

# **THE (IN)EFFECTIVENESS OF SELF-CONTROL INTERVENTIONS**

A Dissertation

by

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## **ABSTRACT**

In consumer domains such as spending and eating, researchers have demonstrated maladaptive patterns of behavior for individuals lower in self-control, but the effectiveness of many common strategies to boost consumer self-control remains underexplored in marketing and psychology literature. This dissertation is organized into three essays contributing to the marketing field's understanding of chronic self-control by investigating potential pitfalls to everyday self-control interventions.

Essay 1 examines how perceptions of goal importance influence self-control decision making. Researchers have previously shown that people put more effort toward goals that are more important, effectively increasing their self-control. The current research shows that individuals with varying degrees of self-control respond differently to important goals and suggests that past experiences lead consumers with low self-control to interpret important goals as more difficult. The results of this essay highlight a severe limitation to a commonly used messaging strategy and suggest a supportive intervention.

Essay 2 evaluates the disclosure of nutritional information as a strategy to influence self-control decision making. Past research has suggested that such disclosure is only effective in reducing obesity when consumers are motivated to seek out and process such information. Due to heightened conflict with hedonic goals, this essay examines and demonstrates a tendency for individuals low in eating self-control to ignore available nutritional information for indulgent foods, thereby heightening their

enjoyment. Supporting evidence is presented using several different measures of attention to information and actual consumption.

Essay 3 examines how perceptions of a food's healthiness are influenced by prior exposure to other foods. Comparative evaluations advance our understanding of perceptions related to food consumption and how exposure to healthy foods may influence future eating choices. This research provides evidence across three studies that the healthiness of foods previously encountered influence healthiness perceptions of ambiguously healthy snacks, and importantly, this influence differs based on one's self-control.

Overall, this dissertation makes both theoretical and practical contributions to the fields of marketing and consumer psychology. The foci of this work are ineffective marketing and public policy interventions and the findings uncover backfire effects that may help facilitate better interventions in the future.

## **ACKNOWLEDGMENTS**

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## TABLE OF CONTENTS

	Page
ABSTRACT .....	ii
ACKNOWLEDGMENTS.....	iv
TABLE OF CONTENTS .....	v
LIST OF FIGURES.....	vii
INTRODUCTION.....	1
ESSAY 1: THE BACKFIRE EFFECT OF EMPHASIZING GOAL IMPORTANCE ON SELF-CONTROL BEHAVIOR.....	5
Synopsis .....	5
Introduction .....	6
Theoretical Background .....	7
Study 1.....	11
Study 2.....	18
Study 3.....	24
General Discussion.....	34
ESSAY 2: IGNORANCE IS BLISS: THE HEDONIC COST OF NUTRITIONAL INFORMATION .....	38
Synopsis .....	38
Introduction .....	39
Theoretical Background .....	41
Study 1.....	45
Study 2.....	50
Study 3.....	53
Study 4.....	56
General Discussion.....	60

	Page
ESSAY 3: THE CONTEXTUAL INFLUENCE OF PRIOR FOODS ON HEALTHINESS PERCEPTIONS .....	64
Synopsis .....	64
Introduction .....	65
Theoretical Background .....	67
Study 1 .....	73
Study 2 .....	76
Study 3 .....	80
General Discussion .....	84
CONCLUSIONS .....	89
REFERENCES .....	93
APPENDIX .....	103

## LIST OF FIGURES

FIGURE		Page
1	Floodlight Analysis of Likelihood to Purchase Based on Self-Control .....	16
2	Floodlight Analysis of Grams of M&Ms Consumed Based on Self-Control.....	22
3	Floodlight Analysis of Unhealthy Choices Count Based on Self-Control.....	28
4	Average Mouse Trajectories to (Un)Healthy Choices Based on Self-Control.....	30
5	Average Mouse Trajectories for Focal Levels of Difficulty and Self-Control.....	33
6	Spotlight Analysis of Seconds Spent Looking Based on Self-Control .....	49
7	Spotlight Analysis of Mean Expected Enjoyment Based on Self-Control.....	52
8	Spotlight Analysis of Mean Enjoyment Differential Based on Self-Control.....	55
9	Spotlight Analysis of Mean Grams Consumed Based on Self-Control .....	59
10	Spotlight Analysis of Goldfish Healthiness Rating Based on Self-Control...	75
11	Spotlight Analysis of Healthiness Rating (with Control) Based on Self-Control.....	80
12	Spotlight Analysis of Intended Smoothie Consumption Based on Self-Control.....	84

## INTRODUCTION

Chronic self-control failure is a critical contributor to not achieving one's goals while higher levels of personal self-control, the tendency to control thoughts, emotions, impulses, and performances (Baumeister, Heatherton, and Tice 1994) are generally linked to positive outcomes, including better job performance, more enduring relationships, improved psychological adjustment, and superior health (Tangney, Baumeister, and Boone 2004). Due to its considerable impact on decision-making and personal well-being, self-control has received tremendous attention in consumer research. The benefits of higher self-control extend to consumption domains and, importantly, researchers have demonstrated maladaptive patterns of behavior for consumers lower in self-control (Dzhogleva and Lambertson 2014; Redden and Haws 2013; Poynor and Haws 2009). Despite a rich body of self-control research in marketing, the effectiveness of many common strategies to boost consumer self-control remains underexplored in the literature. Understanding how personality differences in self-control affect choice is of critical interest to marketers, public policy makers, and consumers as societal realities including the increasing prevalence of obesity (Flegal et al. 2012) and rise in consumer loan and mortgage defaults (Crook and Banasik 2012) demand effective and practical interventions to improve individuals' self-control decisions.

Self-control dilemmas which involve inconsistency between the most attractive option at the present moment and what will be most attractive in the future (Hoch and



Loewenstein 1991) are common in consumer contexts. Individuals lower in trait self-control are most susceptible to failure in these situations as they are more likely to convert their impulses into immediate indulgent behaviors (Friese and Hofmann 2009). Conventional wisdom and prior research suggest that emphasizing the importance of long-term goals or presenting information about attributes that conflict with such goals may be promising interventions to quell temptation. However, this dissertation investigates potential backfire effects for self-control strategies that are well-intentioned but ineffective for those low in self-control. The three essays that comprise the dissertation all contribute to the marketing field's understanding of chronic self-control by identifying mechanisms that lead to suboptimal choices and proposing countermeasures to facilitate improvement.

The first essay (“The Backfire Effect of Emphasizing Goal Importance on Self-Control Behavior”) examines how perceptions of goal importance influence self-control decision making. Prior research demonstrates people’s tendency to exert more effort toward goals that are more important (Carver 2004). This essay proposes that individuals with varying degrees of self-control respond differently to important goals and advances a theory that past experiences lead consumers with low self-control to interpret important goals as more difficult. Evidence for a proposed backfire effect which leads individuals low in trait self-control to yield to temptation when faced with important goals is shown across three studies. The findings are robust across different domains (spending and eating), using explicit (purchase likelihood and food consumption) and implicit (mouse tracking displaying response hesitation) dependent measures. The

results of this essay highlight a severe limitation to a commonly used messaging strategy and suggest a supportive intervention, reducing perceived difficulty, as a promising real-world countermeasure while also highlighting the elevated salience of perceived difficulty as a theoretical contribution to understanding self-control processes.

The second essay (“Ignorance Is Bliss: The Hedonic Cost of Nutritional Information”) evaluates the disclosure of nutritional information as a strategy to influence self-control decision making. Past research has suggested that such disclosure is only effective in reducing obesity when consumers are motivated to seek out and process such information (Howlett et al. 2009). Because consumers generally believe that unhealthy items taste better (Raghunathan, Naylor, and Hoyer 2006), there may be a substantial hedonic cost when objective nutritional facts are known to the consumer. Research has shown that consumers are sometimes willfully ignorant of easily obtainable product attributes when these attributes conflict with goals and generate negative emotions (Ehrich and Irwin 2005). Due to heightened conflict with hedonic goals, this research proposes and examines across four studies a tendency for individuals low in eating self-control to ignore available nutritional information for indulgent foods, thereby heightening their enjoyment. Supporting evidence is presented using different measures of attention to information including time spent looking at packaging and the simple choice to view information or not. Overall, this research shows how nutritional information intended to advance consumer knowledge and moderate consumption primarily helps individuals who are naturally able to exert self-control. The consumers most vulnerable to bad eating behavior avoid such information and receive

comparatively little benefit. This work enhances our understanding of differences in self-control and shines a light on a major limitation of nutrition disclosure.

The third essay (“The Contextual Influence of Prior Foods on Healthiness Perceptions”) examines how perceptions of a food’s healthiness are influenced by prior exposure to other foods. Comparing food alternatives is a key aspect of consumption and studying perceptions advances our understanding of consumer behavior (Fishbach and Zhang 2008) and exposure to healthy foods may influence future eating choices (Dhar and Simonson 1999). Ambiguous attributes are most susceptible to contextual influence and many times our choices, and specifically choices regarding food consumption, involve ambiguity. This research proposes and finds supporting evidence across three studies that the healthiness of foods previously encountered influence healthiness perceptions of ambiguously healthy snacks, and importantly, this influence differs based on one’s self-control. Lower self-control makes consumers susceptible to the influence of previously encountered foods, resulting in perceptions that are at odds with successful self-control. This study has implications for both dieters and consumers in general who sequentially encounter foods and food imagery at grocery stores, at restaurants, in other social settings, at home, and in the media.

This dissertation provides both theoretical and practical contributions to the fields of marketing and consumer psychology. The foci of this work are ineffective marketing and public policy interventions and, thus far, the findings uncover backfire effects that may help facilitate better interventions in the future.

# **ESSAY 1: THE BACKFIRE EFFECT OF EMPHASIZING GOAL IMPORTANCE ON SELF-CONTROL BEHAVIOR**

## **Synopsis**

Researchers have demonstrated a link between greater goal importance and enhanced efforts toward and success at achieving important goals. Observations in the self-control domains of spending and eating are seemingly at odds with these findings, as low self-control individuals often struggle greatly in the pursuit of highly important goals. We hypothesize that individual differences in trait self-control lead to varying interpretations of goal importance. Across three studies, we demonstrate that elevating relative goal importance can backfire and increase indulgent consumption for individuals low in chronic self-control. Accordingly, well-intentioned approaches for enhancing self-control negatively impact people who are naturally vulnerable. This backfire effect occurs due to the impact of emphasizing goal importance on one's perceptions of goal difficulty.

## **Introduction**

Individuals generally dedicate more time (Emmons and Diener 1986), allocate greater self-regulatory resources (Carver 2004), and experience increased affective well-being from goal progress (Wiese and Freund 2005) when goals are subjectively important. However, societal realities such as prevalent obesity (Flegal et al. 2012) and high rates of consumer debt defaults (Crook and Banasik 2012), among others, seem to be at odds with the connection between goal importance and successful self-regulation. Do people simply not value their health or finances? In this research, we predict and show that goal importance is not interpreted in the same way by all individuals. Specifically, we test whether emphasizing goal importance can ironically hinder goal-directed efforts for consumers lower in trait self-control.

Self-control dilemmas arise when attractive, proximal options conflict with more prudent, distal alternatives (Fujita 2011). Successfully exerting self-control in such scenarios requires an individual to forgo temptations that are presently preferred and available in favor of some longer-term benefit that would be preferred in the future (Dshemuchadse, Scherbaum, and Goschke 2013; Hoch and Loewenstein 1991). Faced with time-inconsistent preferences, the individual will succumb to self-control failure when the desire for temptation outweighs the desire to remain committed to a goal (Gul and Pesendorfer 2004). Given such trade-offs, we might expect placing greater importance on future preferences and related longer-term goals to increase the probability of forgoing current temptations. From a control theory perspective, feedback

indicating discrepancies between the goal and performance should be attended to with greater effort, or enhanced motivation, when a goal is perceived to be more important (Hollenbeck and Williams 1987).

## **Theoretical Background**

### Self-Control and Goal Importance

We suggest that feedback inferred from emphasizing goal importance will vary based on individual differences in self-control. Specifically, while people higher in self-control are generally adept at and motivated to reach goals and particularly highly-valued goals, emphasizing goal importance will instead cue an inability to achieve those goals and heighten the perceived goal difficulty for individuals lower in self-control. This effectively widens the discrepancy between the current state and self-control goal, reducing expectancy that effort will lead to successful goal attainment (Vroom 1964). Even if the low self-control individual highly values the self-control goal, low goal attainability results in lower levels of goal pursuit or even goal disengagement which manifests in goal incongruent behaviors. As such, our key prediction is that for those individuals with less self-control, enhancing the importance of a goal will decrease goal-consistent behaviors, whereas those with greater self-control will be less influenced by volatile perceptions of goal importance.

Overall, individuals with less dispositional self-control exhibit several characteristics that lead us to predict this backfire effect in which emphasizing goal importance leads to self-control lapses: (1) They are less effective at allocating regulatory resources for multiple goals (Muraven, Shmueli, and Burkley 2006). (2) They hold more pervasive chronic hedonic goals (Poynor and Haws 2009) that lead to favoring proximal over distal goals. (3) They have likely experienced repeated failure in self-control domains, further fueling the fire of their likelihood to succumb to temptation when the stakes are high (Baumeister et al. 2006; Tangney, Baumeister, and Boone 2004). Given that perceptions of goal difficulty are central to our proposed process, we next discuss their role in the ironic importance effect.

#### Perceptions of Goal Difficulty

At a foundational level, goal difficulty is clearly relevant to motivation and goal achievement. Prior research suggests that higher goal importance increases goal commitment (Locke and Latham 2006), but less is understood about the interplay of goal importance and goal difficulty, particularly with respect to how individual differences may moderate their effects on goal-oriented decision making. We predict that highlighting the importance of goals may be counterproductive to goal pursuit for individuals low in self-control by increasing perceived difficulty to a greater extent than when goal importance is relatively lower. Despite recognizing the goal as important, the

individual's realization that they are unlikely to achieve a difficult goal becomes a self-fulfilling prophecy.

Difficulty perceptions are shaped by an individual's accumulation of experiences and are influenced by actual failures and successes (Bandura 1988; Lee and Bobko 1994). As a function of successful goal progress and attainment (Drèze and Nunes 2011), people consider a goal's difficulty when assessing their likelihood of achieving important goals. Bandura (1977) suggests that the perceived difficulty or ease with which one is able to perform relevant tasks is a key component of self-efficacy. Self-doubt produced by cumulative failure undermines efforts for people with low self-control to self-regulate in important situations (Bandura 1988) and contributes to diminished performance subsequently (Silver, Mitchell, and Gist 1995). A personal history of misallocating self-regulatory resources combined with compelling current hedonic goals heighten a goal's seeming difficulty for those with lower self-control. We predict that increased doubts about attainability and awareness that important goals are difficult will be key to the underlying process linking high goal importance and low self-control to more indulgent choices. People low in self-control are more likely to ascribe past failures to low ability (Gist and Mitchell 1992) and tend to respond poorly to past failure as manifested by subsequent behaviors (Zemack-Rugar, Corus, and Brinberg 2012), thereby impeding progress toward presently important goals.

Importantly, perceptions of goal difficulty are dynamic. Such perceptions can vary over time and across different situations (Bandura and Wood 1989). This malleability combined with research showing that external persuasion can enhance



efficacy (Bandura 1988) suggest that goal difficulty can be situationally reduced or enhanced. Research related to self-control has shown that goal difficulty is associated with differential responses. For example, holding a lay theory that self-control resources are limited leads individuals to experience greater success achieving self-control goals when goals seem less difficult (Mukhopadhyay and Johar 2005). Behavioral studies on weight loss show that individuals with higher preexisting and manipulated self-efficacy, suggesting that goals are less difficult and more attainable, lose more weight over time (Linde et al. 2006). We suggest that even though individuals with lower self-control ability may feel that self-control based decision-making is difficult in general, the inability to control one's behaviors in tempting situations will be exacerbated when goals are highlighted to be particularly important (and on the contrary, less potent when goals are perceived as relatively less important).

Based on this theoretical account of self-control and goal importance, we hypothesize that emphasizing the relative importance of a goal will ironically hinder goal pursuit for those lower in self-control. Specifically, although goals will naturally be viewed as more or less important, we focus on altering perceptions of the relative importance of a goal, showing the impact of situational influences on the perceptions of goal importance. We examine the proposed self-control and goal importance interaction across three studies. Additionally, we explore processes related to goal difficulty. First, we examine the primary effect of self-control and importance on decisions and behaviors in both studies 1 and 2 across two different domains (spending and food consumption). Then, in study 3, we present further evidence that goal difficulty influences the amount

of conflict experienced. By continuously tracking the stream of cognitive output involved in simple choice tasks, we are able to conduct a rich analysis of the conflict underlying discrete self-control related choices.

### **Study 1**

This study tests whether higher situational importance of goals differentially influences goal-directed behavior for consumers with varying levels of self-control. We predict that those lower in self-control would be more likely to make a non-budget conforming purchase when the corresponding financial goal was perceived as relatively more important.

#### **Method**

To test the above hypothesis, we ran a study in which 159 undergraduates (95 female) participated for course credit. Fourteen participants who began but did not complete the study were excluded from analysis. Study 1 used a 2 (goal importance: low, high)  $\times$  continuous measured self-control design. We asked participants to rank five goals from most to least important using a drag-and-drop task (see Table 1 for the list of goals used). As the focal goal of this study, “managing one’s finances carefully” was the focal goal of interest for both conditions. Following previous literature regarding assimilation and contrast effects (Wedell, Hicklin, and Smarandescu 2007), we expected

participants to compare “managing one’s finances carefully” to the surrounding goals and accordingly interpret that goal as more or less important than the others.

Specifically, the low importance condition diminished the importance of the financial domain by presenting it alongside items that pretested as highly important goals such as “caring for one’s family and friends” and “fostering one’s spiritual development.” The high importance condition similarly used contrast effects to elevate the importance of finances by presenting “managing one’s finances” among goals that pretested as less important including “getting regular haircuts” and “deciding which movies to watch.”

**Table 1**  
Goal Importance Manipulation Ranking Task Items

<b>Less important goals (High importance condition)</b>	<b>More important goals (Low importance condition)</b>
Getting regular haircuts	Fostering one’s religious/spiritual development
Maintaining one’s car properly	Caring for one’s family and friends
Keeping one’s home clean and	Aspiring to reach one’s professional
Managing one’s finances carefully	Managing one’s finances carefully
Deciding which movies to watch	Finding love and living life together

Following an unrelated cognitive task involving simple computational questions, participants read the following projective self-control purchase scenario (from Haws, Bearden, and Nenkov 2012):

Ms. A is a 22-year old college student with a part-time job. It is two days before she gets the next paycheck and at present, she has only \$25 left for necessities in her bank account. In addition, she does have two credit cards that she sometimes uses. Today, Ms. A needs to buy a pair of warm socks for an outdoor party coming up this weekend. After work, she goes with her friend Ms. B to the mall

to purchase the socks. As they are walking through a department store, Ms. A sees a great looking jacket on sale for \$50. The jacket is of a style that she has wanted to buy for a long time, and is in her favorite color. The helpful salesperson tells Ms. A that they have just one piece left in her size, and it is unlikely that they will get more pieces in this style in the future.

We next asked participants to rate their likelihood of making the indulgent jacket purchase if they were the character in the scenario. The likelihood scale measured this likelihood from 0% to 100%. This and similar types of projective techniques have been used in prior research to capture one's self-control in a manner that alleviates potential concerns about socially desirable responding while clearly capturing the tendency toward impulsive and indulgent behavior (Dholakia et al. 2006; Haws et al. 2012).

Later in the session, following filler tasks, self-control was assessed using The Brief Self-Control Scale (BSCS; Tangney et al. 2004) with the degree to which each of 13 statements reflected participants' tendencies measured on a 1 (not like me at all) to 7 (very much like me) scale. This scale has been used extensively in prior research to assess individuals' general propensity to control their behaviors (e.g., Hofmann et al. 2012; Duckworth et al. 2007; Poynor and Haws 2009). Participant gender was recorded along with other demographic information.

## Results

*Importance Manipulation Check and Pretest.* We verified the efficacy of our goal importance manipulation using a non-parametric ordinal comparison of financial goal rankings between the two conditions. As expected, participants ranked finances as

significantly more important in the condition with less important surrounding goals ( $M = 1.41$ ) than more important surrounding goals ( $M = 4.15$ ; Mann-Whitney  $U = -10.22$ ,  $p < .001$ ). Further, our goal importance manipulation did not interact with individual self-control in influencing the ranking ( $F(1, 155) = .41$ , NS).

In addition, because of the novelty of our importance manipulation, we also conducted a separate pilot test with 80 participants (49 male) to verify that the rank order task influenced perceptions of goal importance as intended. Following the same ranking task as study 1, we asked participants to indicate the importance of the “managing one’s finances carefully” goal on a 1 (not at all important) to 9 (extremely important) scale. Although as expected, financial management was perceived to be an important goal, those in the condition with more important surrounding goals rated the focal finance goal as significantly less important ( $M = 6.95$ ) than those in the condition with less important surrounding goals, indicating a successful manipulation of perceived importance ( $M = 7.85$ ,  $t(78) = -2.89$ ,  $p < .01$ ).

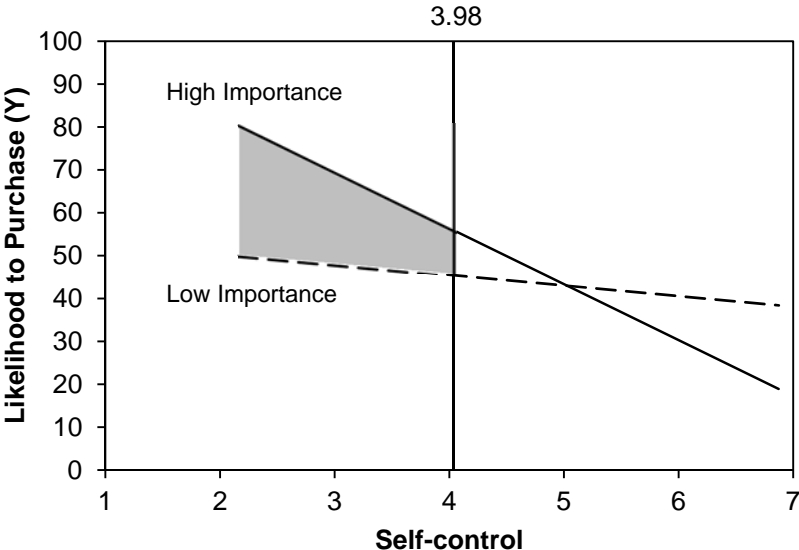
*Purchase likelihood.* The self-control variable was indexed using a continuous measure based on the mean of the self-control scale after reverse coding appropriate items. An ANCOVA on purchase likelihood with BSCS ( $\alpha = .86$ ,  $M = 4.66$ ), the importance condition (contrast coded: -1 = low importance, 1 = high importance), and their interaction as predictors was conducted. A covariate was included for gender because the purchase scenario called for the participant to assume the role of a female. As predicted, the self-control by importance interaction was significant ( $F(1, 154) = 4.66$ ,  $p < .04$ ). Trait self-control had a significant main effect ( $\beta = -7.76$ ,  $t(158) = -3.24$ ,

$p < .01$ ) suggesting that higher self-control reduces the purchase likelihood, a result consistent with prior research (Haws et al. 2012). There was no main effect of goal importance ( $\beta = 1.98, t(158) = .87, NS$ ). Also, females were more likely to purchase the jacket than males ( $\beta = 11.37, t(158) = 2.37, p < .02$ ).

In order to better understand the interaction, we conducted further analyses. Because the continuous self-control index does not contain specific focal values of interest, we decomposed the interaction using a floodlight analysis (Spiller et al. 2013) to explore the range of self-control values for which differences in goal importance are significant. The PROCESS macro for SAS (Hayes 2013), used in this and all subsequent studies, revealed a region of significance using the Johnson-Neyman (J-N) technique. Differences in the likelihood to purchase the indulgent jacket between the low and high importance conditions were significant below the J-N point of 3.98 for self-control ( $\beta_{J-N} = 11.16, SE = 5.65, p = .05$ ), as illustrated by the shaded region in Figure 1, Panel A. This region is inclusive of 3.69, the value 1 SD below the self-control mean that would typically be tested using a spotlight procedure (Aiken and West 1991). Constructed confidence bands are entirely above zero for self-control values below the J-N point, illustrating the significant positive difference between purchase likelihoods for the importance conditions (see Figure 1, Panel B). There are no regions of significance above the J-N point or self-control mean. These findings suggest that consumers lower in self-control are more likely to make decisions that are incongruent with goals when those goals are important versus unimportant while those higher in self-control are not significantly affected by goal importance.

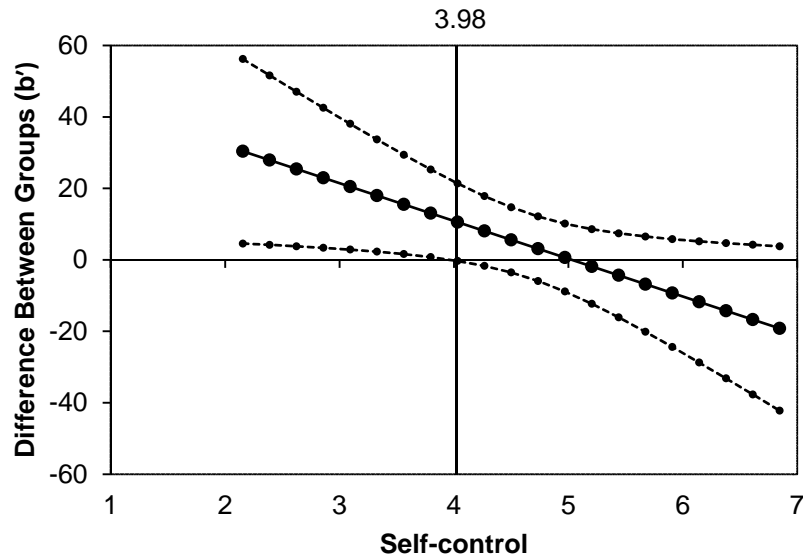
We also dummy coded the importance conditions to test the simple effect of self-control when each condition was coded as zero. Greater self-control was associated with a significantly lower purchase likelihood for an important goal ( $\beta = -13.05$ ,  $t(158) = -3.89$ ,  $p < .001$ ) but not for a less important one ( $\beta = -2.48$ ,  $t(158) = -.71$ , NS).

**Figure 1**  
Floodlight Analysis of Likelihood to Purchase Based on Self-Control  
*A: Regression Lines with Johnson-Neyman Point*



**Figure 1 Continued**

*B: Estimated Simple Effect of Importance (Z) with Confidence Bands*



Notes: Panel A shows the shaded region below the 3.98 Johnson-Neyman point containing self-control index values where the simple effect of goal importance is significant per floodlight procedures recommended in Spiller et al. (2013). Panel B shows the estimated difference between Panel A's regression lines with confidence intervals.

*Discussion.* These results demonstrate that after being induced to perceive a goal in the financial self-control domain as either more or less important than other goals, consumers lower in self-control are more likely to make indulgent decisions than when importance is de-emphasized. Individuals higher in self-control did not exhibit such differences, perhaps because such individuals are less susceptible to situational manipulation than those lower in self-control. Further, making a goal seem relatively less important minimized differences in behavior between those of higher and lower self-control.



## Study 2

Study 2 further extends of our findings from study 1 by testing our core hypothesis with a behavioral outcome measure of self-control in a different consumption domain. We also examine the proposed goal difficulty mechanism linking the self-control by domain importance interaction and actual consumption.

### Method

One hundred sixty-eight undergraduates (83 female) participated in this study for course credit. The study involved a 2 (goal importance: not emphasized, emphasized) × continuous measured self-control design.

The between-subjects manipulation of goal importance was framed as an article recall task. Each participant read a brief article about either the importance of healthy eating (adapted from Williams 2010) or the past presence of forests in Antarctica (adapted from Pappas 2013). The articles were similar in length and ostensibly based on research at Harvard University. We felt that encouraging unhealthy eating would be less believable, and so we chose to use a more conservative approach by including a neutral versus enhanced importance manipulation. To support our cover story that the study tested article recall, each participant answered questions about the source, factualness, and their enjoyment of the article.

The next task was introduced as a video evaluation of “relationships in film.” Participants had at their workstations a bowl containing 70 grams of M&M candies (approximately 1.67 serving sizes) and invited to eat the snack while they watched an 11-minute video. Once the video ended, a lab administrator collected the bowl containing the remaining M&Ms. Participants answered several items about the film that were not focal to our study, to support the claim that the task involved evaluating on-screen relationships (e.g., “How much did you enjoy the film?”, “How much did you feel you could relate to the film?”, and “How appropriate do you think the film was for college students?”). Once participants were dismissed from the lab session, an administrator weighed the remaining contents of each bowl and recorded the weights. To separate the measurement of our dependent variable and the mediating and independent variables, we presented an unrelated task that asked participants to spend several minutes rating how much they enjoyed a series of photographs.

To examine the influence of our importance conditions on perceived goal difficulty, we asked participants to indicate how difficult it is for them to achieve health goals (1 = not at all difficult to 7 = very difficult). Following filler tasks, participants completed the Tangney, Baumeister, and Boone (2004) short-form general self-control scale and provided demographic information including gender.

## Results

*Manipulation check.* The passages from the two articles were examined in a pre-test of 128 participants (54 female). We asked, “How aware are you at this moment about the importance of eating healthy?” on a 1 (not at all aware) to 7 (extremely aware) scale to verify that participants perceived eating self-control as more important in the emphasized ( $M = 5.84$ ) versus not emphasized ( $M = 5.26$ ,  $t(127) = -2.66$ ,  $p < .001$ ) importance conditions. Participants also rated the healthy eating article as significantly more important (“How important was the information presented in the article to you personally?”) during the study ( $M_{\text{important}} = 4.79$ ,  $M_{\text{unimportant}} = 2.78$ ,  $t(127) = -9.01$ ,  $p < .001$ ). There was no significant difference in enjoyment of the two articles ( $M_{\text{important}} = 3.93$ ,  $M_{\text{unimportant}} = 4.12$ ,  $t(167) = -.80$ , NS).

*Amount of candy consumed.* The continuous self-control measure was indexed using the BSCS means ( $\alpha = .88$ ,  $M = 4.14$ ) as in study 1. An ANCOVA was performed on the quantity eaten (in grams) with manipulated domain importance as a contrast-coded, between-subjects factor and BSCS as a continuous factor. Given typical differences in self-regulation related to food consumption for males and females (Fishbach, Friedman, and Kruglanski 2003), gender was included as a covariate in the model, but results also hold in the model that does not include gender. Consistent with our hypothesis and supportive of our results in study 1, there was a significant importance  $\times$  self-control interaction ( $F(1, 161) = 5.59$ ,  $p < .02$ ). Additionally, the results revealed a significant main effect of trait self-control ( $\beta = -4.23$ ,  $t(165) = -2.39$ ,  $p < .02$ );

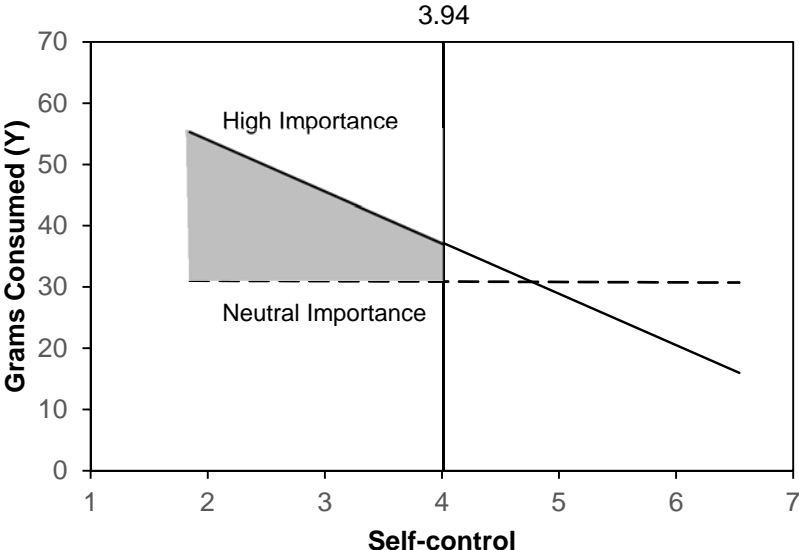
that is, participants consumed fewer M&Ms when self-control was higher. A main effect of goal importance was not significant ( $\beta = 2.64$ ,  $t(165) = 1.56$ , NS). Females consumed significantly smaller quantities than males ( $\beta = -14.49$ ,  $t(165) = -4.16$ ,  $p < .001$ ).

We performed a floodlight analysis (Spiller et al. 2013) to reveal the nature of the significant interaction. Participants with self-control scores below the 3.94 J-N point ( $\beta_{J-N} = 6.85$ ,  $SE = 3.47$ ,  $p = .05$ ) ate significantly more candy when the importance of the healthy eating goal was emphasized compared to when it was not emphasized (see Figure 2, Panel A). This region of significance where confidence intervals were entirely above zero (see Figure 2, Panel B) included the index value 1 SD below the self-control mean (3.15). Further, we assessed the simple effect of self-control for each importance condition and found that greater self-control was associated with reduced M&M consumption when the importance of healthy eating was emphasized ( $\beta = -8.39$ ,  $t(165) = -3.74$ ,  $p < .001$ ) but not when the passage was neutral ( $\beta = -.06$ ,  $t(165) = -.02$ , NS).

*Mediation.* The effect of importance on candy consumption was mediated by goal difficulty. We examined the interaction of importance and self-control which significantly predicted goal difficulty ( $F(1, 161) = 5.89$ ,  $p < .02$ ). Further, the effect of goal difficulty was significant when we added the measure to our model predicting snack consumption ( $\beta = 2.57$ ,  $t(164) = 2.37$ ,  $p < .02$ ), while the interaction of importance and self-control was no longer significant ( $F(1, 160) = 3.65$ , NS). As such, we applied the bootstrapping technique recommended by Hayes (2013) and tested mediation with 10,000 bootstrapped samples using the PROCESS macro for SAS. The indirect effect of goal difficulty in linking the importance  $\times$  self-control interaction to amount consumed

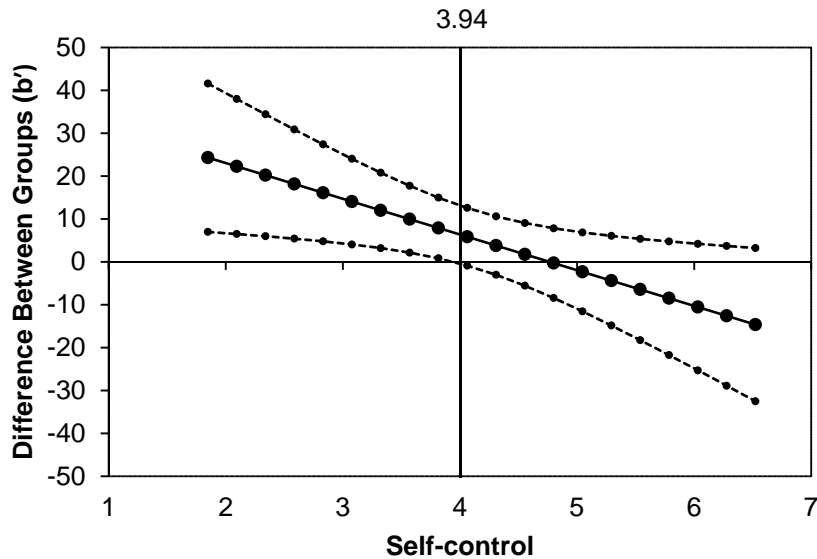
was significant and entirely below zero ( $\beta = -.79$ ,  $SE = .51$ , 95% bias-corrected bootstrap  $CI: -2.20, -.09$ ).

**Figure 2**  
Floodlight Analysis of Grams of M&Ms Consumed Based on Self-Control  
*A: Regression Lines with Johnson-Neyman Point*



### Figure 2 Continued

*B: Estimated Simple Effect of Importance (Z) with Confidence Bands*



Notes: Panel A shows the shaded region below the 3.94 Johnson-Neyman point containing self-control index values where the simple effect of goal importance is significant per floodlight procedures recommended in Spiller et al. (2013). Panel B shows the estimated difference between the regression lines in Panel A with confidence bands.

*Discussion.* Study 2 extends our findings from study 1 to actual eating behavior. Further, not emphasizing the importance of a goal minimizes differences in behavior between those of higher and lower self-control. Additionally, the results from the mediation analysis in study 2 suggest that goal difficulty is underlying our effects. The findings show that greater importance increases perceived goal difficulty for people with low self-control, thereby increasing susceptibility to succumb to temptation.

### Study 3

To advance our understanding of the choice conflict experienced during self-control decision processing, we utilize mouse tracking software in study 3 (Freeman and Ambady 2010). While our previous studies and the vast majority of self-control research have relied on discrete self-control outcomes, this study allows us to analyze mouse trajectories which reveal a stream of conflict experienced through attraction to the alternative choice. Prior research has highlighted the automaticity and implicitness involved with self-control processes and, more specifically, the interplay of temptation and goal pursuit (Fishbach, Friedman, and Kruglanski 2003; Fishbach and Shah 2006). Further, processes involving goal conflict (e.g., temptation and long-term goals) can occur non-consciously (Bargh et al. 2001; Kleiman and Hassin 2011). Study 3 measures implicit self-control responses to goal difficulty cues in situations where goals are manipulated to seem more or less important. When the related goal is important and perceived goal difficulty is heightened, we expect that people lower in self-control will choose more unhealthy snacks and will also exhibit greater decisional conflict (i.e., attraction to unhealthy choices) when choosing healthy snacks.

#### Method

Two hundred fourteen undergraduates (92 female) participated in this study for course credit. Responses were excluded for six participants who did not complete the

study. Study 3 used a 2 (goal importance: low, high) × 2 (goal difficulty: low, high) × continuous measured self-control design. Goal importance was manipulated with a ranking task similar to that presented in study 1 but with “maintaining healthy eating habits” as the focal goal since the main task involved eating self-control.

Following the ranking task, participants read instructions and began the mouse tracking activity. To begin each trial, participants click a “Start” button on an otherwise blank screen. After the participant clicked to start a trial, the button was replaced by a priming phrase in 24-point font for either high (i.e., impossible, hopeless, unattainable, no way, difficult, problematic, hard, or painful) or low (i.e., possible, hopeful, attainable, effortless, no sweat, no problem, easy, or painless) goal difficulty, depending on their randomly assigned condition.

The goal difficulty priming phrase was replaced by a black dot after 50 milliseconds, and two images appeared in the upper-left and upper-right corners of the display. The images in each trial were two photographs, one of a healthy snack (e.g., apple slices, celery sticks with peanut butter, baby carrots, yogurt with granola) and one of an unhealthy snack (e.g., ice cream, cheesecake, chocolate cake, churros).

Before the activity, participants were instructed to begin moving the mouse toward the image of food they preferred when a dot appeared on the screen. The shortest distance between the mouse cursor starting position and each image was 448 pixels sideways and 608 pixels upwards. Each trial concluded when the image of the preferred snack was clicked. We captured choice data for each of the trials and measured underlying conflict experienced as indicated by the MouseTracker data in order to



specifically examine the role that goal difficulty might be playing in impacting the conflict experienced in making the decisions. This approach is consistent with prior MouseTracker research emphasizing real-time information processing measures using mouse trajectories (Dshemuchadse et al. 2013; Freeman and Ambady 2010; van der Wel, Sebanz, and Knoblich 2012; Yu et al. 2012).

Following eight practice trials to familiarize participants with the procedure, participants completed 16 trials in randomized order. The healthy snack was displayed on the left side of the screen in half of the trials and the unhealthy snack appeared on the left in the other half. This variation was intended to remove any curvature effects created by predictability about where healthy and unhealthy snacks would appear. Results from this portion of the study were processed, analyzed, and exported with MouseTracker (Freeman and Ambady 2010). Following the mouse tracking task and a filler activity, participants completed BSCS (2004) and responded to demographic questions including gender.

## Results

*Manipulation check.* The rankings of the healthy eating goal were significantly different between the high ( $M_{\text{high}} = 1.49$ ) and low ( $M_{\text{low}} = 3.47$ ; Mann-Whitney  $U = -11.99, p < .001$ ) importance conditions.

*Snack Choice.* As in prior studies, the self-control measure was indexed ( $\alpha = .85, M = 4.18$ ) and a gender covariate was used in all models. Participants were required to

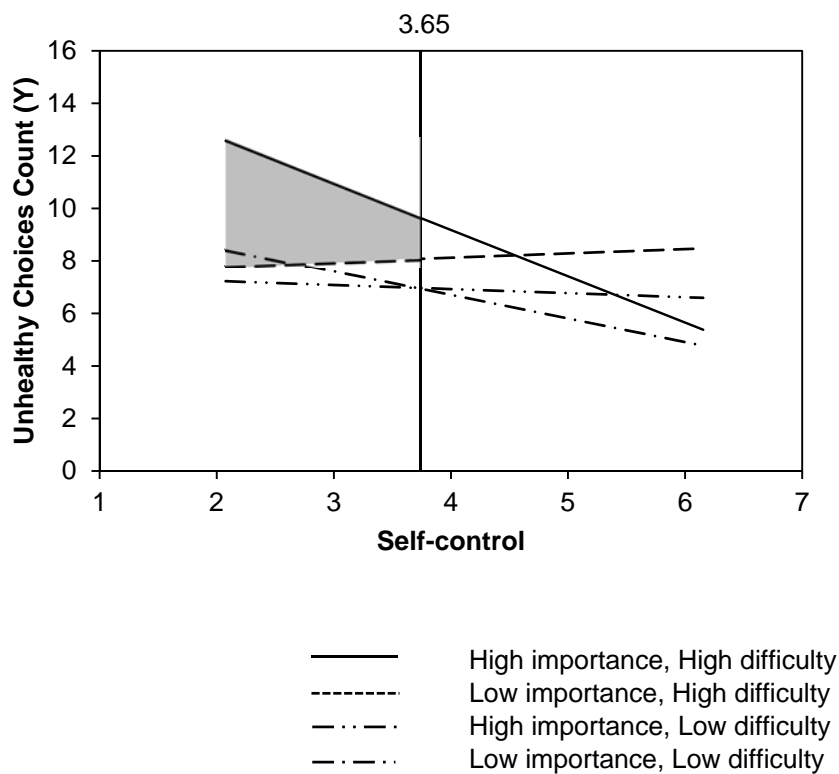
choose between a healthy or unhealthy snack in each trial, so the dependent variable for choice is the total count of unhealthy snacks chosen out of the 16 trials. Significance tests would have been identical if we indexed choice as the count of healthy snacks. We contrast-coded manipulated variables and regressed the number of unhealthy snacks chosen on goal importance (low vs. high), goal difficulty (low vs. high), and self-control. The three-way interaction was significant based on our ANCOVA ( $F(1, 205) = 4.31, p < .04$ ) which we decomposed by assessing the simple two-way interactions. No main effects were significant.

The three-way interaction was in line with our predictions, as revealed by the simple two-way interactions. Specifically, the interaction of importance and self-control was significant for high goal difficulty ( $\beta = -1.93, t(209) = -2.21, p < .03$ ) but not for low difficulty ( $\beta = .73, t(209) = .79, NS$ ). No other simple interactions were significant. We investigated the significant interaction further by assessing the simple-simple effects of importance in the high goal difficulty condition with a floodlight analysis (Spiller et al. 2013) involving a range of values for self-control. The simple-simple effect of importance was significant in the region below 3.65 for self-control ( $\beta_{J-N} = 1.73, SE = .88, p = .05$ ) indicating that lower self-control resulted in more unhealthy snack choices as shown in Figure 4, Panels A and B. These results are consistent with prior studies.

**Figure 3**

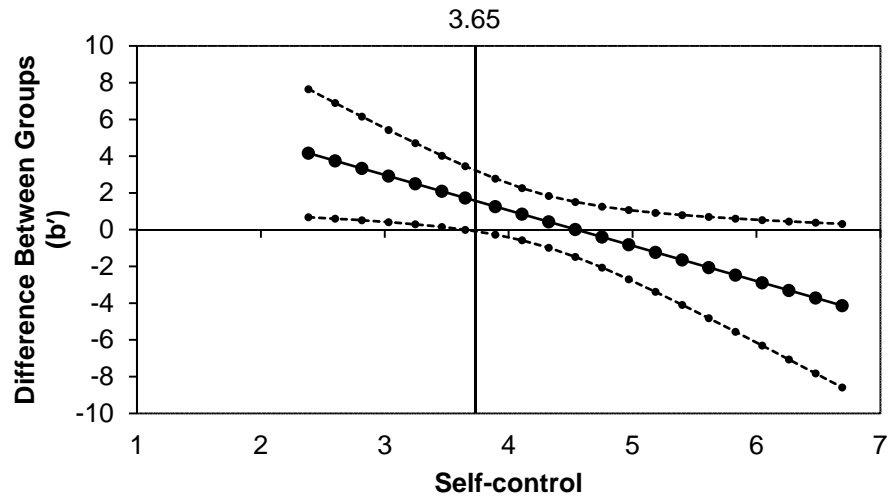
Floodlight Analysis of Unhealthy Choices Count Based on Self-Control

*A: Regression Lines with Johnson-Neyman Point*



**Figure 3 Continued**

*B: High Goal Difficulty. Estimated Simple Effect of Importance (Z) with Confidence Bands*

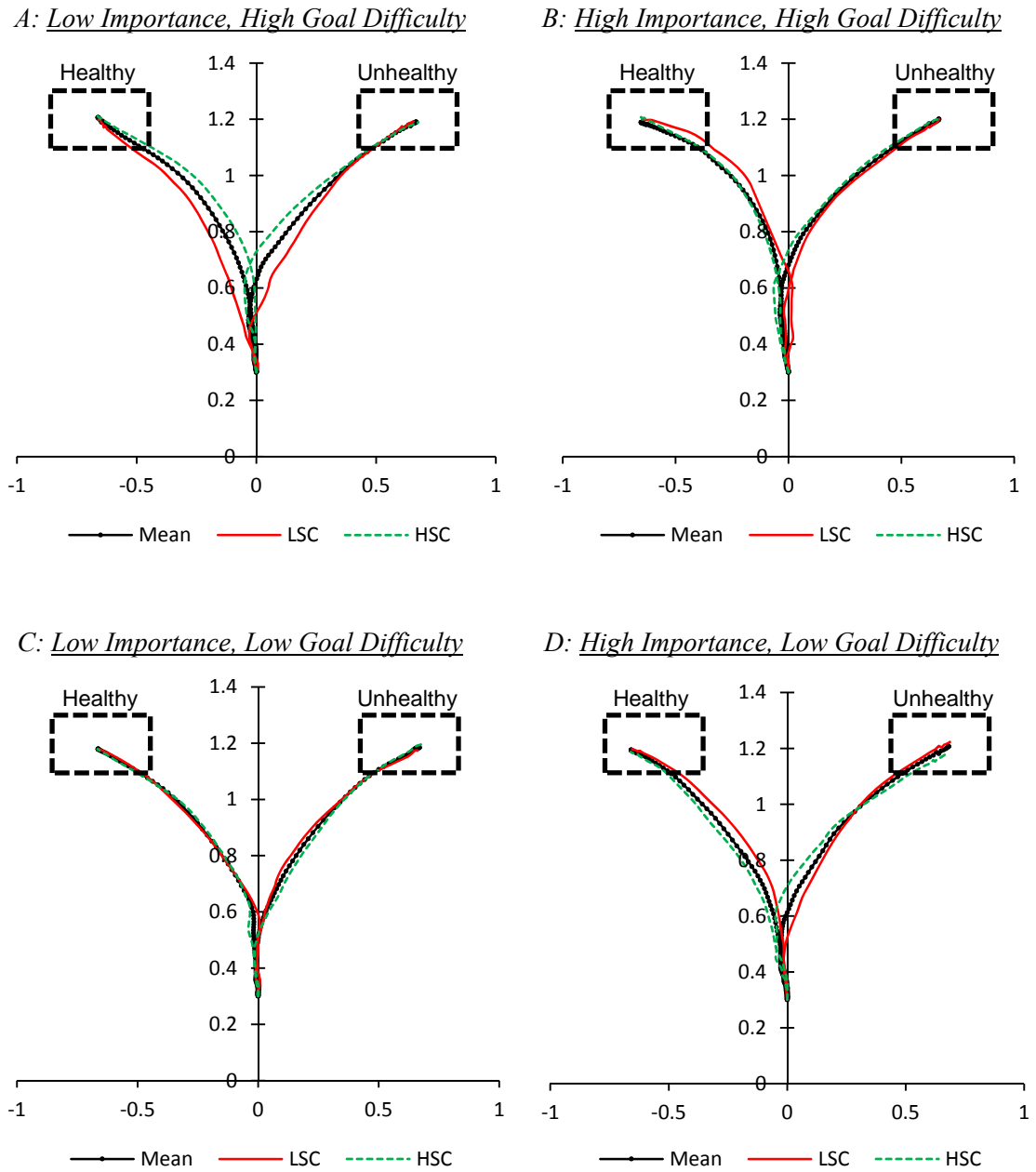


Notes: Panel A shows the shaded region below the 3.65 Johnson-Neyman point containing self-control index values where the simple-simple effect of goal importance is significant when goal difficulty is higher (= 0) per floodlight procedures recommended in Spiller et al. (2013). Panel B shows the estimated difference Panel A's regression lines and the confidence intervals.

*Decisional conflict.* To determine the conflict present in each trial, we analyzed the spatial attraction toward the response alternative to the chosen, most-preferred snack image. Time-normalized mouse movement trajectories yielded an area under the curve (AUC) to assess attraction to the alternative snack. AUC is reported by MouseTracker software and defined by Freeman and Ambady (2010) as the “full geometric area between the actual and ideal trajectories.” Larger values of AUC indicate stronger attraction to the alternative option, implying a greater amount of conflict or uncertainty in one's choice. The mouse trajectories for all of our experimental conditions are shown

in Figure 4. To best interpret the meaning of any observed conflict, we modeled spatial attraction for healthy and unhealthy snack responses separately.

**Figure 4**  
Average Mouse Trajectories to (Un)Healthy Choices Based on Self-Control



*Healthy snack chosen.* Across all studies, we established that high goal importance leads to more indulgent choices for individuals with low self-control, particularly when perceived goal difficulty is high. We also expect that even when these individuals do exert self-control and make goal-congruent choices, they experience substantially more conflict and attraction to the tempting options. As such, we examined the AUC as a measure of attraction toward unhealthy snacks when healthy snacks were chosen. An ANCOVA revealed a significant three-way interaction among the importance and goal difficulty conditions and self-control ( $F(1, 205) = 3.91, p < .05$ ). Simple two-way interactions were analyzed to further our understanding of our significant three-way interaction. No main effects were significant.

The importance  $\times$  self-control simple interaction was significant for the high difficulty group ( $\beta = -.27, t(209) = -2.04, p < .05$ ) but not for the low difficulty group ( $\beta = .09, t(209) = .73, NS$ ). To illustrate the significant interaction, we assessed the simple-simple effects of importance across a range of self-control values. The region below the J-N point 4.23 was significant ( $\beta_{J-N} = .19, SE = .10, p = .05$ ) according to a floodlight analysis (Spiller et al. 2013). Figure 5, Panel A illustrates the differences in mean trajectories for the low and high importance conditions in this significance region (in which self-control was less than the 4.23 cut-off) and plots them against the overall mean trajectory and the straight-line path between the starting point and the healthy stimuli. The high importance condition shows the greatest AUC between the trajectory and the straight-line choice path, indicating stronger attraction to the unhealthy snack

options (again, as depicted by the deviation from the healthy snack they ultimately selected) relative to the low importance condition.

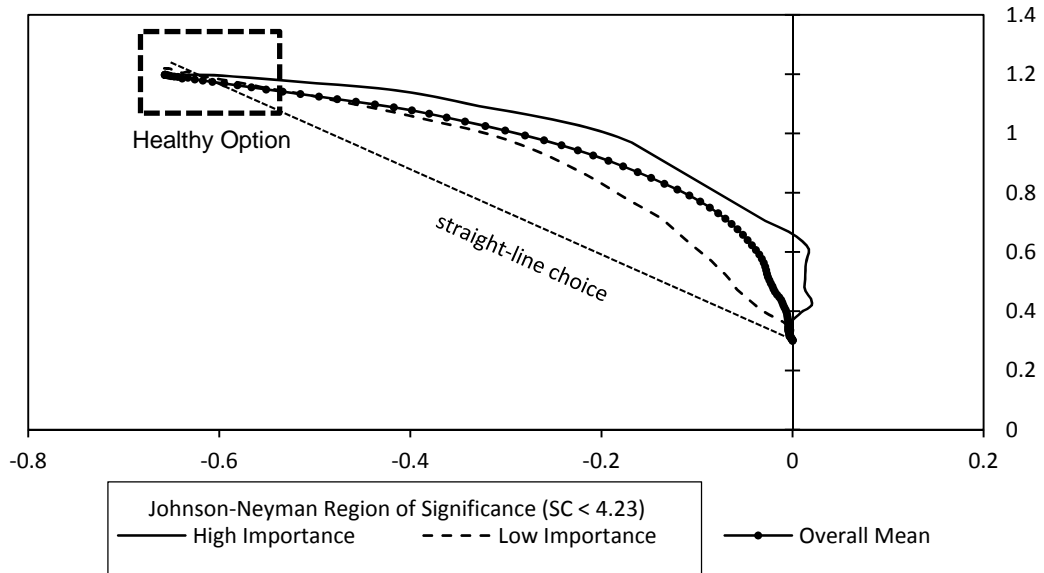
*Unhealthy snack chosen.* We did not expect the decisional conflict for low self-control individuals to manifest when unhealthy snacks were chosen. Regressing AUC on importance, goal difficulty, and self-control when unhealthy snacks were chosen did reveal a marginally significant three-way interaction ( $F(1, 205) = 3.74, p < .06$ ). Interestingly, the simple importance  $\times$  self-control interaction was significant in the low ( $\beta = .35, t(209) = 2.79, p < .01$ ) but not the high ( $\beta = -.01, t(209) = -.08, NS$ ) goal difficulty condition. Additionally, the main effect of self-control was significant ( $\beta = .10, t(209) = 2.13, p < .04$ ) indicating that higher self-control increased the AUC, or attraction toward the healthy alternative. No other main effects or simple interactions were significant.

For low goal difficulty, we analyzed simple-simple effects of importance and found that the region above the J-N point 4.58 for self-control was significant ( $\beta_{J-N} = .26, SE = .13, p = .05$ ), showing greater attraction to healthy options when high self-control individuals chose unhealthy snacks, which is consistent with the general tendencies of those high in self-control. The differences between the low and high importance conditions are shown in the trajectories of Figure 5, Panel B for participants with self-control scores above the J-N point.

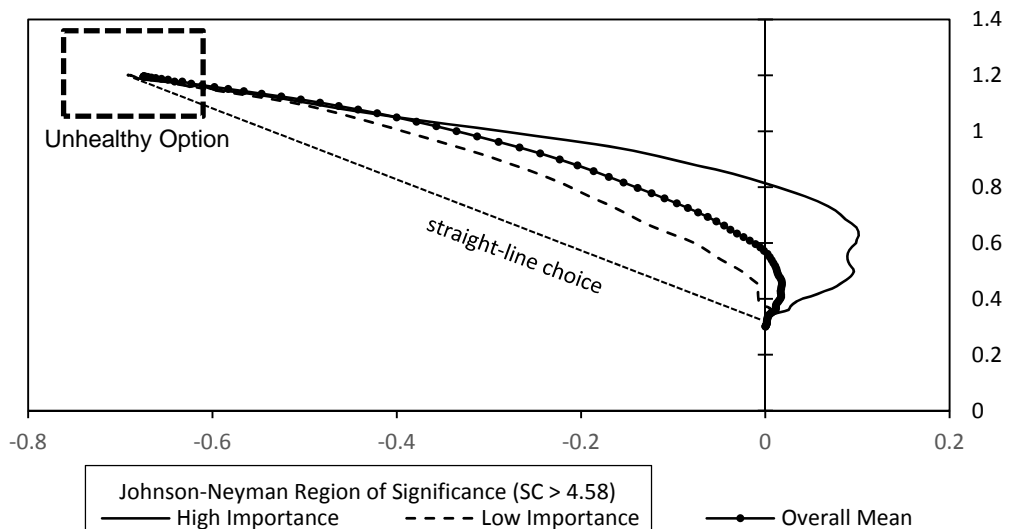
**Figure 5**

Average Mouse Trajectories for Focal Levels of Difficulty and Self-Control

*A: Low Self-Control, High Goal Difficulty. Mouse Trajectories for Healthy Snack Choice below Johnson-Neyman Point for Low and High Importance.*



*B: High Self-Control, Low Goal Difficulty. Mouse Trajectories for Unhealthy Snack Choice above Johnson-Neyman Point for Low and High Importance.*



Notes: Panel A (B) shows healthy (unhealthy) snack choice mean mouse trajectories for all participants below (above) the Johnson-Neyman point of 4.23 (4.58) for high and low importance conditions per floodlight procedures recommended in Spiller et al. (2013).



*Discussion.* Study 3 measured responses to a self-control dilemma continuously. We note that our primary effect involving the interaction of self-control, goal importance, and goal difficulty on choice was consistent with previous studies, showing the detriment of enhancing goal importance to those lower in self-control. Importantly, we illuminate the conflict present in choice decisions using the trajectories of mouse movements. We show that even when choosing healthy options, conflict is heightened for individuals low in self-control under conditions of high goal difficulty and high goal importance.

### **General Discussion**

Our findings suggest that marketers' efforts to enhance self-control by making salient the importance of goals can lead to increased self-control failure for those with lower self-control. Perceptions of greater goal difficulty activated by highly important goals contributes to this effect. Importantly, reducing perceived difficulty for people with lower self-control may help to overcome negative effects from perceiving a goal to be particularly important. Study 1 showed that consumers with lower (vs. higher) trait self-control tend to behave inconsistently with goals when these goals are more important, as measured by likelihood to make an impulsive purchase. We replicated these findings in the eating domain for study 2, using actual consumption as a behavioral measure. Further, goal difficulty mediated the effect of the two-way interaction between self-control and goal importance on the amount consumed. In study 3, we continuously

measured self-control conflict and demonstrated that the backfire effect creates the most conflict for people with low self-control when primed with high goal difficulty. Together the studies demonstrate that emphasizing the importance of goals seems to do little to enhance goal striving, and for those low in self-control, highlighting goal importance is potentially harmful.

Our findings advance research on self-control and goal-striving behavior and raise new questions. Recent research has placed much emphasis on trying to understand the conditions under which various self-control strategies are more or less effective (e.g., Ariely & Wertenbroch, 2002). We add to this body of knowledge by examining the limitations of what appears to be a common and straightforward strategy for improving self-control related decision making—simply highlighting the importance of the goal. While prior research has generally associated higher goal importance with greater goal striving (Fishbach & Trope, 2005 and Hofmann et al., 2012), we demonstrate that this relationship varies depending on one’s individual self-control.

Understanding ways to enhance the achievement of goals is critical for consumer researchers. Since the present research intersects with several theory-laden literatures including self-control, goal striving, desire, and self-efficacy, there are rich opportunities to further develop theory. Future studies could examine the effects of goal importance in more divergent and realistic settings. We note that those high in self-control tend to distinguish their behaviors less based upon the enhancement of importance, although there was a slight tendency toward improved self-control. Is there a possible “choking” effect (Baumeister, 1984) that offsets the benefit of emphasizing importance by lending

greater consciousness to the self-control decision? Further research is needed to understand the circumstances under which enhancing importance significantly improves goal-related decision making for those high in self-control. Another opportunity is to extend our examination to other goal domains. In the present research, we adopted the context of eating and spending. However, our predictions should also apply to other goal domains, for example smoking, gambling, or time management, but these contexts could obviously be tested explicitly in future research while also examining potential boundary conditions based on the goal domain.

In the present research we examine the role of goal difficulty in explaining our effects, but there are other aspects of the decision processing to be considered. What is the specific role of self-efficacy in achieving goals (Bandura, 1977)? Self-efficacy theory suggests that past successes contribute to enhancing one's self-efficacy, while past failures tend to undermine it (Bandura, 1994). As such, those with lower self-control are also likely to have lower self-efficacy, which does not bode well for highlighting how important a goal is. It would also be of interest to see how the effects of importance persist over time. In addition, more interventions can be tested to enhance the ability of those lower in self-control to reach their goals as the present research provides motivation for examining other commonly used strategies to enhance self-control. It may very well be that other strategies (in addition to emphasizing goal importance) may appear to work overall, whereas in reality they are providing a boost to those who are already rather good at controlling their behavior while actually harming those most susceptible to self-control failure, suggesting poor allocation of regulatory

resources (Muraven, Shmueli, & Burkley, 2006 and Myrseth & Fishbach, 2009). An investigation of how desire and willpower shift in the face of temptation may shine more light on these individual differences. Further, we note that our experimental manipulations across the three studies may present limitations to the present research. In studies 1 and 3, we asked participants to rank a focal goal among surrounding goals that were considerably more or less important. In our low focal goal importance condition, the surrounding goals were more abstract than those in the high importance condition. As a result, the impact of construal levels and self-control (Fujita 2006) should be considered and/or ruled out as a factor in future research on self-control and goal importance. Study 2 uses an alternative manipulation, but this study may be limited by the absence of a low importance condition (high vs. neutral).

In conclusion, this research presents the counterintuitive notion that highlighting the importance of a particular goal may actually hinder goal-consistent behavior for those who naturally have lower self-control. As such, current intervention approaches emphasizing the importance of achieving a goal may be misguided in terms of their impact on people who struggle the most to self-regulate behaviors. Understanding such effects is *important* indeed (but perhaps we should not emphasize that).

## **ESSAY 2: IGNORANCE IS BLISS: THE HEDONIC COST OF NUTRITIONAL INFORMATION**

### **Synopsis**

Prior research has suggested that disclosure of nutritional information is only effective in reducing obesity when consumers are motivated to seek out and process such information (Howlett et al. 2009). Since consumers generally believe that unhealthy items taste better (Raghunathan, Naylor, and Hoyer 2006), there may be a substantial hedonic cost when objective nutritional facts are known to the consumer. Research has shown that consumers are sometimes willfully ignorant of easily obtainable product attributes when these attributes conflict with goals and generate negative emotions (Ehrich and Irwin 2005). Due to heightened conflict with hedonic goals, we propose and examine across four studies that individuals low in eating self-control will show a tendency to ignore available nutritional information for indulgent foods, and ignorance to nutrition facts will heighten their enjoyment.

## **Introduction**

As worldwide obesity remains prevalent, the presentation and cognitive processing of nutritional information continues to garner considerable attention from researchers, public health officials, marketers, consumers, and mass media. According to global estimates, the obese and overweight proportion of adults increased by 27.5% between 1980 and 2013 (Ng et al. 2014). In the U.S., 35% of adults were obese in 2011-12 (Ogden et al. 2014). High rates of obesity combined with the major contribution of caloric intake and food composition to body mass (Livingston and Zylke 2012) have prompted substantial efforts to increase consumer awareness of nutritional information. For example, the U.S. Food and Drug Administration (1994; 2014) issued requirements mandating nutrition labeling for all packaged food and recently finalized rules to extend caloric disclosure requirements to chain restaurant menus and vending machines. Despite efforts to increase the availability of nutritional information, such policy tools have failed to reverse obesity trends and questions about consumer responses persist.

Disclosure of nutritional information can only be effective when motivated consumers seek out and process such information (Howlett et al. 2009), but under one-half of U.S. consumers self-report using the Nutrition Facts Panel (NFP) “always” or “most of the time” (U.S. Department of Agriculture 2014). Actual usage may be much lower (Cowburn and Stockley 2005). Researchers have broadly investigated the influence of numerous individual and contextual factors on nutrition label usage (see Drichoutis, Lazaridis, and Nayga 2006 for a review). For example, previous studies find

that females and highly educated consumers pay more attention to labels (Guthrie et al. 1995; Kim, Nayga, and Capps 2001). Personal factors such as health status, knowledge of the relationship between diet and disease, and household shopping behavior are also influential (Drichoutis, Lazaridis, and Nayga 2005; Kim, Nayga, and Capps 2001; Szykman, Bloom, and Levy 1997). While consumer motivation has been studied, researchers have primarily focused on motivation's interaction with the informational design (Keller et al. 1997; Moorman 1990, 1996) and label format (see Campos, Doxey, and Hammond 2011 for a review) of nutrition disclosures. Much less is known of the effects personality differences have on consumers' search motivation and their responses to nutritional information.

We center our investigation on the role of trait self-control, an individual's capacity to control their thoughts, emotions, impulses, and performances (Baumeister, Heatherton, and Tice 1994), as a critical determinant of search behavior and interpretation of nutritional attributes. We draw on prior research streams involving consumer perceptions, regulatory focus, and their interconnectedness with self-control to develop a theoretical account of motivated ignorance and hedonic cost. Four studies demonstrate a tendency for individuals lower in self-control to avoid or ignore nutritional information for tempting foods. This behavior is motivated by a desire to preserve enjoyable eating experiences. Consequently, exposure to unhealthy nutritional information leads to lower enjoyment but also tendencies to eat a smaller quantity of food. People with high self-control exhibit opposite search behavior, seeking out

information that supports long-term health goals and facilitates reduced consumption based when conflict arises.

Overall, this research shows how nutritional information intended to advance consumer knowledge and moderate consumption primarily helps individuals who are naturally able to exert self-control. The consumers most vulnerable to bad eating behavior avoid such information and receive comparatively little benefit. This work enhances our understanding of differences in self-control and shines a light on a major limitation of nutrition disclosure. Additionally, we suggest that forced exposure to nutritional information can counteract any motivation to ignore nutritional information. This insight can help inform more effective self-control interventions, those which reduce opportunities to avoid provided information.

### **Theoretical Background**

In this research, we suggest that lower self-control motivates consumers to avoid nutritional information to protect the pleasure of eating. First, we describe how shifts in approach and avoidance behavior toward indulgence and restraint goals occur when nutritional information is made available and vary depending on individual self-control. Next, we establish the hedonic cost of nutrition attributes for consumers lower in self-control based on research that discusses goal conflict between indulgence and health and the differential influence of self-control on conflict responses.



## Approach and Avoidance

Research has shown that consumers are sometimes willfully ignorant of easily obtainable product attributes when these attributes conflict with goals and generate negative emotions (Ehrich and Irwin 2005). Thus, we expect individuals lower in self-control to be more avoidant of nutritional information that conflicts with their relatively stronger goals to enjoy temptations. Dholakia et al. (2006) show that promotion-minded consumers, those who see the benefits of advancing their goals versus the failures of not advancing them, experience greater desire for focal temptations but also subsequently shift goals, promoting desire resistance. Temptations should situationally activate a promotion focus toward indulgence goals, particularly for those lower in self-control. These individuals experience more attraction to tempting foods compared to their higher in self-control counterparts (Hofmann et al. 2012). On the contrary, temptations are likely to elicit a prevention mindset favoring restraint goals for those higher in self-control (Fishbach, Friedman, and Kruglanski 2003).

People low in self-control give into temptation to match a desired end-state of a pleasurable eating experience. We expect the opportunity to view nutritional information, a mismatch for the hedonic goal, to pose a threat that shifts focus to preventing a reduction in eating enjoyment. The result is an avoidance strategy for nutrition attributes. Higher self-control, in contrast, activates a prevention focus leading to greater avoidance of vice foods. In this case, introducing nutritional information which is supportive of restraint goals activates a shift to an approach strategy that

motivates these individuals to obtain nutrition attribute information. Prior research supports these predictions. Fishbach and Shah (2006) show that successful self-regulators tend to avoid concepts related to temptation and approach concepts congruent with long-term goals. Similarly, those higher in trait self-control avoid tempting situations and resist problematic desires that conflict with important long-term goals (Hofmann et al. 2012).

Consumers are able to identify many foods as “good for me” or “bad for me” before processing the nutritional label. They tend to categorize prototypically unhealthy foods including sugary desserts and fried appetizers as vices while fruits, vegetables, and other healthy foods are virtues (Chernev 2011). Since perceptions of healthfulness and taste are negatively correlated (Raghunathan, Naylor, and Hoyer 2006), consumers expect vice foods to taste better than virtuous ones. Taste is a sensory experience that allows us to detect distinct qualities in the foods we eat. Appetitive qualities (i.e., sweetness, saltiness, fattiness, umami) signal to the brain that food should be ingested while aversive qualities (i.e., bitterness and sourness) signal rejection (Keast and Costanzo 2015). For example, high-fat foods lead to positive taste expectancies that in turn influence cognitions and behavior (Bowen et al. 1992). Consumers also tend to value taste above nutrition in their food decisions (Chandon and Wansink 2012; Stewart, Blisard, and Jolliffe 2006). Consequently, we might expect individuals encountering indulgent foods to search for poor nutritional attributes that reinforce beliefs about better taste, but any taste-confirming utility of high calories, fat, and sodium for known vices will likely be dominated by the utility or disutility of goal conflict.

## The Hedonic Cost of Nutritional Information

The positive utility of heightened goal conflict may be significant in terms of preserving long-term health goals. With salient indulgence-health goal conflict, individuals consume less food (Belei et al. 2012) which supports public policy efforts to mandate disclosure. The disutility may also be substantial if viewing nutritional information ruins eating enjoyment by emphasizing deleterious health-related attributes. Due to this potential hedonic cost, provision of nutritional information can backfire in at least two ways: (1) firms shift consumer focus away from poor health attributes toward the more highly valued taste attribute (Moorman, Ferraro, and Huber 2012) and (2) some consumers avoid nutritional information for unhealthy foods to preserve pleasurable eating experiences. We focus on the consumer side in this essay.

Stroebe and colleagues (2013) show that many dieters fail at weight control because environmental food cues prime an eating enjoyment goal. Specifically, tempting foods increase accessibility for indulgence goals and activate an appetitive state (Belei et al. 2012). Hedonic goals in such circumstances should be most salient for individuals low in eating self-control who tend to succumb to temptation when facing trade-offs between willpower and desire (Hoch and Loewenstein 1991). Individuals higher in self-control experience weaker desires, in general (Hofmann et al. 2012), and exhibit fewer problems regulating their eating behaviors (Tangney et al. 2004). Given their varying susceptibility to desire, people with high and low levels of self-control cope with eating-related goal conflict differently. For example, research suggests that low self-control

motivates consumers to broaden the category of virtues to make it more inclusive of tastier foods when pursuing a health goal (Bublitz, Peracchio, and Block 2010; Davis, Haws, and Redden 2015; Poynor and Haws 2009). People higher in self-control, on the other hand, use goal-protecting mechanisms such as faster satiation on unhealthy (vs. healthy) foods (Redden and Haws 2013) and facilitative linking of temptation cues to superordinate goals (Fishbach, Friedman, and Kruglanski 2003). We predict that responses to available nutritional information will likewise vary depending on self-control and propose that consumers with lower trait self-control experience a hedonic cost for indulgences that manifests as lesser enjoyment and consumption. This response is advantageous for any efforts to improve healthful eating by individuals low in self-control. However, we predict that lower self-control will lead to patterns of avoidance for unhealthy nutritional information relative to higher self-control to preserve the hedonic benefits of eating. We conducted four studies to test our predictions using various methods to make nutrition attributes available to consumers.

### **Study 1**

In this study, we sought to examine how self-control influences the amount of attention consumers allocate to nutritional information. Specifically, we examined whether a snack's health attributes would implicitly influence how much time consumers spent looking at the corresponding front-pack design and Nutrition Facts Panel (NFP).

We argued that lower self-control will lead to greater avoidance behavior when foods are less healthy.

## Method and Procedure

One hundred and twenty-eight undergraduates (69 female) received course credit to take part in our product evaluation task. The healthiness of a potato chip snack was the experimental stimulus. Participants were first informed that they would be looking at the packaging of either Baked Ruffles Original potato chips or Cool Ranch Doritos for subsequent evaluation. On the next screen, front-pack graphics, an ingredients list, and the NFP were displayed (see the appendix for the images used). The time participants spent reviewing the packaging, which was left up to participants, was recorded. Based on the same 1-ounce serving size, the “healthy” Baked Ruffles contained 20% fewer total calories (30), 57% fewer calories from fat (40), 63% fewer grams of fat (5), 11% more milligrams of sodium (20), and 73% fewer ingredients (26; “No Preservatives”) than the “unhealthy” Cool Ranch Doritos. Additionally, the front-pack imagery for the Baked Ruffles included the health claims “Baked!” and “Naturally Baked.” Following the package viewing, we asked participants to rate “how healthy are the chips?” (1 = not at all, 9 = very much so) as a test of the efficacy of our experimental manipulation.

Next, following a substantial filler task of unrelated activity, we captured an individual difference measure of self-control using the brief 13-item version of Tangney

et al.'s (2004) self-control scale. We also collected demographic information including gender, age, and ethnicity along with participant height and weight.

## Results

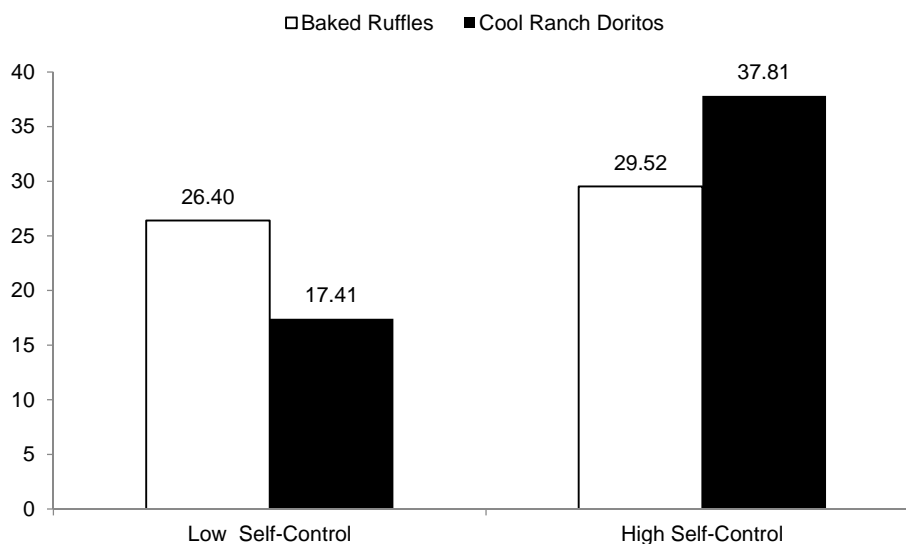
*Manipulation Check.* We verified that our two chip packages (Baked Ruffles Original and Cool Ranch Doritos) elicited significantly different perceptions of healthiness. As predicted, participants rated Baked Ruffles as significantly healthier than the Doritos ( $M_{\text{Ruffles}} = 3.44$ ,  $M_{\text{Doritos}} = 1.90$ ,  $p < .001$ ). Healthiness ratings did not interact with the experimental condition or self-control ( $p > .90$ ).

*Time Spent.* We ran an ANCOVA model to test our prediction that individuals low in self-control would spend less time looking at the packaging for unhealthy foods. The time spent looking at packaging in seconds ( $M = 27.25$ ) was modeled as a function of the packaging condition (contrast coded as healthy = -1, unhealthy = 1), self-control as a continuous index measure ( $\alpha = .77$ ,  $M = 4.40$ ), and their interaction. The interaction between self-control and chip healthiness was significant in the model ( $F(1,124) = 6.96$ ,  $p < .01$ ). We also ran the model with gender included as a covariate since prior research shows that females pay more attention to nutritional labels than males (Guthrie et al. 1995; Kim, Nayga, and Capps 2001). The results held significant ( $F(1,121) = 7.03$ ,  $p < .01$ ). There were no significant main effects for self-control or the experimental condition.

In this and all subsequent studies, we decomposed the interaction using spotlight analyses of self-control at one standard deviation above and below the BSCS mean (per Aiken and West 1991). This approach tests our hypothesis at values representative of both high and low self-control. The effect of the experimental condition on time spent reviewing the packaging was marginally significant at both one SD below the self-control mean ( $\beta = -8.99$ ,  $SE = 4.62$ ,  $p = .05$ ) and one SD above the self-control mean ( $\beta = 8.30$ ,  $SE = 4.61$ ,  $p = .07$ ), as shown in Figure 6. The spotlight significance for low self-control indicates that less time was spent on the page looking at nutritional information for unhealthy Doritos compared to healthier Baked Ruffles. High self-control behavior follows the opposite pattern with more time spent reviewing the unhealthy Doritos packaging than the healthier Baked Ruffles.

We also compared the time spent looking at nutritional information within each experimental condition. There were no significant differences between low and high self-control participants in the Baked Ruffles condition ( $\beta = 1.78$ ,  $SE = 2.75$ , NS). In the Doritos condition, individuals lower in self-control spent significantly less time looking at the packaging than those higher in self-control ( $\beta = 11.65$ ,  $SE = 2.53$ ,  $p < .001$ ).

**Figure 6**  
Spotlight Analysis of Seconds Spent Looking Based on Self-Control



Notes: Self-control scores were graphed at 1 standard deviation above and below the mean to represent high and low scores on the self-control measure (per procedures recommended in Aiken and West [1991]).

*Discussion.* These results are consistent with our prediction that individuals lower in self-control tend to pay less attention to nutritional information for unhealthy foods while those higher in self-control are motivated to process them. This study does not reveal the cognitions or behaviors that result from these differences in approach/avoidance behavior. We also forced all participants to view nutritional information in this study while leaving the time duration under their control.



## Study 2

In study 2, we further examined the influence of motivated ignorance behavior on eating enjoyment. One objective of this study was to examine behavior under conditions where participants had an opportunity to completely opt out of viewing nutritional information. This situation occurs commonly in everyday eating experiences as consumers decide whether or not to view the back-of-package nutritional label, check a website or app for nutrition data, and pay attention to calorie listings on a restaurant menu. This study also captured a measure of eating enjoyment.

### Method and Procedure

One hundred and three undergraduates (35 female) participated in this study in exchange for course credit. First, they were asked to imagine that they were out to dinner and order a slice of chocolate cake for dessert. A large portion of chocolate cake was shown with a fork to give participants a sense of scale (see appendix for image). On the next screen, participants were given the option to view nutritional information for the dessert by clicking a button labeled “view info” or skip the nutritional information by clicking a button labeled “skip.” For this decision, they were asked to choose what they would decide to do in an actual restaurant.

Participants who chose to view the nutritional information were shown the calories and total grams of fat we assigned to the cake. The portion was highly indulgent,

containing 960 calories and 52 grams of fat. Regardless of whether they chose to view or skip, participants next imagined eating a bite of cake and rated enjoyment on a 9-point scale. As in study 1, participants completed a brief, unrelated task before completing the self-control scale (Tangney et al. 2004) and providing demographic information.

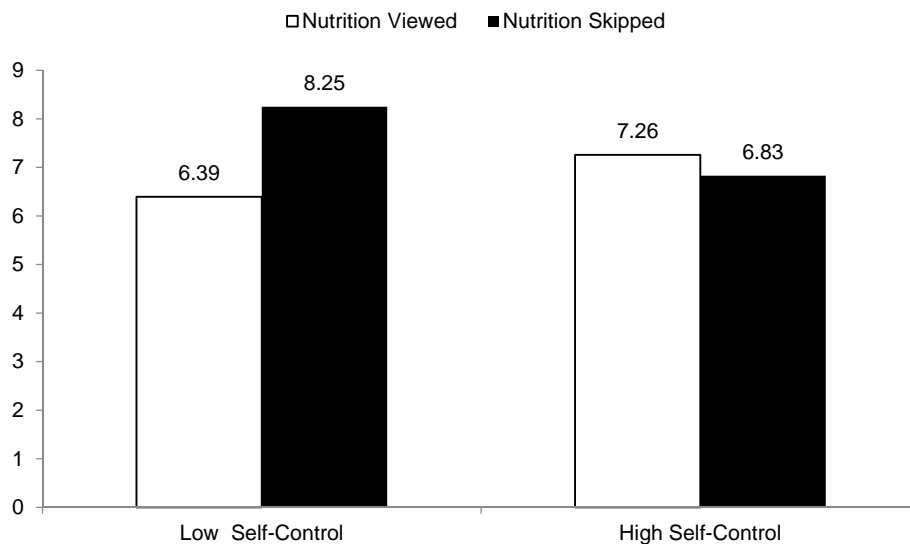
## Results

*Information Choice.* We ran a logistic regression with the choice to view or skip nutritional information as a dependent variable and self-control as the independent variable ( $\beta = .55, p < .001$ ). Higher self-control led to a significantly greater likelihood of clicking to view nutritional information. This result is consistent with our finding in study 1 that individuals lower in self-control tend to avoid nutritional information for indulgent foods.

*Enjoyment.* We found a significant interaction between the information choice and self-control ( $F(1,99) = 6.96, p < .01$ ; see figure 7). A spotlight analysis at 1 standard deviation below the self-control mean showed that individuals lower in self-control who chose to skip nutritional information anticipated significantly higher enjoyment for the chocolate cake dessert relative to those who viewed ( $\beta = 1.85, SE = .66, p < .01$ ). High self-control participants at 1 standard deviation above the mean did not show significantly varying enjoyment between the choices ( $\beta = -.43, SE = .55, NS$ ). When isolating the choice conditions and comparing enjoyment across self-control groups, we found that participants higher (vs. lower) in self-control expected significantly lower

enjoyment when they skipped nutritional information ( $\beta = -.74, SE = .25, p < .01$ ). Low and high self-controllers did not differ significantly when viewing the nutritional information ( $\beta = .45, SE = .37, NS$ ). Results were consistent when gender was included as a covariate.

**Figure 7**  
Spotlight Analysis of Mean Expected Enjoyment Based on Self-Control



Notes: See notes from figure 6.

*Discussion.* These results have implications for the disclosure of nutritional information. Consistent with study 1, individuals lower in self-control were more avoidant of nutrition attributes for the indulgence. Furthermore, viewing the nutrition attributes had a significant impact on subsequent expectancies of eating enjoyment. Viewing the calories and fat for a very unhealthy, large portion of cake significantly reduced anticipated eating enjoyment for those lower in self-control. Those higher in

self-control were relatively unaffected by the absence or presence of nutritional information in terms of their anticipated eating enjoyment.

### **Study 3**

In study 3, we sought to answer questions raised by results from studies 1 and 2. We specifically aimed to determine whether the timing of nutritional information disclosure had an effect on enjoyment. If exposure to nutritional information presents a hedonic cost for those lower in self-control, we should observe a decrease in enjoyment if information is furnished between consumption instances. Additionally, we tested enjoyment based on real consumption of an indulgent snack.

#### **Method and Procedure**

One hundred and seventy undergraduates (80 female) participated in this study in a behavioral lab for course credit. Four students were excluded from the analysis due to reported food allergies. Participants were first instructed that they would be evaluating chocolate truffles which were present at their partitioned workstations as part of a taste test. Each participant was asked to eat two truffles during the experiment, and was randomly assigned to view nutritional information for the truffles either before eating the first truffle or between eating the first and second truffle. The nutritional information revealed that the truffles were very unhealthy with an overall health grade of “D” and

containing 200 calories (135 from fat), 15 grams of fat (11 saturated), and 11 grams of sugar. After eating each truffle, participants were asked to rate their eating enjoyment (1 - “not at all” to 9 - “very much so”). The dependent variable in this study was the difference in enjoyment between the first and second truffle. Once participants were finished with the consumption portion of the study, they took part in an unrelated filler task before moving on to the next section. Finally, the participants completed the self-control scale (Tangney et al. 2004) and answered demographic questions including age, gender, and ethnicity.

## Results

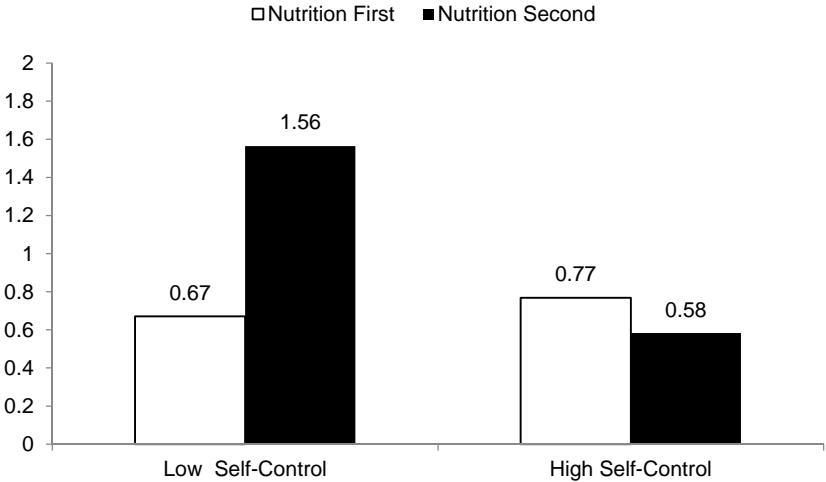
*Difference in Enjoyment.* Our ANCOVA analysis revealed a significant interaction of our experimental condition and self-control ( $\alpha = .82$ ,  $M = 3.6$ ) in predicting the enjoyment differential between the first and second truffle ( $F(1,162) = 7.58$ ,  $p < .01$ ). The interaction remained significant when gender was added to the model as a control variable ( $F(1,159) = 6.67$ ,  $p < .02$ ). A main effect of self-control was significant such that higher self-control reduced the difference in enjoyment between the first and second truffle ( $\beta = -.25$ ,  $SE = .11$ ,  $p < .03$ ).

We performed a spotlight analysis (Aiken and West 1991) to identify whether the conditional effect of our experimental condition on the difference in enjoyment was significant at one standard deviation above and below the mean of self-control. The enjoyment differential between the first and second truffle varied significantly between

experimental conditions for those lower in self-control ( $\beta = .89, SE = .28, p < .01$ ) but not for those higher in self-control ( $\beta = -.19, SE = .28, NS$ ), as illustrated by figure 8, panel A. These findings reveal the tendency for individuals lower in self-control to experience reduced enjoyment following exposure to unhealthy nutritional information. While all values are positive (enjoyment of the first truffle is greater than that of the second; see figure 8, panel B), likely due to natural satiation, the drop in enjoyment is significant only for low self-controllers when they view unhealthy nutritional information after they have eaten and rated enjoyment for the first truffle.

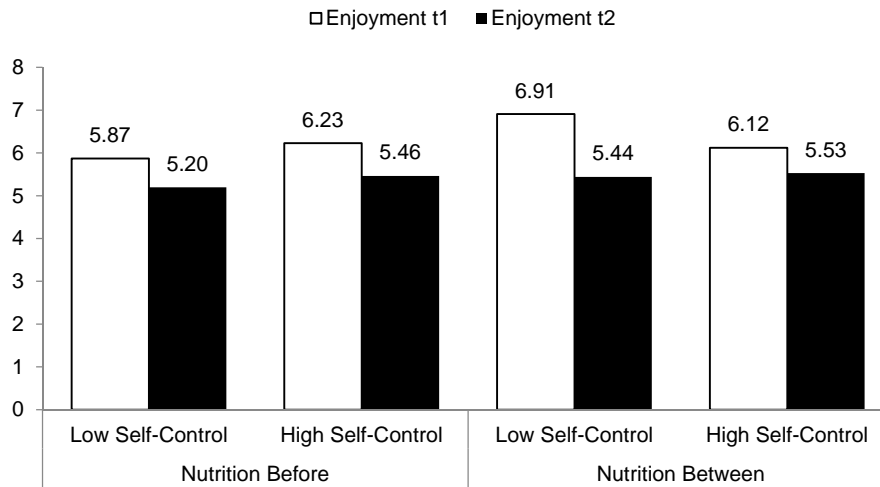
**Figure 8**  
Spotlight Analysis of Mean Enjoyment Differential Based on Self-Control

*A: Difference Between Consumption Enjoyment at Time 1 and Time 2*



### Figure 8 Continued

#### B: Consumption Enjoyment for Time 1 and Time 2



Notes: See notes from figure 6.

*Discussion.* The study 3 results build on study 2 by showing that lower self-control leads to less enjoyment in real, indulgent eating situations following exposure to nutritional information. Our results also establish that differential enjoyment can occur for the same food indulgence when it is consumed before and after nutritional facts are revealed. While individuals higher in self-control seem steadier in their evaluations regardless of when nutritional information is shown, those lower in self-control experience a dramatic decrease in enjoyment once nutritional information is known.

### Study 4

In study 4, we assessed the downstream effects of eating enjoyment. We again designed a real consumption task but in this study allowed participants to freely consume

a snack after choosing to view nutritional facts or other information. We propose that the reduction in eating enjoyment for those low in self-control after viewing nutrition facts will subsequently reduce consumption. This finding has important implications for nutritional information disclosure as a self-control intervention.

## Method and Procedure

We asked 194 undergraduates (120 female) to participate in a study involving food evaluations and preferences for course credit. Nine of these participants were excluded from the analysis due to reported food allergies or incompleteness. First, each participant was informed that they would taste milk-chocolate almonds and evaluate the taste. Workstations were preset with 40 grams of the chocolate-covered almond snack. Each participant was instructed to eat one milk chocolate almond before advancing in the study. Next, participants were given the opportunity to learn more about the milk chocolate almonds. They were forced to choose to view either nutritional information or customer reviews.

Those who chose nutritional information were exposed to the actual nutrition facts including serving size (30g), calories (160 per serving), total fat (12g per serving), sodium (15mg per serving), and total carbohydrates (13g with 10g of sugar). Participants who chose to view customer reviews saw four reviews that were generally positive (four stars out of five, on average). None of the reviews mentioned nutrition. Participants then were asked to watch and evaluate a twelve-minute romantic comedy video clip and were



invited to consume as many of the remaining almonds as they wanted during the clip. At the end of the video we asked a series of questions such as “how much did you enjoy the film that you watched?” that were not focal to our study but disguised the intentions of the free consumption task. We then asked how much the participants enjoyed the milk chocolate almonds they consumed. At the end of each session, the remaining almonds were weighed by a lab administrator and the total eaten was our dependent variable. As in previous studies we asked participants to complete BSCS (Tangney et al. 2004) and demographic information following a filler task.

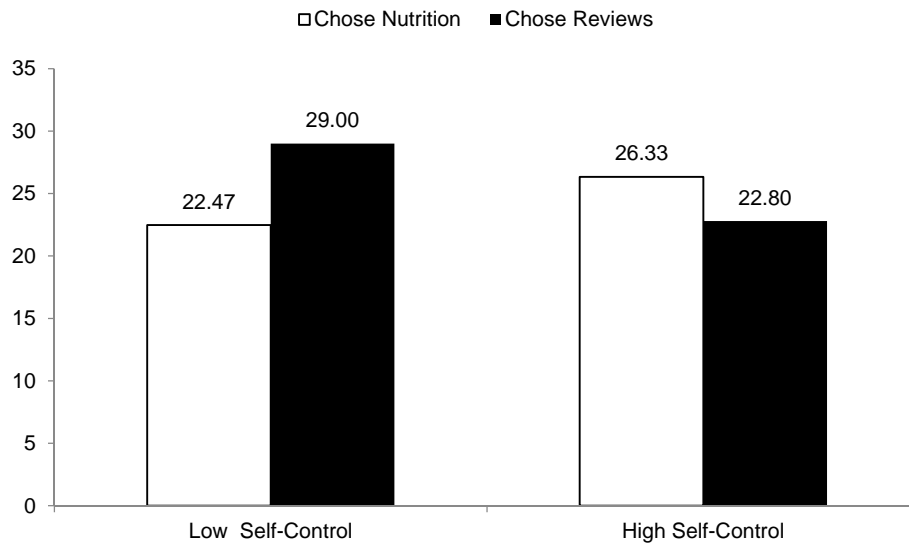
## Results

*Information Choice.* Seventy individuals chose to view nutritional information while the remaining 114 chose customer reviews. In this study, there were no significant differences in information type chosen by those low versus high in self-control. It may be that the chocolate-covered almonds are more ambiguous in healthiness than prior stimuli.

*Consumption.* An ANCOVA was performed on the amount of chocolate-covered almonds consumed (in grams) with participant choice (nutritional information vs. customer reviews) and self-control ( $\alpha = .84$ ,  $M = 4.1$ ) as factors. Our analysis revealed a significant interaction between information choice and self-control ( $F(1,181) = 4.12$ ,  $p < .05$ ), such that those low in self-control consumed marginally more of the snack when they chose to view customer reviews vs. nutritional information ( $\beta = 3.26$ ,  $SE =$

1.80,  $p < .08$ ). Those higher in self-control did not significantly differ in consumption for the two information types ( $\beta = -1.77$ ,  $SE = 1.82$ , NS). Figure 9 illustrates the spotlight analysis at 1 standard deviation below and above the self-control mean. Examining each condition across the range of self-control values, we found that low and high self-controllers did not consume significantly different quantities after viewing nutritional information ( $\beta = 2.22$ ,  $SE = 2.25$ , NS). However, those higher (vs. lower) in self-control consumed significantly less of the snack after viewing customer reviews ( $\beta = -3.57$ ,  $SE = 1.76$ ,  $p < .05$ ).

**Figure 9**  
Spotlight Analysis of Mean Grams Consumed Based on Self-Control



Notes: See notes from figure 6.

*Enjoyment process.* We next examine how enjoyment of the eating experience influenced the amount of consumption. There is a significant interaction between the

participant's information choice and individual self-control on the enjoyment rating ( $F(1,181) = 4.06, p < .05$ ) with no main effects in the model. The nature of the interaction is such that for those lower in self-control, choosing to view customer reviews (vs. nutritional information) increases enjoyment ( $\beta = .49, SE = .25, p = .05$ ) while there is no significant effect of choice for those higher in self-control ( $\beta = -.20, SE = .25, NS$ ). We tested mediation using a bootstrapping technique (Hayes 2013) with the PROCESS macro for SAS and 10,000 bootstrapped samples. The indirect effect of eating enjoyment in linking the information choice and self-control interaction to the quantity of almonds consumed was significant and entirely below zero ( $\beta = -1.53, SE = .79, 95\%$  bias-corrected bootstrap *CI*: -3.18, -.08).

*Discussion.* Study 4 demonstrates the effect of different types of information on the amount of indulgent food consumed, particularly for individuals low in self-control. Viewing nutritional information tends to reduce consumption for these individuals compared to information not related to nutrition. Further, we find supporting evidence for our proposed eating enjoyment process. Consumption is driven by the amount of enjoyment experienced. Those who are low in self-control feel less eating enjoyment after exposure to nutrition facts and therefore eat less.

## **General Discussion**

When consumers are exposed to nutritional information, there are different interpretations and responses that are possible. Some people experiencing conflict

between an alluring food and health goals may feel more vigilant toward protecting long-term goals. Others may feel that nutritional awareness ruins their pleasurable eating experience. Adding to the complexity, individuals have different levels of personal self-control which may influence their interpretation of nutrition facts. In today's marketplace, most consumers have reasonable access to nutritional information, but how they use it is often mysterious. In our research, we examine the efficacy of providing nutritional information by exploring whether individuals lower in self-control tend to avoid available nutritional information for more indulgent foods and whether such exposure influences consumption. We measured tendencies to view nutritional information through time spent looking at packaging (study 1) and explicit choices to view or not view nutrition facts (studies 2-4). Further, we find that people with low self-control tend to consume more unhealthy food when they avoid nutritional information (studies 2 and 4) and enjoy unhealthy food more (less) when avoiding (viewing) nutritional information (studies 2-4). These findings, using different food stimuli and various formats of information, provide strong evidence in support of our predictions.

Together, these findings make a novel contribution to our understanding of self-control. First, they show that disclosure of nutritional information is not sufficient for improving consumer welfare. In our studies, individuals lower in self-control, who presumably would benefit most from learning about the nutrition of foods they consume, show a tendency to avoid this information when possible. However, furnishing nutritional information is promising as an intervention since individuals low in eating self-control consume a smaller quantity of food after viewing such information. This

understanding advances the goals of public policy efforts, but there is an important caveat. Exposure to unhealthy nutrition attributes reduces eating enjoyment for those low in self-control which may have important marketing implications for customer satisfaction, repeat purchase behavior, and word-of-mouth. On the other hand, the current research may signal a call to action for health marketers and public policy makers to design packages, menus, and labels so that the most critical nutritional information is more difficult to avoid.

There are a number of unresolved questions that merit further exploration. First, there is an opportunity to clarify which aspects or attributes of nutritional information most influence enjoyment and consumption. How do individuals low and high and self-control visually process and cognitively interpret different types of information that are available? Addressing this question will also help surface strategies to make nutritional information more difficult to avoid and accessible to people who struggle to exert self-control. Which formats of information are the most helpful? What is the effect of voluntary pursuit of nutritional data versus forced exposure? Our present research may be limited by the lack of process evidence underlying responses to our experimental manipulations. For example, we assess a tendency to ignore information or choose different types of information, but the causal reasons for doing so are not explored. A more nuanced examination of information processing is a fruitful area for future research. There may also be an affective component that motivates individuals lower in self-control to avoid information that makes them feel bad about self-control failure.

Furthermore, the interplay and activation of competing goals could be examined in more depth. Under what circumstances do nutritional facts reinforce health goals and when do they not? Are there situations, such as special occasions, in which nutritional awareness spoils the experience for those high in self-control? Similarly, are there situations in which nutrition facts enhance the experience for those lower in self-control through mechanisms such as licensing and vicarious goal fulfillment?

Nutritional information is everywhere and becomes a greater part of everyday life as new regulations and initiatives to improve public health are created. While there are still many questions remaining about the efficacy of disclosing nutritional information, we now have a greater understanding of how such information can motivate avoidant behavior but can also reduce indulgent consumption when utilized.

## **ESSAY 3: THE CONTEXTUAL INFLUENCE OF PRIOR FOODS ON HEALTHINESS PERCEPTIONS**

### **Synopsis**

Perceptions of a food's healthiness are a critical input to consumers' decision making about what to eat, and therefore understanding factors that impact these healthiness perceptions is important. We examine the role of prior exposure to other foods in impacting healthiness perceptions. We propose and find that the healthiness of foods previously encountered influence healthiness perceptions of ambiguously healthy snacks, and importantly, this influence differs based on one's self-control. Consumers lower (but not higher) in self-control show assimilation in their healthiness perceptions of ambiguous foods following exposure to healthy foods. As such, this research demonstrates how the order in which individuals are exposed to various foods affects consumer perceptions of healthiness and intended consumption.

## **Introduction**

Imagine two friends enjoying a nice, healthy dinner of grilled fish and steamed broccoli. Afterwards, a wild berry tart is brought out for dessert. One friend thinks “Great, what a healthy way to top off our meal!” while the other instead thinks that the relative unhealthiness of the tart places a big red mark on the experience. As suggested in this scenario, perceptions of a food’s healthiness can differ significantly for individuals. People are always told to eat healthy foods, but it is not always clear what constitutes a healthy food. As such, we ask: Can perceptions of the healthiness of foods be impacted by other foods encountered? How do these perceptions differ among individuals? These are two interesting questions at the intersection of contextual effects and food perceptions and behaviors that our research addresses.

Many aspects of one’s environment or decision making context can influence perceptions of foods, food selections, and the quantity of food consumed. To name a few, recent research has examined the role of plate size and color (Van Ittersum and Wansink 2012), variety (Haws and Redden 2013), timing of courses (Huss et al. 2013), presentation format of nutritional information (Dowray et al. 2013; McCann et al. 2013), food labels (Vadiveloo et al. 2013) and so on. The present research examines how the context of a food sequence influences healthiness perceptions and shows that trait self-control, explains systematic differences among individuals. Specifically, we propose that exposure to other foods alters evaluations of the healthiness of foods currently under consideration based upon one’s chronic self-control capacity which is characterized by



an ability to exert willpower in the face of competing goals and desires (Hoch and Loewenstein 1991). Healthiness is a relative concept that often depends on comparisons among foods and contextual cues. For example, the wild berry tart from our previous example may be perceived differently depending on whether it is compared to a serving of fresh fruit or a slice of triple chocolate cake.

Comparative evaluations are a critical input to consumers' choices and perceptions (Dhar and Simonson 1999; Fishbach and Zhang 2008). Ambiguous attributes are most susceptible to contextual influence and many times our choices, and specifically choices regarding food consumption, involve ambiguity. In this research, we examine exposure to foods that are clearly healthy or unhealthy as an important cue that individuals may use to inform evaluations about the healthiness of subsequent, more ambiguous foods. We predict that in the presence of ambiguity, the healthiness of food previously seen will influence evaluations of the focal food, particularly for individuals low in self-control.

This work has important implications for consumers who sequentially encounter foods and food imagery at grocery stores, at restaurants, in other social settings, at home, and in the media. In addition, this work has direct implications for managers and marketers who are decision makers or choice architects in designing menus, optimizing shelf space locations, organizing cafeterias and restaurants, and choosing stimuli for advertisements. An individual's awareness of biased perceptions in sequential food encounters, particularly if they are motivated to make more health conscious decisions, may lead to efforts to remove the bias and correct subsequent, potentially unhealthy

behaviors. Public policy makers may be able to mandate ambiguity reduction in consumer food choices through labeling or other efforts. Marketers may find motivation to either enhance ambiguity to make foods seem healthier than they objectively are or reduce ambiguity to facilitate consumer goal pursuit or even enhance perceptions of taste (Raghunathan et al. 2006). Across three studies, we study the effect of food contexts involving prior exposure to foods that are prototypically healthy or unhealthy. We test our prediction that trait self-control moderates contextual order effects, resulting in food perceptions that are less conducive to the pursuit of health goals for individuals lower in self-control.

## **Theoretical Background**

### Food Perceptions and Self-Control

Numerous positive outcomes, including better performance at work, enhanced relationships, improved psychological adjustment, and better health outcomes, have been linked to high self-control (Hofmann et al. 2012; Tangney et al. 2004). Goal conflict, poor monitoring, resource depletion, and dispositional self-control are determinants of self-control failure that have been studied extensively in psychology (Baumeister 2002). Researchers have shed light on various strategies for improving self-control under different circumstances, such as creating mental budgets for eating behaviors (Krishnamurthy and Prokopec 2010) and bringing negative self-conscious affect to mind

in the face of temptation (Giner-Sorolla 2001). Further, recent research has revealed that various approaches to controlling one's eating behavior or responding to environmental cues related to food consumption impacts those of higher and lower self-control differently. For example, those higher in self-control were found to be less susceptible to the variety effect, wherein the presence of greater variety increases the amount consumed, than were those lower in self-control (Haws and Redden 2013). Those findings implicated variety as a more precipitous hurdle to healthy eating for those lower in self-control.

In combination, past self-control research suggests great potential for understanding how individuals' self-control interacts with various cues that might influence food decision making. Adding to prior understanding of self-control based differences, the present research proposes that biased healthiness perceptions based on exposure to prior foods are an overlooked cause of suboptimal eating decisions. Understanding the role of individual differences in self-control can help consumers manage their own eating behavior, facilitate public policies that attend to the most vulnerable populations, and inform marketing strategies that account for the heterogeneity of consumers. In order to study the contextual effects we propose, it is important to first more generally examine conditions under which people rely on contextual clues to form healthiness evaluations.

## Context Effects and Food Perceptions

Prior research offers various theoretical accounts of how contextual information influences food evaluations and choice. With regard to calorie estimation, Chandon and Wansink (2007) find that “health halos” cause consumers to underestimate calories of food choices. Because calories are difficult to estimate, individuals tend to assimilate ambiguous health attributes of menu items to a restaurant’s brand positioning (Chandon and Wansink 2007), for example, with the same side dish at McDonald’s being evaluated as less healthy than at Subway. Further, Chernev and Gal (2010) find paradoxically that adding a healthy item to an indulgent dish will likely reduce the total calories estimated by consumers despite the impossibility that adding more food reduces calories. Chernev (2011) later showed that dieters are the most susceptible to this underestimation of calories for a combined meal of healthy and indulgent foods. This prior research suggests that calorie estimates can be influenced by specific contexts, and that positive perceptions of healthiness are transferable to other foods that are psychologically related: in the same restaurant, on the same plate, and, as our research examines, part of the same sequence. Unlike many past researchers, we do not examine calorie counts that involve numerical anchoring effects, but do explore the carryover of health perceptions in a more general sense. Additionally, our work focuses on trait differences in self-control and suggests that vulnerability to unhelpful biases such as an overestimation of the healthiness of ambiguous food choices, may not affect all groups in the same way.

Consumers often face scenarios where they are unable or unmotivated to evaluate and estimate the calorie content of foods. In these situations, such as dining out at a restaurant when attributes such as calories or fat content are not always known, consumers rely on cues to infer the overall healthiness of food. We expect prior foods in a sequence to be used as information in making heuristic-based evaluations of the healthiness of a focal food in a manner consistent with consumers' motivations. Similar to the dieter who is prone to overestimate the healthiness of a combined plate of healthy and indulgent food, we expect the individual low in self-control to overestimate the healthiness of an ambiguous food in a sequence that contains healthy food.

Early investigations into assimilation and contrast effects revealed that anchors presented prior to stimuli create an assimilation effect by default because contrast requires more deliberation (Sherif et al. 1958; Sherif and Hovland 1961). Assimilation is particularly common when comparisons involve targets that can be easily compared to a similar standard (Lee and Suk 2010). In this research, the targets and anchors are highly comparable as snack foods but the healthiness attribute of the targets (e.g., Goldfish crackers) is ambiguous. Avoiding a rich piece of chocolate cake is a clear violation of health goals, but eating from a bowl of Goldfish crackers is not as clear. The healthiness of an ambiguous food will likely have different boundaries for people with varying degrees of self-control. Specifically, lower self-control individuals have been shown to demonstrate patterns of motivated categorization including a tendency to broaden categories of acceptable options in pursuit of restriction goals (Poynor and Haws 2009). Looser boundaries on the category of healthy foods, allow people with lower self-control

to perceive foods as more healthy when available cues are supportive. The more vague the boundaries, the more likely it is that people will assimilate (Kim and Meyers-Levy 2008). People high in self-control, with more rigid boundaries of what is healthy, will be more likely to contrast and less vulnerable to cues overall. On the other hand, a healthiness biasing enables those lower in self-control to consume temptations more freely, while still feeling that they are acting in accordance with a goal to limit unhealthy consumption.

With respect to the presence of multiple foods in a decision context, Fishbach and Zhang (2008) studied the effects of presenting healthy and unhealthy foods together in a unified presentation or apart as separate choices. Across several studies, participants made choices between healthy or unhealthy food items that were grouped together (e.g., part of the same photograph) or presented apart (e.g., in two separate photographs shown side by side). Their results consistently show that people prefer temptations when foods are presented together and prefer goal-congruent healthy options when options are presented separately. While these studies did not present foods sequentially, they have theoretical implications for our research. Foods in a sequence more closely resemble an “apart” presentation and we thus expect a preference for healthy options and a corresponding mindset that healthy and unhealthy items are competing. The individual lower in self-control, with wider category boundaries of what is acceptably healthy, cognitively reduces the healthiness discrepancy between an unambiguously healthy food and one with ambiguous healthiness. However, individuals higher in self-control with more restrictive categorizations, are guarded against ambiguously healthy foods viewing

them as relatively less healthy than a healthy anchor. Following exposure to an unhealthy food, the low self-control individual does not have motivation to inflate the healthiness of the ambiguous food which is clearly healthier (and perhaps less tasty) than the previous stimuli. Similarly, the high self-control individual is less vigilant against threats to a health goal following exposure to unhealthy items.

To test our prediction that people low in self-control will assimilate healthiness of ambiguous foods to a healthy anchor and our related predictions that high self-controllers will contrast in this situation and unhealthy anchors will not have a pronounced effect, we conducted three experimental studies. Individuals with lower self-control consistently demonstrate a tendency to overestimate the healthiness of options presented following a healthy option, relative to those with higher self-control. The first two studies reveal the key interactive effect between the healthiness of the first food and trait self-control using different stimuli and outcome measures. Study 3 looks at the potential for the differences in healthiness perceptions from studies 1 and 2 to impact intentions regarding the quantity consumed. In all studies, participants are first exposed to either a healthy or unhealthy stimuli, and are then exposed to a more ambiguous food option.

## Study 1

### Method

In our first study, 103 participants (35 female) in an online panel rated the healthiness of images they were shown on separate screens. The images were sequentially ordered by increasing or decreasing healthiness, depending on random assignment to the two order conditions. The set contained an apple (healthy), potato chips (unhealthy), and crackers (ambiguously healthy). The ambiguous option was always shown as the second item in the sequence. Half of the participants saw the apple » Goldfish » potato chips sequence (decreasing healthiness), and the other half saw the potato chips » Goldfish » apple sequence (increasing healthiness). As each image appeared, participants indicated the healthiness of the food to be on a 9-point scale ranging from “not at all healthy” to “very healthy.” Participants later completed BSCS (Tangney et al. 2004) as a measure of dispositional self-control. The scale items were averaged, after appropriate reverse-coding, to create an index of self-control ( $\alpha = .88$ ). This measure has been shown to be quite relevant to food-related issues and less susceptible to some of the biases associated with measures of eating restraint (Redden and Haws 2013).



## Results and Discussion

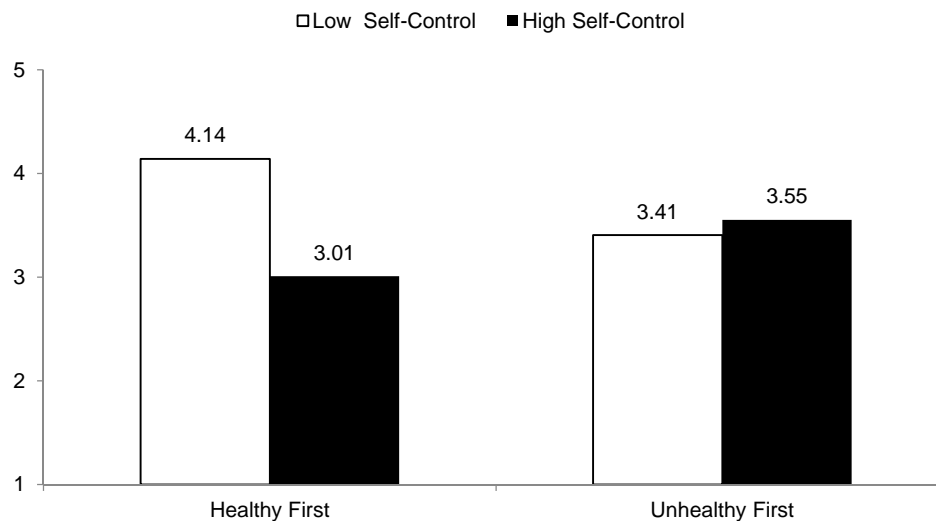
We analyzed the data using the healthiness rating of the ambiguous option (Goldfish) as our dependent variable with the order condition, trait self-control, and their interaction as independent variables in an ANCOVA model. We found a significant interaction ( $F(1, 96) = 4.07, p < .05$ ) between the experimental condition and self-control then decomposed the interaction to test the slope of the self-control effect in each order condition. After being exposed to a healthier item (an apple), the slope was significantly negative ( $\beta = -.53, t = -2.56, p < 0.02$ ) while the slope was not significant when the unhealthy food (potato chips) was shown first ( $p > .74$ ; see figure 10 for a spotlight analysis comparing self-control at +/- 1 standard deviation from the self-control mean (Aiken and West 1991)). These findings suggest that while an individual with low self-control is more likely to assimilate judgments about the healthiness of a focal food with the foods she has been exposed to previously, higher levels of self-control correspond to greater contrast with healthy stimuli. Participants perceived Goldfish to be marginally more healthy in the healthy-first condition compared to unhealthy-first at one standard deviation below the mean ( $\beta = .74, t = 1.65, p < 0.10$ ) but they were no different one standard deviation above the mean ( $p > .22$ ). We found no significant simple effects in the model ( $p > .12$ ).

Unsurprisingly, we also note that the healthiness rating of the apples was significantly higher than that of potato chips ( $M_{\text{apple}} = 8.27, M_{\text{chips}} = 2.09; t(99) = 38.23, p < .0001$ ). Further, although not our focus, the ratings did not vary based on order of

presentation. T-tests indicated no significant differences between the healthiness ratings for the apple ( $M_{\text{first}} = 8.12$   $M_{\text{last}} = 8.42$ ;  $t(98) = -1.65$ , NS) or potato chips ( $M_{\text{first}} = 2.22$   $M_{\text{last}} = 1.96$ ;  $t(98) = 1.19$ , NS) regardless of the appearance order, nor did these health ratings interact with self-control ( $\beta_{\text{apple} \times \text{self-control}} = .08$ ,  $t = .38$ , NS;  $\beta_{\text{chips} \times \text{self-control}} = -.02$ ,  $t = .11$ , NS). As such, we conclude that healthiness of the initial food item was successfully manipulated, and our key effects hold specifically for ambiguous foods.

Consistent with our prediction, people lower in self-control rated the focal ambiguous food as more healthy (relative to those high in self-control) following exposure to a healthy item. Low self-control also led people to rate the ambiguous Goldfish as marginally healthier following a healthy versus unhealthy prior food.

**Figure 10**  
Spotlight Analysis of Goldfish Healthiness Rating Based on Self-Control



Notes: See notes from figure 6.

Study 1 demonstrates the default tendency for individuals low in self-control to perceive an ambiguous food as being more healthy following exposure to another, prototypically healthy food. This influence does not extend to high self-control individuals who perceive foods as less healthy relative to their low self-control counterparts. Additionally, there were no apparent differences between people with low and high self-control when an unhealthy food was shown first. One possible explanation is that exposure to healthy foods activates different mindsets for consumers with varying levels of self-control, but exposure to unhealthy foods does not have this differential influence. The strength of motivation to either assimilate or contrast to an unhealthy food is likely weaker than for a healthy food. In this case, eating Goldfish seems healthier than potato chips without adjusting healthiness perceptions. As a result, individuals lower in self-control may need to expend more effort to reduce ambiguity and be more mindful of the influence that other foods in their eating context have on their perceptions of healthiness.

## **Study 2**

In study 2, we attempt to corroborate study 1's demonstrated associations between the healthiness of the first food in a sequence and perceived healthiness of an ambiguously healthy subsequent food using different preliminary foods along with a control condition to better assess the nature of our effects. We expect to again find that individuals lower in self-control perceive an ambiguously healthy food as more healthy

following exposure to a healthy food while higher self-control individuals tend to show relative contrast.

## Method

Three hundred forty-eight (203 female) undergraduates completed this study for course credit. Participants were randomly assigned to one of three conditions: healthy food (baby carrots) presented first, unhealthy food (chocolate truffles) presented first, or a control with no food presented before the focal stimuli. Subsequently, all participants were shown Goldfish Crackers as an ambiguously healthy snack food. After being presented with the ambiguous snack, participants rated the healthiness of the crackers on a 1 (Not at all healthy) to 9 (Extremely healthy) scale. Following unrelated tasks to separate the measurement of our dependent variable and individual differences, we again measured self-control tendencies using the brief Tangney et al. (2004) scale to create a self-control index ( $\alpha = .86$ ).

## Results and Discussion

We analyzed the data using the healthiness rating of the ambiguous option (Goldfish Crackers) as our dependent variable with the experimental conditions, trait self-control, and their interactions as independent variables in an ANCOVA model. To estimate the model with a multicategorical experimental design, we used the three-

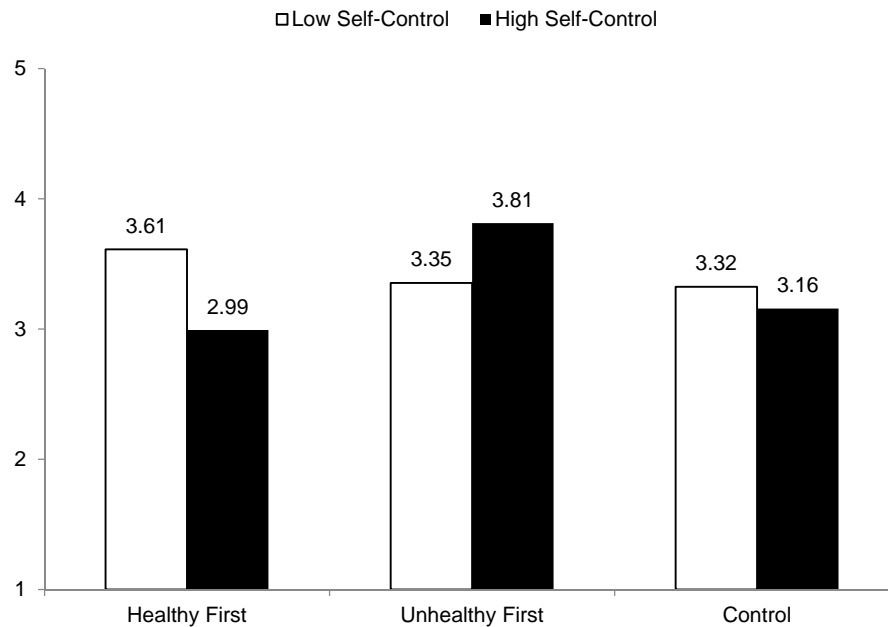
category moderator procedure recommended by Hayes (2015). As such, we treated experimental condition as a moderator by applying indicator coding. In this coding scheme, a dummy variable for “healthy” was set to 1 whenever participants saw a healthy snack first and 0 otherwise. The same approach was taken for the unhealthy snack first condition. With this indicator variable scheme, the control condition served as our reference group. In the model, the dummy variables were treated as two moderators which allowed us to interpret and compare all theoretically meaningful coefficients and significance tests for our three experimental conditions.

The test of the interaction between experimental condition and self-control was significant, as predicted ( $F(1, 341) = 3.91, p < .03$ ). See figure 11 for a spotlight analysis comparing each of the three conditions at +/- 1 SD of trait self-control. To probe the interaction, we assessed the conditional effect of self-control on the healthiness ratings of ambiguous Goldfish snack for each condition. In the control condition, we found no significant effect. That is, when participants were not shown another snack prior to evaluating Goldfish, participants with low and high self-control did not differ significantly in their perceptions of Goldfish healthiness ( $p = .57$ ). The slope of the self-control effect after exposure to a healthy snack first was significantly negative ( $\beta = -0.31, t = -2.22, p < 0.03$ ) indicating that lower self-control corresponded to greater perceptions of healthiness following a healthy snack. Prior exposure to an unhealthy snack yielded a marginally positive slope ( $\beta = 0.23, t = 1.70, p < 0.09$ ). This pattern of results suggests that lower self-control leads people to assimilate judgments to prior foods when faced with foods that are ambiguously healthy, while higher self-control

leads to a contrast effect. We also assessed pairwise comparisons of the experimental conditions and found that while neither healthy nor unhealthy snack exposure differed significantly from the control condition ( $p > .10$ ), the healthy and unhealthy conditions differed significantly ( $\beta = 0.54, t = 2.78, p < 0.01$ ). Directionally comparing each condition to the control, we do observe that low self-control evaluations of healthiness are higher than the control in the healthy-first condition and nearly equal in the unhealthy-first condition. For high self-control, the healthy-first condition yielded slightly lower evaluations of healthiness while unhealthy-first was higher relative to the control. We found no significant simple effects in the model ( $p > .1$ ).

After exposure to healthy foods, those lower in self-control may exhibit a category broadening behavior that is more inclusive of foods in the healthy category. This behavior eases the pursuit of restraint goals but also reduces effectiveness. On the other hand, those people higher in self-control protect health goals by perceiving ambiguous foods as more unhealthy following prior healthy foods. In study 2, we found support for similar patterns of assimilation and contrast following exposure to unhealthy foods.

**Figure 11**  
Spotlight Analysis of Healthiness Rating (with Control) Based on Self-Control



Notes: See notes from figure 6.

### Study 3

Finding that differences in the healthiness of previous foods influences perceptions of healthiness for current foods being evaluated, as we demonstrated in studies 1 and 2, is quite important in further understanding food-related decision making. Building further on these differences in healthiness perceptions, we ask what impact might this have on the quantity one intends to consume.

In this study, rather than drawing attention to perceptions of healthiness of the foods, we had participants indicate how much of an ambiguous snack they intended to consume after being exposed to either a healthy or unhealthy food. We suggest that if the

ambiguous food is perceived to be healthier, participants will eat more in keeping with prior literature showing that low-fat labels (Wansink and Chandon 2006) and “healthy” claims (Vadiveloo et al. 2013) lead to increased consumption. Therefore, for those lower in self-control, biased perceptions of healthiness arising from the previous presentation of healthy foods will lead to increased consumption of this ambiguous food in contrast with those higher in self-control who are less vulnerable to such bias.

## Method

Participants were 182 (86 female) undergraduates who received course credit for completing the study. For this study, the healthy food stimulus was celery sticks while the unhealthy food was potato chips. Following exposure to an image of one of these snacks, participants all viewed a “fruit and frozen yogurt smoothie,” which was presented as an ambiguously healthy snack, similarly to the “mango lassi” drink study by Raghunathan et al. (2006) in which healthiness perceptions were manipulated. Participants were next shown images of the smoothie in a glass with various portions to consume (0%, 20%, 40%, 60%, 80%, and 100%) and asked to indicate the percentage they would consume (see appendix). We later measured participants’ preference for the fruit smoothie as a covariate to control for liking. “Please indicate how much you like Fruit and Frozen Yogurt Smoothies” was assessed on a scale from 1 (do not like at all) to 9 (like very much). Following a filler activity, participants responded to BSCS (2004) to create a self-control index ( $\alpha = .86$ ). Finally, demographic information was collected.



## Results and Discussion

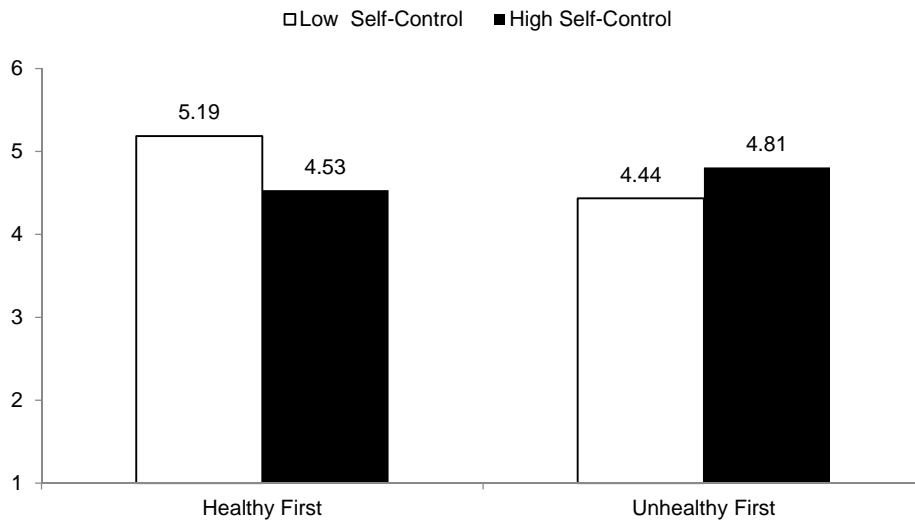
We first tested for the primary interaction between self-control and nature of the first stimuli on the amount of smoothie participants intended to consume. The liking rating for fruit smoothies was included as a covariate, and as expected, it was significant ( $\beta = .26, t = 4.93, p < .001$ ). However, neither health condition nor self-control had significant simple effects. Importantly, the interaction between healthiness condition and self-control was significant ( $F(1, 178) = 4.71, p < .04$ ; see figure 12). We tested the effect of self-control by assessing the slope for each experimental condition and found a significantly negative slope for the prior healthy exposure ( $\beta = -.32, t = -2.10, p < .04$ ) while the unhealthy-first condition was nonsignificant ( $p > .30$ ). The negative slope following a healthy food suggests that higher self-control leads to lower consumption intentions. This finding is consequential as lower self-control leads us to not only assimilate foods to healthy foods we have seen previously, but also to a greater propensity to consume. Further decomposing the interaction reveals a significant effect of condition at one standard deviation below the self-control mean ( $\beta = -.75, t = -2.26, p < .03$ ) but not at one standard deviation above ( $p > .40$ ). This finding indicates reduced intentions to consume the smoothie for low self-controllers in the unhealthy-first condition relative to the healthy-first condition. Individuals higher in self-control did not significantly differ across conditions.

Interestingly, examining the correlations between self-control and smoothie liking shows that those relatively lower in self-control actually like smoothies less

( $r = .35$ ,  $p < .01$ ), and yet, the healthy food prime leads to increased intended consumption. The healthiness perception effects exhibited throughout the present studies may actually lead those low in self-control to increase consumption of less preferred, ambiguously healthy foods.

The results of this study suggest that the same patterns shown in the first two studies and extend our findings to include differences in the quantity of intended consumption. Specifically, after exposure to a healthy food, a more ambiguous food is selected in greater quantity for those lower in self-control, but lesser quantity for those high in self-control. Assuming that healthier smoothies would seem appropriate to consume in larger quantities (consistent with previous research suggesting that people eat larger quantities of food when they are perceived to be healthier; Wansink and Chandon 2006), this pattern again underscores effects of prior healthy foods increasing healthiness perceptions of subsequent foods for those lower in self-control relative to those higher in self-control.

**Figure 12**  
Spotlight Analysis of Intended Smoothie Consumption Based on Self-Control



Notes: See notes from figure 6.

### General Discussion

The healthiness of Goldfish crackers relative to chocolate candy or apple slices: Perhaps it's no surprise that these context effects impact our judgments of the goldfish crackers. After all, healthiness, like many other attributes, is certainly a relative evaluation (Chernev 2011; Vadiveloo et al. 2013; Wilcox et al. 2009). Unlike much past research which focuses on lack of willpower as a critical driver of self-control failure, we examine situations in which perceptions of what is actually healthy are biased by the context supplied by other foods.

Food researchers have found that when there is ambiguity associated with an eating experience, people often rely on situational and environmental cues to determine how much they eat (Wansink, Payne, and Shimzu 2010). As such, this research has

expanded our understanding of self-control and food consumption, specifically related to contexts where individuals are exposed to different foods over time. We often assume that self-control failures are deliberate and understood by the individual to be such. However, in the present research we proposed that individuals may be subject to biases in judgment that lead to differential perceptions of healthiness for ambiguous foods based on prior observation of other foods that are either healthy or unhealthy. Our findings point to perceptions that can work against people with low self-control as they pursue goals to become healthier. Awareness that low self-control can lead people astray in assimilating healthiness can help consumers, public policy makers, and marketers in configuring purchasing and eating environments. Malleable healthiness perceptions may lead to rationalization of eating certain foods or consuming greater quantities of food, as study 3 results suggest. As promising areas of intervention, marketers and public policy makers may consider exploring labeling techniques and the visual categorization of healthy and unhealthy products on menus and store displays to reduce harmful ambiguity. Individual consumers aware of the context effects of other foods are advised to interpret exposure to healthy foods as a cue necessitating greater subsequent deliberation.

We utilize unhealthy first conditions in all our studies which demonstrate the boundaries of our effects to perceptions following exposure to healthy foods (the types of foods almost always advocated for consumption on any plan for healthy eating or weight loss). However, our results also suggest that healthiness perceptions of ambiguous foods following exposure to unhealthy foods may vary. The present results

paint an unclear picture of exactly what these effects are based upon self-control or other related differences, but future research should more thoroughly examine these possibilities. For example, in our first two studies, there is some suggestion that those low in self-control perceive foods as more healthy following healthy foods (as central to our findings) but perhaps perceive foods as less healthy following exposure to unhealthy foods. In contrast, the direction of results is the opposite for those higher in self-control who show more of a tendency to have negative perceptions of healthiness following healthy exposure and more positive healthiness perceptions following unhealthy exposure.

From these studies, we cannot be sure whether increases or decreases in perceived healthiness are driving the behavior. A more fundamental question here is what exactly does exposure to healthy and unhealthy food prime? We suggest that our results provide some level of clarity for healthy foods: such foods prime the idea of health for individuals of all levels of self-control. However, the relative goals and context effects found speak to the differences in how those of varying levels of self-control respond to a healthiness prime. Those low in self-control wish to be consistent with the idea of health and do so by enhancing perceptions of the healthiness of the ambiguous snack. Those high in self-control demonstrate consistency with the healthy mindset by evaluating the ambiguous snack as less healthy, again suggesting the expansion or contraction of goal-consistent alternatives (Poynor and Haws 2009). The effects of presenting individuals with an unhealthy food are less clear. Future research

should more carefully examine the goals primed by unhealthy foods, and the impact on subsequent food evaluations and consumption.

We note that our results, particularly for the intended quantity of consumption may seem related to licensing effects (Khan and Dhar 2006). Specifically, in the case of those low in self-control, exposure to a prior healthy stimulus may create a sense of licensing to indulge. However, Wilcox et al. (2009) find that adding healthy items to a choice set with relatively unhealthy items results in vicarious health goal fulfillment for individuals high in self-control. Essentially, the mere presence of healthy items may satisfy a goal and license the individual to choose unhealthy foods. However, the sequential effect we find influences those low in self-control to a greater extent and our studies measure not only choice and consumption but also health perceptions.

Future research should attempt to more clearly understand the processes underlying our interactive effect. Possibilities may include similarity and dissimilarity testing, concreteness or abstractness of healthiness properties, affective versus cognitive responses, numeric and conceptual interpretation of the prior foods, and others. In the present research, we focused on the effects of previous food exposure on ambiguous food options. However, it is possible the individual self-control might influence perceptions of healthier or unhealthier foods following initial exposure as well. In other words, future research should examine the boundaries of the malleability of perceptions of food healthiness based on contextual order effects.

Many subtle environmental factors that influence food perceptions, decision making, and consumption have been studied in prior literature. This research adds novel

insights by demonstrating that prior exposure to a certain food can influence perceptions of the next food, and that the nature of this effect is determined by one's level of self-control. Such patterns can have a significant impact on eating patterns and create previously unknown backfire effects for healthy foods for those most susceptible to self-control failure.

## CONCLUSIONS

Marketers, public policy makers, and consumers struggle with issues related to dispositional self-control in a number of consumption domains. Societal realities such as prevalent obesity and high levels of consumer debt are often targeted with well-meaning interventions intended to quell behaviors stemming from low self-control. Self-control plays a critical role in consumer decision-making and any effort to enhance societal welfare should account for this important trait. It is often unclear whether interventions are effective for individuals lowest in self-control, those needing the most assistance. Measures of success are frequently taken at an aggregate level that does not account for inherent personality differences among consumers. This approach raises questions about the effectiveness of common self-control interventions.

In this dissertation, I examine specific self-control interventions involving domain importance, nutrition disclosure, and order effects across three essays. This work contributes to not only self-control research, but also literatures on goal pursuit, motivation, hedonic consumption, and contextual influence in the psychology and marketing disciplines. These essays together show that various interventions designed to help people exert self-control are susceptible to ineffectiveness and even backfire effects.

Essay one examines the interplay of the importance of one's goals and trait self-control. While conventional wisdom suggests that elevating a goal's importance should have a positive influence on self-control decision-making, I propose and demonstrate a



backfire effect for individuals low in self-control. I explore the phenomenon across both the eating and spending domains using a variety of dependent measures. Furthermore, I highlight perceived goal difficulty as a process underlying the influence of goal importance and self-control on behaviors. This essay shines a light on a critical problem with a commonly used tactic to improve personal self-control and suggests that downplaying goal difficulty can potentially mitigate the issue.

Essay two examines the effectiveness of providing nutritional information to consumers as an intervention to discourage overconsumption. Consumer search behavior is a critical factor in assessing nutritional disclosure. I propose and find that individuals lower in trait self-control are motivated to forgo nutritional information for unhealthy foods when given the opportunity. This limited exposure to nutritional facts hinders any possible success for an intervention. I find that when these low self-control consumers do evaluate nutritional information, they experience a hedonic cost that reduces overall enjoyment, leading to less consumption of unhealthy food. This promising finding suggests that the format and delivery of nutritional information is extremely important for public policy makers and marketers to improve.

Essay three considers foods encountered in a sequence, a common scenario in grocery stores, restaurants, media, and other areas. Individuals low in eating self-control are encouraged to eat healthier foods and this essay examines the effect of exposure to such healthy items on subsequent evaluations of foods with ambiguous health attributes. Consumers are vulnerable to contextual influence when faced with ambiguity, and I predict that people low in self-control will assimilate ambiguous foods to previously

encountered items. The evidence in this essay demonstrates a tendency for consumers lower in self-control to overestimate the healthiness of ambiguously healthy foods. These results have important implications for consumers who are striving for healthier lifestyles as well as food marketers.

One common theme threaded throughout the three essays involves a tendency for people lower in self-control to respond negatively to stimuli threatening the pursuit of temptations. Future research may further explore an emotional component, feeling bad about one's incapacity to exert self-control, as a parsimonious explanation of these findings. There are also questions about whether behavioral responses are driven by desire (to protect indulgence), willpower (to avoid shortcomings), or a combination. Any intervention that threatens one's freedom to indulge or makes salient one's inability to pursue self-control goals is in danger of backfiring for people low in self-control resources.

Overall, this dissertation contributes to the psychology and marketing literatures and carries key implications for managers and public policy makers. In marketing messaging, downplaying the importance of certain goals or assuaging concerns about difficulty may facilitate goal pursuit for those low in self-control. With the disclosure of nutritional information, presenting the key data in a format that is observed and understood by those lower in self-control may reduce consumption. When presenting foods or marketing stimuli related to food in a sequence, the order of foods and relative healthiness may influence perceptions of subsequent foods encountered. These essays

contribute new theory and compelling evidence that the role of self-control is a critical factor in evaluating the effectiveness of interventions.

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## APPENDIX

### Essay 2, Study 1 Stimuli



**Ingredients:** Dehydrated Potatoes, Modified Food Starch, Corn Oil, Sugar, Salt, Soy Lecithin, Leavening (Monocalcium Phosphate and Sodium Bicarbonate), and Dextrose.  
No Preservatives.

#### Nutrition Facts

Serving Size 1 oz. (28g/About 10 crisps)  
Servings Per Container 10

Amount Per Serving		Calories from Fat 30	
		% Daily Value*	
<b>Calories</b>	120		
<b>Total Fat</b>	3g	5%	
Saturated Fat	0g	0%	
Trans Fat	0g		
<b>Cholesterol</b>	0mg	0%	
<b>Sodium</b>	200mg	8%	
<b>Total Carbohydrate</b>	21g	7%	
Dietary Fiber	2g	6%	
Sugars	2g		
<b>Protein</b>	2g		

Vitamin A 0% • Vitamin C 6%  
Calcium 4% • Iron 0%  
Thiamin 4% • Niacin 6%  
Vitamin B6 4% • Phosphorus 8%

Zinc 2%

\* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:  
Fat 9 • Carbohydrate 4 • Protein 4



**Ingredients:** Whole Corn, Vegetable Oil (Corn, Canola, Soybean and/or Sunflower Oil), Maltodextrin (Made From Corn), Salt, Tomato Powder, Corn Starch, Lactose, Whey, Skim Milk, Corn Syrup Solids, Onion Powder, Sugar, Garlic Powder, Monosodium Glutamate, Cheddar Cheese (Milk, Cheese Cultures, Salt, Enzymes), Dextrose, Malic Acid, Buttermilk, Natural and Artificial Flavors, Sodium Acetate, Artificial Color (Including Red 40, Blue 1, Yellow 5), Sodium Caseinate, Spice, Citric Acid, Disodium Inosinate, and Disodium Guanylate.  
**CONTAINS MILK INGREDIENTS.**

#### Nutrition Facts

Serving Size 1 oz (28g/About 12 chips)

Amount Per Serving		Calories from Fat 70	
		% Daily Value*	
<b>Calories</b>	150		
<b>Total Fat</b>	8g	12%	
Saturated Fat	1g	5%	
Trans Fat	0g		
<b>Cholesterol</b>	0mg	0%	
<b>Sodium</b>	180mg	8%	
<b>Total Carbohydrate</b>	18g	6%	
Dietary Fiber	2g	6%	
Sugars	less than 1g		
<b>Protein</b>	2g		

Vitamin A 0% • Vitamin C 0%  
Calcium 2% • Iron 0%  
Vitamin E 6% • Thiamin 4%  
Riboflavin 2% • Vitamin B6 4%  
Phosphorus 4% • Magnesium 4%

\* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram:  
Fat 9 • Carbohydrate 4 • Protein 4

**Essay 2, Study 2 Stimuli**



### Essay 3, Study 3 Stimuli

How much of the smoothie would you consume?

