something that looks delicious, it often makes me feel so hungry that I have to eat right away.

_____ 16. When I feel depressed, I want to eat.

Read each statement carefully and answer by ticking the alternative that best applies to you.

17. How often do you avoid “stocking up” on tempting foods?

____ Almost never
____ Rarely
____ Usually
____ Almost always

18. How likely are you to make an effort to eat less than you want?

____ Unlikely
____ A little likely
____ Somewhat likely
____ Very likely

19. Do you go on eating binges even though you’re not hungry?

____ Never
____ Rarely
____ Sometimes
____At least once a week

20. How often do you feel hungry?

____ Only at mealtimes
____ Sometimes between meals
____ Often between meals
____ Almost always

21. On a scale from 1 to 8, where 1 means no restraint in eating (eating whatever you want, whenever you want it) and 8 means total restraint (constantly limiting food intake and never 'giving in'), what number would you give yourself?

Circle the number that best applies to you:

1 ---------- 2 ---------- 3 ---------- 4 ---------- 5 ---------- 6 ---------- 7 ---------- 8

Eat whatever I want, whenever I want it

Constantly limiting food intake, never 'giving' in

B-11: DEMOGRAPHIC QUESTIONNAIRE

Age: _____

Sex: Male Female

I would describe my ethnicity as:
1) Hispanic or Latino 2) NOT Hispanic or Latino

I would describe by race as:

_____ American Indian/Alaska Native

_____ Asian

_____ Native Hawaiian or other Pacific Islander

_____ Black or African American

_____ Caucasian/White

_____ Hispanic or Latino (Black or African American)

_____ Hispanic or Latino (White)

_____ More than one race

Other: _____

Country of Birth: _____
If not U.S., how many years have you lived in the U.S.? _____

How many hours ago did you last eat? _____

On a scale from 1 (*not hungry*) to 7 (*hungry*), how hungry are you right now? _____

Do you currently have a cold? YES NO

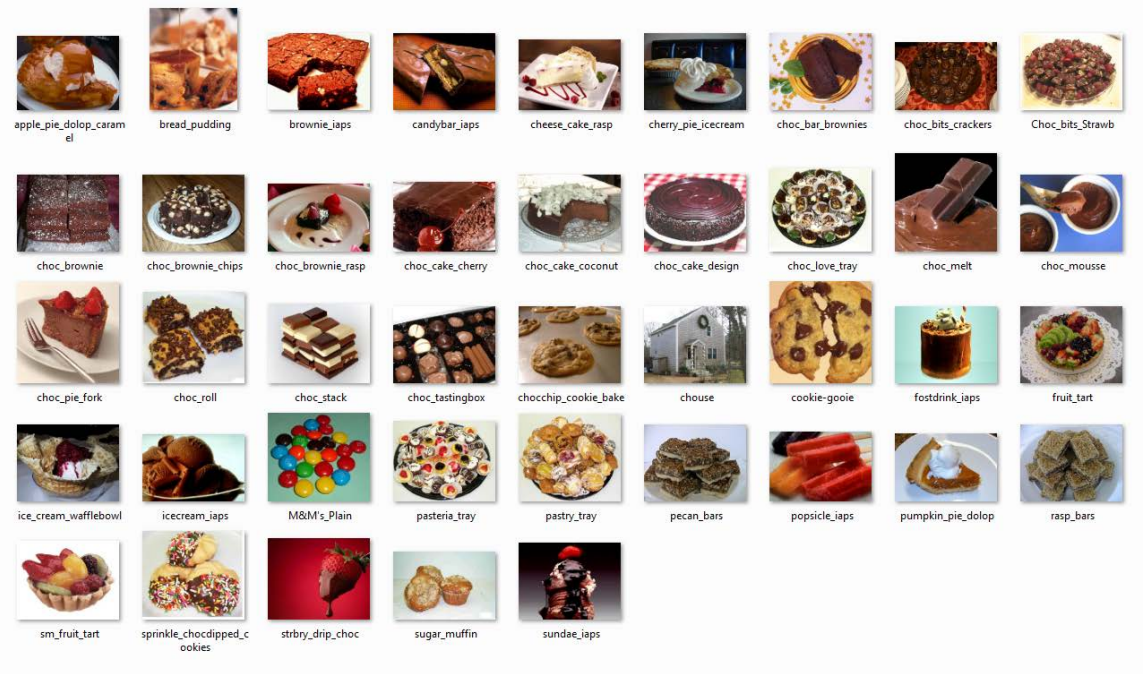
How many hours of sleep did you get last night? _____

On a scale from 1 (*not tired*) to 7 (*tired*), how tired are you right now? _____

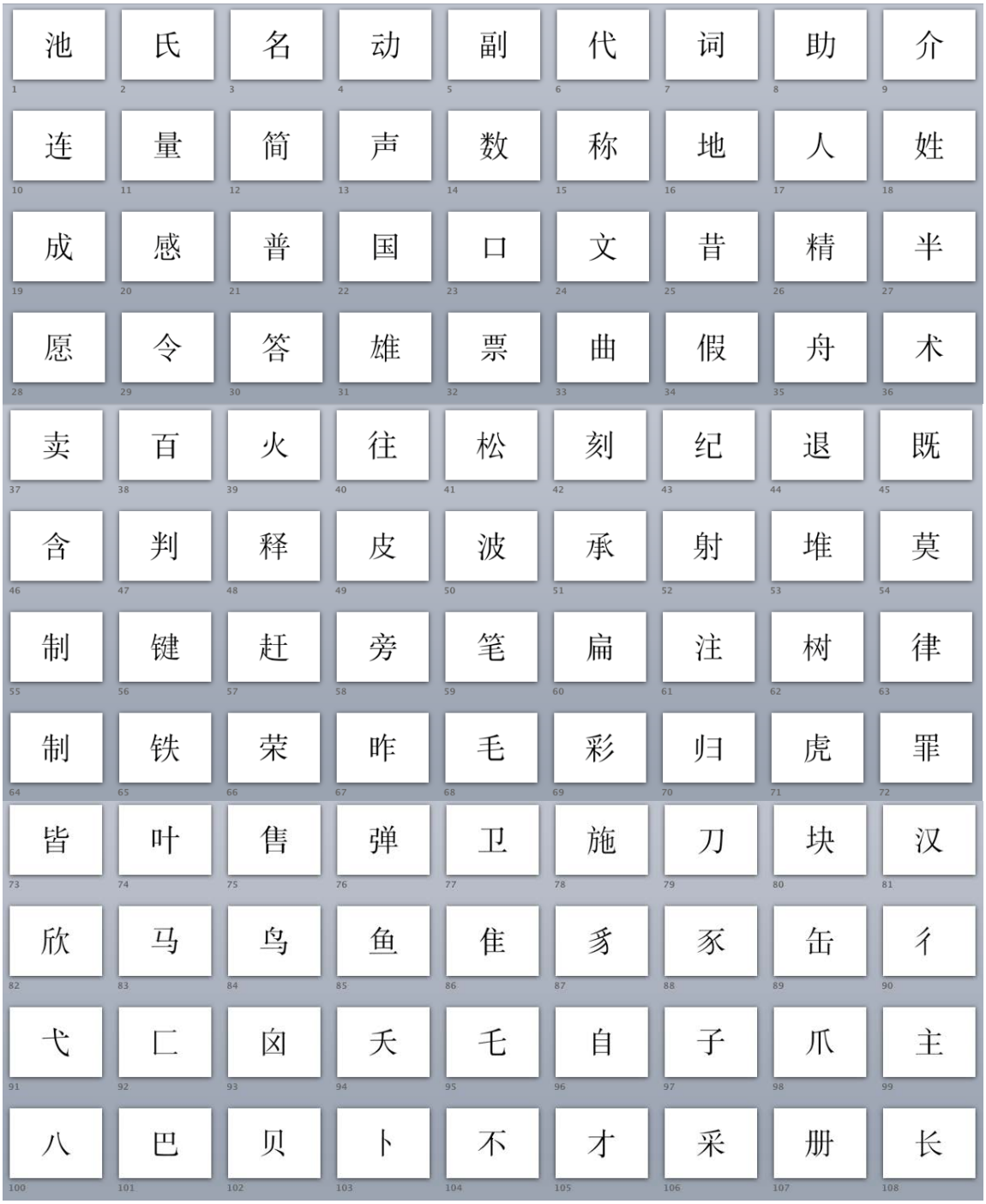
Have you experienced any extremely stressful events so far today? YES NO

Are you currently in your everyday life dieting or restricting your eating? YES NO

B-12: DESSERT STIMULI USED FOR THE AFFECTIVE MISATTRIBUTION PROCEDURE



B-13: PICTOGRAPH STIMULI USED FOR THE AFFECTIVE MISATTRIBUTION PROCEDURE



Note: Pictograph stimuli are available for download on Keith Payne's laboratory website (http://www.unc.edu/~bkpayne/materials.html).

B-14: DEBRIEFING

Thank you for participating in this study! Now that the study is over, we would like to tell you more about the purpose of this research. We ask in advance that you please do not share any of this information with others – it is important for our data that future participants are unaware of the objectives of this study before they participate.

What was this study about?

In this study, we are examining how abstract mindsets influence people's subjective experiences. We hypothesize that thinking abstractly will reduce the intensity of one's physical and emotional states and have potential downstream effects (e.g., allowing people to exert better self-control).

Why is it important?

This study is important because it will help us to better understand the factors influencing self-control. If abstract thinking diminishes the intensity of urges and drives, this type of thinking may be incorporated into various treatments for addiction.

What you did today…

In order to investigate this research question, we led participants to adopt either an abstract or concrete mindset through a writing task. We then attempted to induce specific visceral states, such as hunger or thirst. In some conditions, we did this by asking participants to refrain from eating/drinking prior to the study and/or exposing them to food/drink in the lab. Depending on condition, we measured the intensity of visceral states via self-report questionnaires, an implicit awareness task, or by measuring how much food/drink participants' consumed as part of a "taste test." Finally, in some conditions, we examined subsequent self-control by having participants perform a decision making task.

Things you should know…

You will be receiving 2 credit hours for participating in this experiment.

Further questions?

If you have any further questions or concerns, feel free to contact one of the principal investigators of this study at loganberg@tamu.edu.