Tools to Assist Restrained Eaters: A Query Theory and Regulatory Focus Theory Approach

Sudy Majd

Submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Graduate School of Arts and Sciences

COLUMBIA UNIVERSITY

2018
ABSTRACT

Tools to Assist Restrained Eaters: A Query Theory and Regulatory Focus Theory Approach

Sudy Majd

For chronic dieters, modern food environments make it very difficult to always behave inline with health goals. Approximately 45 million Americans report never fully being off a diet because they fail to reach their weight loss goals. These individuals are colloquially known as chronic dieters but in the food behavior and literature, these people are known as Restrained Eaters. Restrained Eaters are known for the vacillation between food restraint and disinhibition. Past research has demonstrated that one way to keep Restrained Eaters from reach disinhibition is to prevent or weaken their involuntary physical and cognitive responses to external food cues. In a series of three lab studies, this dissertation tests two novel approaches to influencing the behavior of Restrained Eaters when faced with a hedonic food item. The focus of Study 1 is on using Query Theory to test whether there is an effect of endowment on decision and whether thoughts predict decision. We found a significant effect of endowment on the decision of Restrained and Unrestrained Eaters. Study 2 also uses Query Theory but reverse the natural order in which participants generated thoughts and whether that had an effect on decision. In Study 2, we found changing the natural order of thoughts can reverse the effect of endowment. Studies 3 and 4 reanalyze the data from Studies 1 and 2 using Regulatory Focus Theory. In this reanalysis, we found thoughts coded using regulatory focus also predicted behavior. We use the results from this reanalysis to justify Study 5,
which is a test of regulatory focus inductions on decision. We found no significant effect of regulatory focus inductions on the decision of Restrained or Unrestrained Eaters.

This research aims to develop interventions that will help Restrained Eaters make decisions that are not overshadowed by external cues or instant gratification, giving them a better chance to reach a sought out goal.
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>List of Tables and Figures</td>
<td>iii</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>vi</td>
</tr>
<tr>
<td>Dedication</td>
<td>vii</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Dietary Restraint &amp; Restrained Eaters</td>
<td>3</td>
</tr>
<tr>
<td>Selection of Revised Restraint Scale</td>
<td>17</td>
</tr>
<tr>
<td>Query Theory</td>
<td>21</td>
</tr>
<tr>
<td>Regulatory Focus Theory</td>
<td>27</td>
</tr>
<tr>
<td>Endowment Effect</td>
<td>30</td>
</tr>
<tr>
<td>Chapter 1:</td>
<td></td>
</tr>
<tr>
<td>Study 1: Evidence of Query Theory as a Tool to Assist Restrained Eaters</td>
<td>33</td>
</tr>
<tr>
<td>Chapter 2:</td>
<td></td>
</tr>
<tr>
<td>Study 2: The Effects of Thought Reversal on the Decision of Restrained Eaters</td>
<td>55</td>
</tr>
<tr>
<td>Chapter 3:</td>
<td></td>
</tr>
<tr>
<td>Study 3 &amp; 4: Evidence for Regulatory Focus Theory as an Intervention Tool to Assist Restrained Eaters</td>
<td>68</td>
</tr>
<tr>
<td>Chapter 4:</td>
<td></td>
</tr>
<tr>
<td>Study 5: The Effects of Regulatory Focus Inductions on the Decisions of Restrained Eaters</td>
<td>83</td>
</tr>
<tr>
<td>Chapter 5:</td>
<td></td>
</tr>
<tr>
<td>Structure of Thoughts, Focus of Thoughts and Time Orientation as Predictors of</td>
<td></td>
</tr>
</tbody>
</table>
## LIST OF FIGURES AND TABLES

<table>
<thead>
<tr>
<th>Figure/Study</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction, Figure 1</td>
<td>Behavioral Model of Restrained Eaters</td>
<td>7</td>
</tr>
<tr>
<td>Study 1, Figure 2a</td>
<td>Percent of Restrained and Unrestrained Eaters taking the shampoo by endowment condition</td>
<td>41</td>
</tr>
<tr>
<td>Study 1, Figure 2b</td>
<td>Percent of Restrained and Unrestrained Eaters taking the ice cream by endowment condition</td>
<td>42</td>
</tr>
<tr>
<td>Study 1, Table 1</td>
<td>Classification of thoughts based on thought valence about ice cream and time</td>
<td>43</td>
</tr>
<tr>
<td>Study 1, Figure 3</td>
<td>The mean number of thoughts listed as a function of endowment and eater type for shampoo and ice cream</td>
<td>44</td>
</tr>
<tr>
<td>Study 1, Figure 4</td>
<td>Mean Standard Median Rank score as a function of endowment and eater type for shampoo and ice cream</td>
<td>45</td>
</tr>
<tr>
<td>Study 1, Figure 5</td>
<td>Mean Balance of Thought scores as a function of endowment and eater type for shampoo and ice cream</td>
<td>46</td>
</tr>
<tr>
<td>Study 1, Figure 6a-d</td>
<td>Scatterplot of Structure of Thoughts of Restrained Eaters &amp; Unrestrained Eaters</td>
<td>48</td>
</tr>
<tr>
<td>Study 1, Figure 7a-d</td>
<td>Logistic Regression of the Decisions of Restrained Eaters</td>
<td>50</td>
</tr>
<tr>
<td>Study 1, Table 2a</td>
<td>Linear Regression Results of the Interaction of Structure of Thoughts and Endowment for Restrained Eaters</td>
<td>51</td>
</tr>
<tr>
<td>Study 1, Table 2b</td>
<td>Linear Regression Results of the Interaction of Structure of Thoughts and Endowment for Unrestrained Eaters</td>
<td>52</td>
</tr>
<tr>
<td>Study 2, Figure 8</td>
<td>Percent of Restrained and Unrestrained Eaters taking the ice cream by endowment condition</td>
<td>60</td>
</tr>
<tr>
<td>Study 2, Figure 9</td>
<td>Mean standard median rank (SMRD) scores of Restrained and Unrestrained Eaters</td>
<td>61</td>
</tr>
<tr>
<td>Study 2, Figure 10</td>
<td>Mean balance of thought (BOT) scores of Restrained and Unrestrained Eaters</td>
<td>62</td>
</tr>
</tbody>
</table>
Study 2, Figure 11a-b. Scatterplot of Structure of Thoughts of Restrained and Unrestrained Eaters

Study 2, Figure 12. Logistic Regression of the Decisions of Restrained & Unrestrained Eaters

Study 3 & 4, Figure 13a-d. Study 3 & 4: Scatterplot of Restrained & Unrestrained Eaters’ Focus of Thoughts of Ice Cream

Study 3, Figure 14. A scatterplot showing the relationship between order and valence for thoughts in Study 3

Study 4, Figure 15. A scatterplot showing the relationship between order and valence for thoughts in Study 4

Study 3 & 4, Figure 16a-b. Logistic Regression of Ice Cream Decisions of Restrained & Unrestrained Eaters

Study 3 & 4, Figure 16c-d. Logistic Regression of Ice Cream Decisions of Restrained & Unrestrained Eaters

Study 5, Figure 17. Percent of participants taking the ice cream by induction and eater type

Study 5, Figure 18a-b. Scatterplot of Focus of Thoughts for Restrained and Unrestrained Eaters

Study 5, Figure 19a-b. Logistic Regression of Ice Cream Decision of Restrained and Unrestrained Eaters

Chapter 5, Figure 20. Query Theory (Studies 1 & 2): Correlation of Order and Content

Chapter 5, Figure 21. Regulatory Focus Theory (Studies 3 & 4): Correlation of Order and Content

Chapter 5, Figure 22. Correlation matrix of Restrained Eaters’ order and content of thoughts when coded according to Query Theory vs. Regulatory Focus Theory

Chapter 5, Figure 23. Correlation matrix of Unrestrained Eaters’ order and content of thoughts when coded according to Query Theory vs. Regulatory Focus Theory
ACKNOWLEDGMENTS

I would first like to acknowledge my gratitude towards my dissertation committee: Drs. Elke Weber, E. Tory Higgins, Eric Johnson, Valerie Purdie-Vaughns, and Paige West. Thank you for all your encouragement and advice throughout my graduate career. An exceptional thanks is due to my advisor Elke Weber, for the support and guidance she has given me. I would also like to thank my collaborator on the projects used for this dissertation: Mark A. Conley, Elke Weber and E. Tory Higgins. I am additionally grateful to my wonderful, fellow doctoral students. I consider myself incredibly fortunate to have had the opportunity to work alongside such an exceptionally smart, kind and hardworking group of people. Special thanks are due to Mark A. Conley, Lisa Zaval, Raymond Crookes, Dan Wall, Kaytee Turetsky, Katherine Zee, Becca Mohr, Claudia Schneider, Travis Riddle, Maya Rossignac-Milon, Hale Foster and all the members of CASPR. I am also very thankful for the support of three great labs: The Center for Research on Environmental Decisions, the Center for Decision Sciences and the Higgins Lab.
DEDICATION

To Aubrey

Thank you for the love, support, encouragement, patience, inspiration and laughter.
Introduction

Modern food environments are replete with processed foods containing little nutritional value. Chronic consumption of these foods can contribute to obesity, diabetes, heart disease, stroke, cancer, and other diseases (Gordon-Larsen et al., 2006). At any given moment, approximately 45 million Americans are on a diet and are spending approximately $33 billion annually on weight loss-products (Price, Schchat, & Rothwell, 2016). Of those 45 million Americans, a majority of them report that many of their diets fail and they never reach their health goals. Indeed, researchers estimate that 97 percent of dieters regain everything they have lost, often more, within three years of their original weight loss (Callahan, 2013). This consistent failure often leads people to become lifelong dieters, more commonly known as chronic dieters (Jeffery et al., 2000). Ironically, chronic dieters are more likely to engage in binge eating and are more likely to become overweight or obese (Stice, Cameron, Killen, Hayward, & Taylor, 1999). While there is a large and growing body of research on how to overcome and stop the obesity epidemic, it is clear that a better understanding of the factors that negatively impact the efforts of chronic dieters and how to counter those factors is still needed. The aim of this body of research is to better understand what factors derailing the efforts of chronic dieters (referred to as Restrained Eaters) and whether our behavioral interventions work to keep them on track towards their health goal.

---

1 A “health goal” can have a wide range of meanings but in the United States, and in this dissertation, a health goal refers to a person’s goal of losing weight and/or eating healthier to lose weight.
We\textsuperscript{2} begin this dissertation by introducing our population of interests: Restrained Eaters (Herman & Polivy, 1980). We introduce a cyclical behavioral model of Restrained Eaters that shows the psychological processes and the casual relationship between restraint and disinhibition. We review interventions and studies of varying success used to influence the decisions of Restrained Eaters, specifically interventions that help avoid disinhibited eating. The next section explores the scale used to identify Restrained Eaters: the Revised Restraint Scale (Polivy, Herman, & Howard, 1988). We then go on to discuss the theoretical frameworks and behavioral paradigm used in all five studies. The first theory, Query Theory, has been used to influence a variety of decisions, but never food decisions (Johnson et al., 2007; Weber et al., 2007). Studies 1 and 2 use Query Theory as their primary theoretical framework. The second theory, Regulatory Focus Theory, has been used to change food decisions in previous research (Higgins, 1997). Studies 3 and 4 are exploratory research using regulatory focus in a Query Theory framework. Results of Study 3 and 4 are used to support Study 5 hypotheses. Study 5 uses a Query Theory behavioral paradigm and Regulatory Focus Theory as the theoretical framework. Finally, we discuss the endowment effect (Kahneman & Tversky, 2000), which is primary behavioral paradigm used in all five studies. The endowment effect paradigm is meant to mimic the difficult decision Restrained Eaters face when confronted with the decision to eat or not eat a food item that conflicts with their goal of eating healthy. We devote a chapter to each of the five studies where complete study hypotheses, methodology, results and conclusions are included. This dissertation ends with a chapter on Query

\textsuperscript{2} Though I authored this dissertation myself, I use ‘we’ to refer to my coauthors on the projects and various papers that will come from this dissertation.
Theory, Regulatory Focus Theory and the mechanisms driving the behavior in our studies. This dissertation ends with concluding remarks, study limitations and future directions of research.

**Dietary Restraint & Restrained Eaters**

Our studies focus on individuals who consistently struggle with dietary restraint and reaching their health goals, namely chronic dieters. Dietary restraint is the intention to restrict food intake in order to control or reduce body weight (Herman & Mack, 1975). To measure dietary restraint, we turned to the Revised Restraint Scale (Herman & Polivy, 1980), which categorizes individuals as Restrained Eaters or Unrestrained Eaters. The Restraint Scale, which was first developed by Herman & Mack (1975), was later revised as the 10-item Revised Restraint Scale (RRS) by Polivy, Herman, & Howard (1988), which is the scale used in throughout these studies. The scale ranges from 5 to 35 with participants scoring 15 and above considered Restrained Eaters and those below as Unrestrained Eaters. The scale contains items assessing both weight fluctuation and subjective concern for dieting (a more in depth discussion of the Revised Restraint Scale is the next section) (Appendix A). Restrained Eaters are most notable for their restraint and lapses in restraint (i.e. disinhibition), with the lapses being a direct consequence of restraint. Put another way, lapses are caused by a dieter’s “all-or-nothing” mentality. Dieters often mentally categorize stretches of time (e.g. a day or a week) as a successful diet period or a complete failure. This binary categorization is highly prevalent among Restrained Eaters, which leads to a habit of continuous yet sporadic dieting (Heatherton et al., 1988). When there is complete failure, Restrained Eaters become disinhibited in
their eating until they return back to restraint. This struggle between restraint and disinhibition makes weight loss and maintenance perpetually difficult for Restrained Eaters (Wilson & Brownwell, 1980). While Restrained Eaters are not a clinical population, they are an important demographic to study for two reasons. First, a better understanding of their decision processes may lead to interventions wherein Restrained Eaters learn to shape their own decision environment and do not have to rely so heavily on self-control. Second, restricted eating is positively correlated with weight gain and restrictive practices may ironically lead to an increase in consumption due to foods heightened appeal (Polivy, Herman & Walsh, 1978; Polivy, Heatherton & Herman, 1988; Polivy, 1996; Rollins et al., 2014).

In this section, we discuss the psychological underpinnings of Restrained Eaters and outline a model of behavior that shows the process of decision making made by Restrained Eaters when making food decisions. We discuss each stage of the model by reviewing previous research focusing on that particular behaviors and reactions and how those lead to the proceeding stages of the model. We then discuss the damaging effects of disinhibition and how behavioral interventions have been used in previous studies to influence decisions and avoid harmful disinhibited behavior, which helps Restrained Eaters stay on the path to their health goal.

The underlying concept of Restrained Eaters is psychological. According to Ruderman (1986), restraint is a continuous “cognitively mediated effort” that an individual makes “to combat the urge to eat” (p. 248) and that disinhibition is the direct result of restraint (Lowe, 1993). Restrained Eaters are cognitively preoccupied with food, while constantly trying to monitor and regulate the food they eat through “self-imposed
dietary rules” (Polivy, 1998; Ward & Mann, 2000, p. 755). However, research indicates that this approach to food consumption and decision making does not result in dietary virtue; there is a significant correlation between weight gain and restrained eating ranging from .37 to .45 (Heatherton, Herman, Polivy, King, & McGree, 1988). While eating for Unrestrained Eaters is largely a physiological need, Restrained Eaters are more likely to eat because of environmental cues (e.g. plate size) and cognitive cues (e.g. food primes) (Heatherton, Striepe, & Wittenberg, 1998; Wansink & Sobal, 2007; Tomiyama, Mann, & Comer, 2009). These cues, or triggers, are not mutually exclusive and their effects are likely additive for Restrained Eaters. When faced with hedonic food decisions, Restrained Eaters use whatever resources at their disposal to suppress the physiological urge to eat up until an environmental or cognitive cue challenges wears down their willpower (Ruderman, 1986). This sets off a chain reaction of cognitive and physical triggers that leads the Restrained Eater to disinhibition and a failed health goal until there is a return to practicing active psychological restraint.

Figure 1 (shown on the next page) is a Restrained Eaters’ cyclical model of behavior. This model shows the different phases of psychological processes and behaviors experienced by Restrained Eaters practicing restraint and how restraint causes disinhibition and how disinhibition also then causes restraint. Read from left to right, the model shows psychological restraint leading to a heightened attention to food, which results in a heightened sensitivity to food-related environmental and cognitive cues (i.e. heightened sensitivity), which then causes heighted physical and cognitive responses (i.e. heightened responses). A Restrained Eater’s heightened physical and cognitive reaction often leads to disinhibited eating and a failure to reach their health goal. Once the
disinhibition period has ended, Restrained Eaters return to the practice of restraint in order to balance the disinhibition period. In the following section, we review research at each stage of the model and the evidence linking one stage to another.
Many studies have demonstrated how psychological restraint causes a heightened reaction to environmental and cognitive food cues, or triggers. External food cues are exposure to the sight, smell or taste of food while cognitive triggers are subconscious or conscious primes focusing on diet-related domains and negative affect. Researchers tested the casual relationship between restraint and heightened reactions by comparing the differences in behavior between Restrained Eaters and Unrestrained Eaters. The heightened physical responsiveness of Restrained Eaters to external cues is well documented. For example, when exposed to the sight or smell of varying hedonic food items, Restrained Eaters, compared to Unrestrained Eaters, salivated more, reported increases in hunger, reported an increased desire to eat, and feelings of reduced fullness. In addition, Restrained Eaters then went on to eat more of the foods they were exposed to (Klajner, Herman, Polivy, & Chhabra, 1981; Legoff & Spigelman, 1987; Jansen & van den Hout, 1991; Fedoroff, Polivy, & Herman, 1997; Loxton & Dawe, 2001; Fedoroff, Polivy, & Herman, 2003). These effects were not as strong when exposed to less salient foods. It is important to note that not all Restrained Eaters responded equally to each cue, suggesting person variables play an effect on response(s), such as the rules or subgoals a Restrained Eater attempts to follow.

Researchers have also demonstrated the heightened impact of external cues on the cognitive the abilities of Restrained Eaters. The simple presence of an external cue, whether consumed or not, seems to have an impact on the cognitive capabilities of Restrained Eaters. For example, previous researcher has exhibited that Restrained Eaters who are exposed to a hedonic food item in some way (e.g. sight, smell, taste test etc.)
performed significantly worse on a number of simple task, such a crossword puzzle, catching spelling mistakes in a document, and simple addition problems (Pliner & Cappell, 1974; Herman et al., 1978). These findings suggest that the cognitive act of restraint and pre-occupation with their health goal coupled with the stress of an external cue significantly impact the Restrained Eater’s ability to concentrate on tasks presented to them.

Like external cues, cognitive triggers also cause unique responses among Restrained Eaters that result in physical and cognitive responses. Cognitive triggers covers a broad range of topics such as subconscious or conscious primes focusing on weight, eating, food, dieting, and other diet-related domains as well as negative affect. Stroebe and colleagues (2008) tested how easily the goal of weight control/reduction could be suppressed and incited among Restrained Eaters using food related words as a cognitive trigger. In a lab study, they asked participants to decide as quickly as possible whether words flashing on a computer screen were words or non-words. Participants assigned to the control were only shown neutral, nonfood words. Participants in the prime condition were shown words associated with food and eating enjoyment. They found that the simple act of being exposed to the prime significantly increased the reaction time for Restrained Eaters compared to Restrained Eater in the no control condition. There were no significant differences in reaction time between Unrestrained Eaters in the prime versus no prime condition. Researchers have also demonstrated that Restrained Eaters perform worse on the Stroop color-naming cognitive task when food and weight related words were used (Mahamedi & Heatherton, 1993; Ogden & Greville, 1993). These findings suggest Restrained Eaters are more concerned and cognitively aware with
concepts associated with food and dieting and that the effects can manifest themselves in either performance augmenting or hampering ways.

Research has also demonstrated how cognitive triggers manifest themselves as physical reactions among Restrained Eaters. Work by Papies, Stroebe and Aarts (2008) tested how different cognitive primes affected the feelings of hunger and food choices among Restrained Eaters. At the very beginning of the study, Papies and colleagues told participants they would be compensated for their participation with a gift of their choosing: an apple or a candy bar. This information was the cognitive trigger for Restrained Eaters; the hypothesis being that Restrained Eaters would automatically become cognitively preoccupied with this decision. Participants were randomly assigned to a no prime or prime condition. In the prime condition, participants were exposed to exercise and diet-related magazines and diet-related television ads and were asked to rate how much they liked or did not like each magazine/ad. No prime condition participants were also asked to rate each magazine/ad but the content of the magazines and ads were non-diet and non-exercise related. After completing the task, participants chose their compensation and were then asked how hungry they felt. Papies and colleagues (2008) found that Restrained Eaters exposed to the diet-related primes choose an apple over a candy bar as a parting gift from the study whereas Restrained Eaters who were not primed chose to take the candy bar. They also found a main effect of priming on hunger, such that Restrained Eaters in the no prime condition reported being significantly hungrier than their primed peers, an example of a heightened response. Unrestrained Eaters showed no difference in choice or hunger levels between prime and no prime conditions.
The impact of negative affect on food consumption has been demonstrated extensively in laboratory studies (Heatherton, Striepe, & Wittenberg, 1998; Heatherton, Herman, & Polivy, 1991, 1992; Schotte, Cools, & McNally, 1990; Frost, Goolkasian, Ely, & Blanchard, 1982). These experiments typically compared the eating behavior of Restrained and normal eaters under negative mood induction (such as task failure, threat of shock, interpersonal rejection) compared to eating without mood induction or with positive mood induction. Most of these experiments resulted in increasing eating among Restrained Eaters under negative mood inductions (Cools et al., 1992; Heatherton, Herman, & Polivy, 1991; Tanofsky-Kraff et al., 2000; Wallis & Hetherington, 2004). However, while some studies/conditions did not find significant differences in consumption in all, none of them found a reduction in consumption (Eldredge, 1993; Heatherton, Herman, & Polivy, 1991; Ridgway & Jefferey, 1998; Rotenberg & Flood, 1999; Oliver et al., 2000; Sheppard-Sawyer et al., 2000). The connection between emotional distress and its negative impact on self-control is likely explained by the impact on self-awareness and attention. Specifically, negative affect reduces self-awareness and limits attention to the immediate environment and decision. In the absence of self-awareness, the immediate desire of enjoying the hedonic food overpowers any long-term goals.

In the section above, we discussed previous research on environmental and cognitive triggers and their effects on the decisions and behaviors of Restrained Eaters. There is considerable research suggesting Restrained Eaters respond uniquely, and often involuntarily, to a variety of different external and cognitive cues. The reaction to these triggers can be physical, cognitive or both. These triggers activate a series of reactions
and behaviors that ultimately perpetuate a cycle of restraint-disinhibition and can cause health goal failure. The following section explores the casual link between the reactions to triggers and disinhibition as well as existing behavioral interventions aimed at influencing the decisions of Restrained Eaters.

*Heightened Response: Physical and Cognitive Triggers & Disinhibition*

When Restrained Eaters are faced with triggers, they often have a heightened cognitive and/or physical response, which then leads them to a period of disinhibited eating. Disinhibition occurs because the psychological restraint of Restrained Eaters is temporarily relaxed or interrupted and they then binge and consume food well past the point of satiation (Herman & Polivy, 1980; Ruderman, 1986). As mentioned, disinhibition is especially common among Restrained Eaters who hold an all-or-nothing view of dieting. If they fail to be “all”, they consider their diet to be a failure and go to “nothing,” i.e., and are disinhibited in their eating for the foreseeable future, normally until the following day (Polivy & Herman, 1985; Knight & Boland, 1989; Cools et al., 1992). In many ways, disinhibition is psychologically damaging because these individuals are faced with consistent goal failure (Bublitz, Peracchio & Block, 2010). It is also considered to be physically damaging because it is thought to be the primary reason Restrained Eaters fail to lose weight (Polivy & Herman, 1985; Polivy, 1996; Bublitz, Peracchio & Block, 2010). However, the restraint-disinhibition cycle (Figure 1) may be stopped through the use of behavioral interventions aimed at the “Reaction to Triggers” phase of the model. Because it is difficult to control exposure to tempting external cues (e.g. television commercials, Subway intentionally blowing the smell of bread outside of its stores) and cognitive cues (e.g. advertising), we believe designing interventions aimed
at lowering their heightened sensitivity to cues, which will then change their heightened reactions, may be the best way to prevent Restrained Eaters from reaching disinhibition and perpetuating this damaging cycle.

There are many studies that demonstrate the plasticity of Restrained Eaters’ decision making. Some researchers hypothesize the mechanisms underlying their behavior come from a set of conflicting goals. This goal-conflicting model posits that Restrained Eaters have two ongoing, opposing goals with regard to food: a hedonic goal of enjoying tasty food and a long-term goal of weight control/reduction (Papies, Stroebe, & Aarts, 2008; Stroebe, Mensink, Aarts, Schut, & Kruglanski, 2008). When Restrained Eaters are externally or cognitively exposed to unhealthy food items during the trigger phase, the hedonic goal of eating palatable food is activated and the long-term dieting goal is suppressed. However, as easily as a Restrained Eater can temporarily suppress their long-term dieting goal, it can be just as easily evoked using behavioral interventions to combat negative reactions to various triggers. Studies have found that a single decision and sometimes multiple decisions made by a Restrained Eaters can be influenced through the use of several different behavioral intervention devices. Some of these tactics and devices are discussed below.

Priming has been widely used to influence the decision of Restrained Eaters, as discussed above. While priming is often used to negatively impact the behavior, it can also be used to for good. Priming is largely dependent on goal reminders to reach a desired behavior. In a field study, Papies and Hamstra (in press) tested the effectiveness of a diet prime (i.e. poster advertising diet recipes) in a grocery store that was giving out free samples of chicken and chocolate. The environmental trigger was the smell of grilled
chicken. Researchers observed the number of meat samples and chocolate samples consumed by shoppers in the market. After completing the shopping trip, participants were asked to answer the Revised Restraint Scale. Half of the participants entered the store when a diet recipe poster was hanging in the entrance and the other half entered with no poster. Papies and Hamstra (in press) found that Restrained Eaters in the no poster control condition ate significantly more meat samples and chocolate samples than Restrained Eaters in the diet prime poster condition. Restrained Eaters in the control condition were significantly more likely to eat the meat samples as a reaction to the trigger and then go on to eat more chocolate samples, implying some level of disinhibition. Of the Restrained Eaters in the poster condition who ate the meat sample, very few went on to try the chocolate sample, suggesting that the external cue still had an effect on behavior but that the prime posters kept their dietary goal salient enough to eliminate the temptation to eat the chocolate. Even after controlling for time spent shopping in store, this difference was still significant.

Restrained Eaters have also shown resolve to maintain their goals in the face of triggers when using commitment devices. Whereas priming is largely dependent on goal reminders in order to reach a desired behavior, commitment devices use goal reminders as a means to practice self-regulation (Milkman, Rogers & Bazerman, 2008). Commitment devices are voluntarily imposed restrictions in situations of goal conflict that attempt to prevent an anticipated heightened response to a tempting goal to enforce another goal considered more desirable in a “cold” state. This voluntary behavior implies the individual is aware that their future selves cannot be trusted to follow through with goal attaining behavior and have been effective at changing food decisions (Rogers,
Milkman & Volpp, 2014). For example, Bryan, Karlan and Nelson (2010) found that participants who committed to writing a grocery list before going grocery store shopping in store (a place with many triggers) or online bought fewer unhealthy items on impulse than participants who did not commit to using a grocery list. Adding self-imposed penalties to a commitment also works to influence behavior. Trope and Fishbach (2000) tested the effectiveness of cash penalties on avoiding sugary foods. They found participants who were on a diet and who were less confident in their ability to avoid sugary foods self-imposed higher costs on their potential failure. Dieters were more likely to adhere to this commitment over a longer period of time as the penalty increased, implying they made multiple goal consistent choices when facing trigger cues (Trope & Fishbach, 2000). The control group, participants facing no cash penalties, failed to avoid sugary foods.

Another form of commitment device focuses on implementation intentions, which refers to the intention to perform a pre-determined plan when in a goal-threatening situation (Gollwitzer, 1993, 1999). In the restraint-disinhibition model, goal-threatening situations are the heightened sensitivity phase. Implementation intentions are in the form of if-then statements where the if component focuses on under what circumstances a goal attainment wants to be pursued and the then component focuses on how a goal will be maintained. If-then statements have been found to help people close the gap between setting goals and actually reaching these goals. In a lab experiment, Achtziger, Gollwitzer and Sheeran (2008) found dieters who formed if-then plans before being presented with hedonic food items achieved their goal of resisting eating the food as opposed to dieters
and nondieters who did not form if-then plans (e.g. “If I see a piece of chocolate cake then I will eat an apple.”).

Interestingly, if-then plans appeared to be as effective when the if-part is focused on motivational cues (e.g. why) rather than situational (e.g. when/where) (Adriaanse, de Ridder, & de Wit, 2009). In other words, the focus of the if-statement changes from a time and place in which the person may face a challenge to more of a general feeling (e.g. “If I am bored”) that can also lead to poor decisions. A general feeling, like boredom, can also be thought of as a cognitive trigger in the behavioral model. Adriaanse and colleagues found that dieters who used motivational cues consumed significantly more fruits and vegetables over the course of a week than those assigned to situational cues or no cues at all. Unsurprisingly, this effect became even greater when dieters chose their own motivational cue. Commitment devices have demonstrated their effectiveness at influencing behavior so long as the individual agrees to a commitment and has a high intention of goal pursuit (Gollwitzer, 1993, 1999; Orbell, Hodgkins, & Sheeran, 1997; Sheeran & Orbell, 1999; Gollwitzer & Sheeran, 2006; Achtziger, Gollwitzer & Sheeran, 2008; Adriaanse, de Ridder, & de Wit, 2009). Commitment devices have demonstrated how the decisions of Restrained Eaters can be influenced and how effective a tool can be over a long period of time, even when an individual is aware their behavior is trying to be changed.

Restrained Eaters who voluntarily deprive themselves and then succumb to disinhibition appear to suffer both psychologically, as a result of goal failure, and physically, as a result of weight gain. The ability of external and cognitive cues to lead to increased food intake among Restrained Eaters has been extensively investigated (Legoff
& Spigelman, 1987; Jansen & van den Hout, 1991; Nederkoorn, Smulders, Havermans, & Jansen, 2004; Nederkoorn, Smulders, & Jansen, 2000; Van Strien & Ouwens, 2003; Burton, Smit, & Lightowler, 2007). This is especially troublesome given that our environment is awash with food advertisements aimed at getting people to find these items difficult to resist. However, research suggests a Restrained Eater’s self-regulation and motivation may be aided using behavioral interventions aimed at minimizing a their reactions to environmental and cognitive triggers and, therefore, prevent disinhibition (Fedoroff, Polivy & Herman, 1997, 2003; Papies, Stroebe & Aarts, 2008; Stroebe et al, 2008; Papies & Hamstra, in press).

Like the findings presented in this dissertation, many of the studies presented above focused on changing a single food related behavior among Restrained Eaters. Some studies also demonstrated how the single behavior lead to other, similar goal oriented behaviors. Although an overarching goal of eating healthy is comprised of many decisions made throughout the course of a day, month and year, research has demonstrated that the effect of one healthy decision has a potentially (and exponentially) positive effect on food related decisions made thereafter (Trope & Fishbach, 2000; Burton, Smit, & Lightowler, 2007; Adriaanse, de Ridder, & de Wit, 2009; Papies & Hamstra, in press). An important point to make is that restraint, in moderation, is a healthy behavior to exercise because people lead a healthy lifestyle and habits and still enjoying occasional treats. The goal of this research is not to eliminate the practice of restraint but rather to determine tools that will aid in the restraint of certain food Restrained Eaters are trying to avoid and to decrease disinhibition.

**Selection of Revised Restraint Scale**
When deciding which scale to use to classify our participants as chronic dieters or nonchronic dieters, we considered three different scales: Three Factor Eating Questionnaire (TFEQ) (Stunkard & Messick, 1985), Dutch Eating Behavior Questionnaire (DEBQ) (Van Strien et al., 1986), and Revised Restraint Scale (RRS) (Polivy, Herman, & Howard, 1988). We were solely interested in scales that measured restraint since disinhibition was a direct result of restraint.

Three Factor Eating Questionnaire (TFEQ) (Stunkard & Messick, 1985) and Dutch Eating Behavior Questionnaire (DEBQ) (Van Strien et al., 1986) have been used to measure restraint. TFEQ is a 51-item questionnaire with three factors (Cognitive Restraint, Disinhibition, and Hunger) and distinguishes between dieters and “free eaters.” TFEQ itself has an issue of construct validity regarding the factor Hunger, which repeatedly appears to be unrelated or negatively correlated with the other two factors. It is expected that Hunger be positively correlated with Disinhibition since feelings of hunger are highly predictive of disinhibition (Rollins et al., 2014). The predictive validity of TFEQ has also been called into question. TFEQ has failed to replicate well-documented and consistent findings between restraint and emotionally disinhibited eating. The behavior of restrained subjects, resulting in excessive overeating, has been found to be significantly different from that of unrestrained subjects following depression or anxiety manipulations (Baucom and Aiken, 1981; Frost, Goolkasian, Ely & Blanchard, 1982; Ruderman, 1985). However, participants who rated high in TFEQ Cognitive Restraint were no more likely to be in a dysphoric than nondysphoric state before overeating. This is contrary to well-established findings (Ferriday & Brunstorm, 2011).
Like TFEQ, DEBQ is derived from a factor analysis developed to gain information about three factors: extent of emotional, external, and restrained eating. High scores on DEBQ signify restraint and eating less food, though the latter is a self-reported measure of eating and not in terms of actual eating behavior. DEBQ, like TFEQ, aims to connect three independent aspects and styles of eating rather than a unitary construct of restraint as RRS does (discussed further below). In other words, both TFEQ and DEBQ measure restraint by measuring food restrictions rather than measuring restraint as a range of behaviors such as disinhibition and guilt after excessive eating. This discrepancy between measurement strategies likely accounts for the difference of findings obtained across the three scales (Cooper & Bowskill, 1986; Wardle, 1986).

The Revised Restraint Scale (RRS) was developed using the original Restraint Scale (Herman & Mack, 1975). The original Restraint Scale differed only slight from the RRS in that the respondents’ body mass index was used to categorize them as Restrained or Unrestrained Eaters. Polivy, Herman, & Howard (1988), who developed the RRS, felt the inclusion of respondents’ body mass index should not a determining factor in calculating levels of restraint nor was it an appropriate predictor. We chose to use RRS as opposed to the other scales discussed in this section for several reasons. First, we are interested in individuals who have a goal of losing weight rather than being interested in individuals who should be losing weight. There are a number of individuals who are overweight but are not trying to change their eating habits or lose weight. When classifying individuals as Restrained or Unrestrained Eaters, the RRS does not take their weight or weight above their biological set point into account. Second, RRS does not categorize individuals based solely on restraint behavior. Heatherton at al. (1988) argue
that a dieter who is only restrained in behavior is, in fact, not representative of Restrained Eaters because they do not intermittently break dietary goals. The intention of the scale is to capture individuals who both exhibit periods of restraint and disinhibition. Third, RRS, only categorizes Restrained Eaters when they exhibit both weight fluctuations and concern for dieting. Some researchers (Drewnowski, Riskey & Desor, 1982; Ruderman, 1986) claimed that obese individuals would score high on the RRS even if they did not engage in chronic dieting due to their tendency for greater weight fluctuations for reasons of physiology. However, Lowe (1984) found that the correlation between concern for dieting and overweight individuals ($r=.43$) was significantly higher than the correlation between weight fluctuation and overweight individuals ($r=.14$) due to method variance. Furthermore, Lowe (1984) found the effect of weight fluctuation factor disappeared when concern for dieting was included as a partial correlate. While RRS may inadvertently score overweight individuals as higher on the RRS due to weight fluctuations, the concern for dieting factor only captures those who are interested in dieting and their weight thereby lowering the overall score.

While all three measures have their own strengths and weaknesses, we chose to utilize the RRS because we were exclusively interested in individuals who display over concern with their weight and then chronically diet to control it. We felt as though those exhibiting these behavioral characteristics represent a majority of individuals in this country who are spending money on weight loss products and programs, yet rarely feel as though they have achieved their weight loss or health goals. Over the years, countless researchers have stressed how difficult the task of dieting and weight loss can be, especially for those who do not have easy access to factors that aid in weight loss (e.g.
exercise, unprocessed foods, etc.), and that the accumulation of dieting failures can lead to more serious eating disorders (Polivy & Herman, 1983; Grief & Miranda, 2010; Neumark-Sztainer et al, 2012; Lowe et al, 2013).

While we recognize that the problem of weight loss and weight control is not attributed to a single factor, behavioral interventions have shown to be effective at getting people to choose healthier options, especially at the very moment of decision and temptation (Wansink, 2004; Wansink & van Ittersum, 2007). To better understand Restrained Eaters’ thought processes and the effectiveness of our behavioral interventions, we turn to Query Theory (Johnson et al., 2007; Weber et al., 2007) and Regulatory Focus Theory (Higgins, 1997) because both theories have been widely used to change the decision of individuals in a variety of choice scenarios, but less so in food choices. The two theories have also never applied to the same choice, as they are in this body of research. The following studies extend the recent thinking in the field of decision-making, motivation science and behavioral economics to Restrained Eaters, specifically, testing the relative usefulness of Query Theory and Regulatory Focus Theory to understand the cognitive processes behind and susceptibility to behavior change of Restrained Eaters.

**Query Theory**

The field of judgment and decision making research has firmly established that the decision maker is rarely rational in the sense that their preferences are consistent and transitive across situations. Psychologists have found that people’s preferences are often constructed in the immediate context of decision making and are sensitive in the way in
which a choice is described or “framed” (Payne, Bettman, & Johnson, 1992; Slovic, 1995; Lichtenstein & Slovic, 2006). Construction of preferences often occurs in the moment because decision settings are complex, involving many alternatives, with uncertain outcomes and multiple goals that get differentially activated by the decision setting and context. Simon (1956) argued that decision makers are only *boundedly* rational, meaning they attempt to attain some level of satisfaction with every decision. Decision makers also have to make a wide range of simple and complex decisions with finite attention and processing capacity, often adaptively employing decision heuristics or shortcuts to do so (Payne, Bettman & Johnson, 1992).

Weber and Johnson set out to explain a wide range of disparate ways in which judgments and choices deviate from normative models. These deviations are accounted for by some existing models such as endowment effect and attribute framing (Johnson et al., 2007; Weber et al., 2007; Weber & Johnson, 2009). In the area of multi-attribute choice, a range of simpler choice rules have been used, which assumes that people choose the option that maximizes utility across all outcomes weighted by subjective importance (Payne, Bettman & Johnson, 1993; Lovallo & Kahneman, 2000; Loewenstein et al, 2001). But even when explanations for such phenomena exist, Weber and Johnson (2011) argue that the functional relationships described by these behavioral decision-making models deserve to be derived from basic psychological processes that examine attention, information searches, and information integration. The result of their cognitive-process modeling effort, Query Theory, posits that preferences are constructed by serially querying evidence for different choice options and that decisions depend on the order of queries issued and resulting thoughts listed.
Query Theory is based on three premises. The first assumption is that the decision maker serially queries arguments for different choice options. For example, a seller of a good would first consider reasons for keeping the good before considering the advantages of selling the good. These queries occur serially, one after the other, automatically and unbeknownst to the decider. Second, the first choice option considered has a large advantage because arguments for other options are temporarily inhibited as response competitors. This makes the question of which choice option attracts initial attention very important. The third premise states that features of the choice context or environment determine query order. One important example of this is whether one option is a default (e.g., the choice option which maintains a participant’s status quo), which tends to be considered first and, therefore, has a higher likelihood of being chosen (Kahneman & Miller, 1986; Johnson et al., 2007; Weber et al., 2007; Weber & Johnson, 2011). To the extent that these behavioral theories of choice are causal psychological process models, Query Theory provides an entry point for the design of choice environments that can contribute to the modification of choice patterns and decisions through the process of serial querying. In 2007, Johnson and colleagues tested support for the query-based account of decision making. In a series of experiments, they demonstrated that thoughts listed by participants’ play a significant role in predicting choice. In the following paragraphs, I explain two of their experiments, which play a major role in all five studies of this dissertation.

In Experiment 1, Johnson and colleagues wanted to demonstrate that thoughts listed by participants were clustered in the way Query Theory predicts, that order of the clustered predicted the frequency of thoughts that favored selling or not selling and that
the order and frequency of thoughts listed predicted the price of a mug. All participants were randomly assigned to a “seller” condition or “choosing” condition. Sellers were given a mug and told they could keep the mug or sell it back to the experimenter for a certain amount of money whereas choosers were told they could receive the mug or receive some amount of money. Before revealing their decision, all participants were asked to list the reasons they were considering in making their decision. Keeping the mug was considered the sellers’ default state since they owned the mug, which automatically focused them on the good they could potentially give up. In other words, by virtue of being given the mug, sellers did not want to lose it. Since choosers do not own the mug but their money, they pay increased attention to the amount of money that is about to be lost. This difference in default condition and thus preference is referred to as the endowment effect (Kahneman, Knetsch, & Thaler, 1990, 1991; Kahneman & Tversky, 2000). The endowment effect is a behavioral economics phenomenon that suggests that the value of an object depends in part on ownership. People value an object more if they own it than if someone else owns it. The endowment effect posits that endowed participants (i.e. sellers) are more likely to keep the original item than unendowed participants (i.e. choosers) because endowed participants value the item more because they own it. I discuss this paradigm more in detail below.

Johnson et al (2007) hypothesized the endowment state of participants would predict thoughts listed and those would predict the price of the mug. Indeed, Johnson and colleagues found that reasons listed differed between sellers and choosers because of their differing defaults. As predicted by Query Theory, sellers listed more advantages for keeping the mug and earlier on in their listing. Choosers listed more disadvantages for
keeping the mug (i.e. more positive thoughts about the money) and listed these thoughts first. Thought listed predicted the valuation of the mug, where sellers priced the mug at a significantly higher value than sellers. Furthermore, more sellers chose to keep the mug rather than receive money. Johnson and colleagues (2007) used Experiment 1 to determine the “natural” order of thoughts produced by sellers and choosers.

In Experiment 2, Johnson et al. (2007) further tested the causal role of a query-based account of decision making by manipulating the order of queries listed by participants. The goal of the study was to see whether manipulating the order of queries would influence the reasons listed by participants, the decision of participants and eliminate the endowment effect. Once again, participants were randomly assigned to a seller or chooser condition and asked to choose between receiving a mug or money. As done so in Experiment 1 (Johnson et al., 2007), one group of sellers and choosers were asked to list the reasons they were considering in making their decision (unguided condition). Another group of sellers and choosers were also asked to list reasons considered in making their decision but they were instructed to begin by listing reasons in the reverse order (reverse order condition). Put another way, Johnson et al. (2007) demonstrated that sellers and choosers consistently list more advantages or disadvantages depending on their default condition. By instructing participants to reverse order their thoughts, they were being asked to list reasons against their default. Sellers were asked to list disadvantages for keeping the mug and choosers were asked to list advantages for keeping the mug.

Johnson and colleagues found the results of Experiment 1 replicated in Experiment 2 in the unguided condition (also know as the natural order condition).
However, in the reverse order condition, they found no significant difference in price for sellers versus chooser. By altering the order of thoughts, they were successful in completely eliminating the endowment effect. They also found the number of advantageous and disadvantageous thoughts affected the price of the mug such that a greater number of advantageous thoughts had a positive affect on the price and a greater number of disadvantageous thoughts had a negative affect on the price. In the reverse order condition, choosers listed more advantages and therefore valued the mug more than sellers. Johnson and colleagues (2007) further demonstrated that preferences are not fixed and that a simple change to how individuals consider a decision can have a significant effect on their decision. We believed these finding and the results of Majd, Conley and Weber (2017) presented a unique opportunity to further test Query Theory’s impact on a food decision using a thought reversal technique.

Although Query Theory has been used to explain a wide range of decision-making scenarios, including the influence of choice option labels on environmental decisions (Hardisty, Johnson & Weber, 2009), choice defaults (Dinner et al., 2011), risky decisions (Crookes, Wall, Johnson & Weber, 2017) and intertemporal decisions (Weber et al., 2007; Appelt, Hardisty & Weber, 2011), Studies 1 and 2 of this dissertation are the first to propose Query Theory as an intervention for healthy eating choices.

In Study 1, we tested the prospect of Query Theory as a tool to help chronic dieters make healthier decisions when faced with tempting food items by understanding their natural query order (Majd, Conley & Weber, 2017). The objective of the study was to see whether Restrained Eaters behaved differently than Unrestrained Eaters in our behavioral paradigm. In Study 2, we tested the efficacy of Query Theory thought
reversals in the context of endowment to increase healthy eating behavior among
Restrained Eaters (Majd, Conley & Weber, in preparation). We tested whether
manipulating the order of thoughts would eliminate the usual robust findings associated
with the endowment effect and change participants’ decision to take or not take a hedonic
food item, an ice cream sandwich.

**Regulatory Focus Theory**

The hedonic principle, the principle that humans and other animals approach
pleasure and avoid pain, has served as the basis for important theories across a wide
range of disciplines from political theory (Neumann & Morgenstern, 2007) to behavioral
economics (Simon, 1955). The assumption that humans and other animals approach
desired end-states and avoid undesired end-states has been treated as the essential source
from which all other forms of motivation must flow. In fact to this day, this premise
remains as the cornerstone of motivation science and research. A major theoretical
contribution to the field of motivation science came from the development of Regulatory
Focus Theory (Higgins, 1997). Higgins (1997) developed Regulatory Focus Theory in
order to explain the underlying principles that operate approach-pleasure and avoid-pain
behaviors.

Higgins (1997) distinguished between two independent goal orientations:
promotion and prevention. The promotion orientation is concerned with hopes and
aspirations (i.e., a focus on approaching gains and avoiding non-gains). On the other
hand, the prevention orientation is concerned with duties and responsibilities (i.e., a focus
on avoiding losses, and approaching non-losses) (Higgins, 1997). Traditional hedonic
logic recognizes that seeking pleasure and avoiding pain are generally important to
individual actors, but Regulatory Focus Theory posits that the distinct promotion versus prevention orientations towards those concerns separately motivates goal-directed behavior. Research suggests that individuals can pursue (approach) the same desired end-state, or goal, with either a promotion focus or a prevention focus, and different strategic means are preferred. For example, a student in the promotion state studying for a test will approach gains and will study *eagerly* to ensure advances, whereas a student in the prevention state will approach non-losses and will study *vigilantly* to ensure against making mistakes (Higgins, 2002).

Specific to the realm of weight loss, the two motivational orientations have been shown to be uniquely associated with people’s ability to initiate and maintain changes, particularly with proximity to goal as a moderator (Foster et al., 1997; Finch et al., 2005; Fuglestad et al., 2008, 2015). Fuglestad and colleagues (2008) found that obese participants who were high in promotion focus and far from their acceptable weight goal (~30 pounds away) were more successful in maintaining weight loss than those low in promotion focus. Prevention focus had no effect on weight loss maintenance when goals were far. On the other hand, for those close to their acceptable weight goal (~1 pound away), only a higher prevention focus predicted maintaining weight loss. In another study, Fuglestad and colleagues (2015) replicated their 2008 findings using a sample of participants with the goal of weight loss maintenance over a 2-year period. Researchers tracked both total amount of weight lost and distance from goal weight in pounds (the same distance used in their previous study). Once more, they found that high promotion participants far from their goal weight not only gained less weight during the duration of the experiment but also had a higher probability of reaching their total weight loss. They
also found that people close to their weight loss goals who were more prevention focus had higher estimates of maintenance rates than those who were low prevention. These findings suggest that promotion focus is better at initiating and sustaining successful weight loss over a long period of time (i.e. when goals are distant) and that prevention focus is better at maintaining lost weight for short periods of time (i.e. when goals are closer).

Interestingly, the relationship between focus and proximity to goals remains true even when using time, such as minutes, as the measure of distance from goal instead of pounds. A number of studies have found that exposure to some items, such a food, can trigger a particular focus (Shah & Kruglanski, 2003; Zhou & Pham, 2004). Sengupta and Zhou (2007) were particularly interested in how impulsive individuals responded to a hedonic snack (i.e., a piece of chocolate cake). Impulsive behavior is defined as the tendency to plan insufficiently, think, and control. Generally, impulsivity results in an inaccurate or maladaptive response (Solanto et al., 2001). It is clear to see the common traits between impulsive individuals and Restrained Eaters when facing food related triggers. Solanto et al. (2001) hypothesized that impulsive individuals place a disproportionate focus on the positive aspects of instant gratification and, therefore, would develop a promotion focus on exposure to a piece of chocolate cake (Sengupta & Zhou, 2007). They found that by simply exposing impulsive participants to the chocolate cake, they were involuntarily induced into a promotion state and chose to take the cake over an alternative, healthy option. In a follow-up study, Sengupta and Zhou (2007) were able to successfully change the decision of impulsive participants to choosing the healthy alternative by using a prevention induction. These study demonstrate that prevention can
be best at reaching health goals when goals are more proximal in time and weight, but not necessarily when a goal is distant.

Although Sengupta and Zhou’s study focuses on impulsive individuals, we believe the same assumptions may be able to be made about Restrained Eaters. We turn to Query Theory to help understand how regulatory focus causes change in people’s behaviors, particularly Restrained Eaters. Query Theory offers a unique opportunity in understanding the reasons considered by individuals as a decision is being made. We hypothesize that if individuals are of a certain focus then the thoughts produced during the thought list task will echo their current focus. In Study 3, we use Query Theory to test whether the thoughts produced during the decision making process are of a particular focus orientation, specifically promotion. In Study 4, we test whether the focus orientation of thoughts changes as a result of instruction to change the order in which participants lists positive and negative reasons. Finally, in Study 5, we test whether differing regulatory focus inductions lead to thoughts of the same focus induction and whether focus orientation predicts decision. In Study 3, 4 and 5, we test whether focus predicts a decision to take or not take a hedonic snack. These studies further test the feasibility of Regulatory Focus Theory as an intervention tool using a novel and perceptive approach to decision making.

**Endowment Effect**

Patterned after Johnson et al. (2007), we test the effectiveness of Query Theory and Regulatory Focus Theory as intervention tools using the endowment effect to investigate how Restrained Eaters make decisions about a taboo food item, an ice cream sandwich. As explained above, the endowment effect is a behavioral economics
phenomenon that suggests that the value of an object depends on ownership. People value an object more if *they own it* than if *someone else owns it* (Kahneman & Tversky, 2000). Often, and in this study, ownership is determined by how a participant is presented with an item. Participant’s feel they own a product (i.e. they are endowed with a product) when they are first given an item and then, later on in the study, given the option to trade the item for something else. Participant’s feel someone else owns a product (i.e. they are unendowed with a product) when they are simultaneously given the item and offered to trade the item for something else. The endowment effect posits that endowed participants are more likely to keep the original item than unendowed participants because endowed participants value the item more because they feel as though it is theirs. In this behavioral paradigm, items can be traded for any number of things. In our studies, we give participants the opportunity to keep an ice cream sandwich (i.e. hedonic snack) or take time off their participation in a following study.

We chose an ice cream sandwich because we wanted to make sure the decision makers were making an actual choice about a food for themselves. The fleeting nature of possessing ice cream without a way to freeze it makes taking that product a strong indicator of intent for personal consumption. In Study 1-4, we chose time as an alternative currency because college students frequently feel pressed for time and would value the extra time. In Study 5, which tested regulatory focus inductions, we chose a dollar bill as an alternative because money can be considered more fungible than time.

Regulatory Focus Theory has previously examined the interaction of endowment and regulatory focus (Monga & Zhu, 2005; Appelt et al., 2009). Monga and Zhu (2005) demonstrated that when faced with a monetary transaction, buyers (i.e. unendowed) are
prevention oriented and sellers (i.e. endowed) are promotion oriented. Appelt et al. (2009) further explored this finding by challenging the Monga and Zhu’s assumption that buyers and sellers have predominant prevention and promotion focus personalities, respectively. Rather, Appelt et al. (2009) hypothesized that it was more a matter of chronic focus fit with buyer or seller roles rather than assignment to endowment. They hypothesized that buyers who were more prevention focus would experience a better fit in their role as a buyer than those who were more promotion focused. They also hypothesized that sellers who were more promotion focus would experience a better fit in their role as a seller than sellers who were more prevention focused. Appelt et al.’s (2009) findings supported their hypotheses: buyers, who were more prevention focused, experienced a better fit in their role as a buyer. Sellers, who were more promotion focused, also experienced a better fit in their role as a sellers. In this dissertation, I add to the existing literature on endowment and Regulatory Focus Theory by testing previous findings about the relationship between endowment condition and focus. I use a novel to approach to test these previous findings by using thoughts listed by participants during the decision process. I base hypotheses for Study 3, 4, and 5 on the previous findings of Study 1, 2 and Monga & Zhu (2005).

These studies are the first to test Query Theory and Regulatory Focus as tools to assist Restrained Eaters. We intend to investigate whether Query Theory and Regulatory Focus Theory can predict participant’s decisions and, subsequently, be used as interventions to alter decisions. Both Query Theory and Regulatory Focus have the potential to provide insight into possible short-term or long-term weight control in
chronic dieters. Hypotheses for Study 1 and 2 were based on previous research using
Query Theory and the endowment effect. Hypotheses for Study 3, 4 and 5 are exploratory
and are based on data and research findings from Studies 1 and 2. In all these studies,
Unrestrained Eaters were considered the control group because external cues have less of
an effect on decisions than Restrained Eaters. Because Restrained Eaters are particularly
susceptible to food cues, which lead to overconsumption, we hypothesized Restrained
Eaters in Study 1 would be hyper attracted to a hedonic snack but that the behavioral
interventions in Study 2 would significantly reduce the effect of external cue on
behavioral self-regulation.

Chapter 1
Study 1: Evidence of Query Theory as a Tool to Assist Restrained Eaters

Majd, Conley and Weber (2017) conducted Study 1 testing whether the decisions
of Restrained Eaters were systematically different from Unrestrained Eaters due to the
effects of external cues on Restrained Eaters when randomly assigned to an endowment
condition. The first product offered, the control product, was a small bottle of shampoo.
The second product, the test product, was an ice cream sandwich. We chose an ice cream
sandwich to test in this study, and all other studies, because it is more difficult to store
and transfer it than other snacks (e.g. a cookie). The fleeting nature of possessing ice
cream without a way to freeze it made taking that product a strong indicator of intent for
personal consumption.

By exploring the response of Restrained Eaters to nonfood and food items, this
study extended prior research in two major ways. First, Study 1 aimed to determine if
Restrained Eaters’ actions in this paradigm deviated from normative behavior in different
ways than endowment effect would predict, and whether it does so solely for food items or more generally. Second, it estimated the feasibility of using thought lists as a mechanism-based intervention to overcome threats to self-regulation.

Our study hypotheses were grounded in the assumption that there would be no effect of eater type on decision. We posited that participants assigned to the endowed or unendowed condition would mimic previous Query Theory findings whereby endowed participants chose to keep the product at a higher rate than unendowed participants. Ice cream taking would go against a Restrained Eater’s long term dietary goal but we believe the external cue of having the ice cream in front of them would override any resolve for their long-term health goal. Such findings would establish the rationale for Study 2, which tested the manipulation of participants’ order of thoughts on their choice. We tested for the following 3 hypotheses for both shampoo and ice cream:

**Hypothesis 1a.** There will be a significant main effect of endowment on decision.  
**Hypothesis 1b.** There will be a significant main effect of endowment on the decision of Restrained Eaters.  
**Hypothesis 1c.** There will be a significant main effect of endowment on the decision of Unrestrained Eaters.

**Hypothesis 2a.** There will be a main effect of thought lists (i.e. Structure of Thoughts) generated by participants on product decisions.  
**Hypothesis 2b.** There will be a main effect of thought lists thought lists (i.e. Structure of Thoughts) generated by Restrained Eaters on product decisions.  
**Hypothesis 2c.** There will be a main effect of thought lists thought lists (i.e. Structure of Thoughts) generated by Unrestrained Eaters on product decisions.

**Hypothesis 3a.** There will be a significant, positive interaction of endowment and thought lists for on the product decisions of all participants.  
**Hypothesis 3b.** There will be a significant, positive interaction of endowment and thought lists for on the product decisions of Restrained Eaters.  
**Hypothesis 3c.** There will be a significant, positive interaction of endowment and thought lists for on the product decisions of Unrestrained Eaters.

**Methodology**
**Participants.** A total of 204 participants (85% female, 18-24 years old) completed the study. The majority of participants were female with some college or a bachelor’s degree (72%) and with an average income below $25,000. Age, income, and sex demographics are typical for studies conducted on university campuses. Participants were recruited via email through the Columbia Business School Behavioral Research Lab (BRL) and through the Psychology Department Participant Pool. All experiments were conducted from January to March 2015 after 1pm, to control for time-of-day.

**Study Design and Procedure.** The study was a 2 x 2 mixed design experiment where endowment state was the between variable and products were the within variables (endowed vs. unendowed x shampoo vs. ice cream sandwich). Participants were randomly assigned to an endowment state (endowed or unendowed) and then asked to make a decision about each product, first the shampoo and then the ice cream sandwich. Participants were asked to make a decision between taking the product versus doing a shorter version of the second, distractor study. We chose an ice cream sandwich as the tempting food item because it is more difficult to store and transfer than other snacks. The fleeting nature of possessing ice cream without a way to freeze it makes taking that product a strong indicator of intent for personal consumption.

**Endowment State.** After completing a practice thought-listing task, participants were randomly assigned to an endowed or unendowed condition. Endowment condition remained unchanged throughout the study. Endowed participants were physically presented with the endowed items, a small sample of shampoo and then an ice cream sandwich. Endowed subjects were given each item one at a time. For each item, they were told the item was theirs to keep, but that they had an option of exchanging it for the
shorter follow-up study. Unendowed participants were shown computer images of each product one at a time. Unendowed participants were told they had a choice: keep each product or taking the shorter study. All participants were first given/shown the shampoo and had to complete the Thought Listing and Decision stage followed by the Thought Coding stage before repeating the stages with the ice cream sandwich (Appendix B).

Thought Listing & Decision. After participants were assigned to an endowment condition, they were asked to list their thoughts, both positive and negative, about their decision to keep the product (Appendix C). Participants were instructed to list each thought one by one. After completing the thought list task, all participants were asked to make their decision to keep the product or take a shorter version of the distractor study. Decision made about each product was the dependent variable of interest.

Thought Coding. Next, participants were asked to rate each of the thoughts they had generated as an advantage for taking the product over reducing the length of the second study, disadvantage, or neither (Appendix D). After completing this step for the shampoo, participants completed the same set of tasks for the ice cream sandwich. Participants then moved on to the distractor study.

Revised Restraint Scale. Lastly, after completing the distractor study, all participants filled out the Revised Restraint Scale (Herman & Polivy, 1975; Herman & Polivy, 1980). Based on their responses to the RRS, participants were categorized as Restrained or Unrestrained Eaters.

Measures. Results were analyzed using R Studio version 3.2. Using linear regression, we report the beta coefficients, F-statistic, and p-value with values less than
.05 considered statistically significant. Where appropriate, we tested for differences in means using t-tests. The following 4 measures were used in the analyses.

*Product Decisions.* Participants’ decision to take the product versus reduce the length of the distractor study was the binary dependent variable. Decisions were recorded for each product. Decision was regressed on SOT (see below) using logistic regressions.

*Structure of Thoughts.* Participants categorized each of their thoughts as an advantage, disadvantage, or neither for owning the product during the Thought Coding stage of the study. Using these categories, the thought list of each participant for each decision was given a score. This score is known as the structure of thoughts (SOT) and is a measure of order of thoughts and overall valence of thoughts listed. The structure of thoughts (SOT) was calculated using the same method used in Johnson and colleagues (2007): the standardized and averaged values of the standard median rank difference (SMRD) (i.e. order) and balance of thoughts (BOT) (i.e. valence).

To calculate SMRD, we used the following equation,

\[
\text{SMRD} = 2(MR_D - MR_A)/n.
\]

MR_D was the median rank of disadvantage thoughts, i.e., thoughts against owning the object. MR_A was the median rank of advantage thoughts, i.e., thoughts for owning the object. And n is the total number of thoughts generated by each participant. SMRD scores range from 1 to –1 and is a measure of a participant’s tendency to produce advantageous thoughts before disadvantageous thoughts, and vice versa. Randomly generated thoughts of one kind or the other produce an SMRD of 0. A SMRD of -1 indicates that all disadvantageous thoughts were listed before any advantageous thoughts, and 1 indicates that all advantageous thoughts were listed before any disadvantageous thoughts.
BOT refers to the difference in the number of thoughts coded by the participant as advantages and the number of reasons coded as disadvantages. To calculate BOT, we took a difference of total number of thoughts coded as an advantage and total number of thoughts coded as disadvantage during the Thought Coding stage:

\[ \text{BOT} = \sum(\text{“Advantage” thoughts}) - \sum(\text{“Disadvantage” thoughts}) \]

A positive BOT indicates that more advantages for taking the product than disadvantages. A negative BOT indicates that a participant listed more disadvantages for taking the product than advantages. SMRD and BOT scores were calculated for each subject then standardized into z-scores and averaged to determine each subject’s structure of thoughts.

SOT is a continuous score with both positive and negative values; it captures the order and valence of thoughts generated. A negative SOT indicates that the participant listed disadvantages earlier and listed more disadvantages than advantages. For example, if the first thought about the ice cream sandwich is, “It is just after lunch and so I’m not hungry,” followed by more disadvantageous thoughts than advantageous thoughts, participant’s SOT score will be negative. A positive SOT indicates that the participant listed advantages earlier and listed more advantages than disadvantages. For example, if the first thought is, “It is just after lunch so I would like a dessert,” followed by more advantageous thoughts than disadvantageous thoughts, this participant’s SOT will be positive. SOT was also regressed on endowment to test whether endowment condition caused SOT scores.

*Endowment.* Endowment condition was used in the analysis as a binary treatment to investigate a causal link on both SOT and the decision to take the product.
Gender. Given of the large percentage of female participants in our subject pool, we included sex in the analysis as a covariate. However, controlling for sex, we found no effect of sex on decision or SOT. Therefore, sex is not reported in our results. We discuss some possible reasons why we find no difference by sex in the Discussion section.

Revised Restraint Scale. The RRS was used in the analysis as a covariate. RRS generates 2 factors of eater types: Restrained and Unrestrained Eaters, and is not used as a continuous scale since the original restraint scale was revised. Participants scoring 15 or higher were categorized as Restrained Eaters and those below as Unrestrained Eaters (SE=4.5). There were 102 Restrained Eaters in our sample and 102 Unrestrained Eaters. The RRS had a Cronbach alpha of .85, indicating good internal consistency reliability.

Results

Endowment. There was no significant effect of endowment on the decision to take products, though in the expected direction (42.8% vs. 36.1%, respectively), $\beta = 0.07$, $p = 0.30$ (Hypothesis 1a). However, eater type did predict product decisions. Restrained Eaters were approximately 13.7 percentage points less likely to take any product than Unrestrained Eaters, $\beta = -0.13$, $t(201) = -2.01$, $p < 0.05$.

We ran a multiple regression model to investigate to what extent endowment, as a treatment, and eater type, as a covariate, could predict product decisions. We hypothesized there would be an effect of endowment on Restrained and Unrestrained Eaters such that endowed participants would choose to take products more than their unendowed peers (Hypothesis 1b and 1c). We found a significant, positive interaction of endowment and eater type on decision, $\beta = 0.29$, $t(201) = 2.18$, $p < 0.05$, where Restrained Eaters endowed with a product were 30 percentage points more likely to take
a product than unendowed Restrained Eaters (SE = 0.13). As predicted by Hypothesis 1b, there was a main effect of endowment on the decision of Restrained Eaters such that endowed Restrained Eaters chose to take products more than Restrained Eaters in the unendowed condition. However, there was no effect of endowment for Unrestrained Eaters. Unendowed Unrestrained Eaters were just as likely to take the product as their endowed peers, $p = 0.40$ (Hypothesis 1c).

Figure 2a-b shows an interaction of endowment and eater type for Restrained Eaters and Unrestrained Eater separated by shampoo and ice cream decision. This treatment by covariate interaction on the decision to take each product shows that endowment had a particularly strong effect on Restrained Eaters endowed with the ice cream. In fact, the significant interaction between Restrained Eaters and endowment can be explained by its strong effect within the ice cream condition, $\beta = .56$, SE = .18, $t(98) = 3.05$, $p < 0.01$ (Figure 2b). In Figure 2b, we also see that unendowed Unrestrained Eaters took the ice cream more so than any other group. This unexpected finding may be explained by Unrestrained Eaters’ indifference towards external cues. In other words, when presented with the opportunity to have an ice cream sandwich, Unrestrained Eaters were unmoved by the alternative choice of more time and chose the ice cream. The difference in endowment did not seem to lead to any departure from what they would normally do. One reason for this is that Unrestrained Eaters do not attach food decisions to moral judgment. Unlike Restrained Eaters, they do not think they are doing anything “wrong” when they eat something that might not be the best for them. Unrestrained Eaters likely make healthful choices most of the time because that is what feels best to
their bodies, and thus what they actually want. Therefore, they are not sent into an uncontrollable frenzy when they do have an ice cream sandwich.

Neither Restrained nor Unrestrained Eaters endowed with shampoo took the shampoo at a significantly higher rate than their unendowed peers, $p = 0.89$ (Figure 2a), but when presented specifically with ice cream, they did.

![Fig. 2a](image)

**Fig. 2a.** Percent of Restrained and Unrestrained Eaters taking the shampoo by endowment condition. The rate at which participants took the shampoo were not significantly different between endowment conditions, $p = .89$. Bars denote ±1 SEM.
Fig. 2b. Percent of Restrained and Unrestrained Eaters taking the ice cream by endowment condition. This significant, positive interaction shows endowment had a particularly strong effect on Restrained Eaters endowed with the ice cream, $\beta = .56$, SE = .18, $p < .01$. Bars denote ±1 SEM.

**Order, Content & Structure of Thoughts.** Query Theory posits that endowed participants will begin by listing thoughts for keeping the product before listing reasons against keeping the product (i.e. SMRD measure) and that more positive thought will be listed than negative thoughts (i.e. BOT measure), therefore a positive SOT score. Query Theory predicts the opposite for unendowed participants. In this section, we take a closer look at the thoughts produced by all participants to better understand whether there was a main effect of endowment on thoughts generated by Unrestrained Eaters and by Restrained Eaters (Hypothesis 2a-c).

Table 1 helps illustrate different thoughts listed by participants in this study about the ice cream sandwich, our product of interest. Each cell in Table 1 contains an aspect generated by a participant in our study regarding ice cream taking versus time taking. Aspects generated fall into two categories: value increasing and value decreasing. Value
increasing, or positive, thoughts enhance the “value” of the ice cream because they are believed to increase the likelihood of choosing the ice cream. Value increasing thoughts are in the top left and bottom right cells of Table 1. Value decreasing, or negative, thoughts reduce the “value” of the ice cream because they are believed to decrease the likelihood of choosing the ice cream. These thoughts are in the top right and bottom left cells of Table 1. In Table 1, thoughts with a “Positive” thought valence indicate a positive attribute about the ice cream or time. “Negative” thought valence indicates a negative aspect about an item. We see that the majority of aspects generated by participants were concerned with the ice cream, even if the valence was negative.

<table>
<thead>
<tr>
<th>Item</th>
<th>Thought Valence</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ice Cream</td>
<td>Ice cream!! I’ve been craving this all day.</td>
<td>[2.35]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I don't really care that much about the ice cream.</td>
<td></td>
<td>[2.25]</td>
</tr>
<tr>
<td>Time</td>
<td>I could use the extra time.</td>
<td>[0.50]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 minutes isn’t that much time.</td>
<td>[0.75]</td>
<td></td>
</tr>
</tbody>
</table>

We also tested total number of aspects listed as a function of endowment, eater type for shampoo and ice cream (Figure 3). As predicted by Query Theory, we found no difference in number of aspects generated by eater type in differing endowment conditions for either product. On average, participants generated 3.88 thoughts about shampoo (SE = 0.26) and 4.05 thoughts about ice cream (SE = 0.22).
Fig. 3. The mean number of thoughts listed as a function of endowment and eater type for shampoo and ice cream.

Figures 4 show the average standard median rank scores (SMRD) for Restrained and Unrestrained Eaters making decisions about shampoo and ice cream. Query Theory predicts that participants in the endowed condition will have a mean positive SMRD score and those in the unendowed condition will have a mean negative SMRD score. We see that there was no significant difference between endowment conditions for either Unrestrained or Restrained Eater. Although mostly in the predicted direction, Restrained Eaters endowed with the shampoo had a negative SMRD score, suggesting that a Restrained Eater’s self-control may extend beyond food decisions.
There were some significant differences between balance of thought (BOT) scores and endowment conditions (Figure 5). According to Query Theory, endowed participants will generate more positive thoughts than negative thoughts, therefore generating a positive BOT score. Unendowed participants will generate more negative thoughts, therefore generating a negative BOT score. Restrained Eaters behaved as Query Theory predicted: endowed Restrained Eaters produced more positive thoughts about taking the product ($M_{BOT} = 0.33, SE_{BOT} = 0.61$) than negative thoughts for both products and vice versa for unendowed participants ($M_{BOT} = -1.64, SE_{BOT} = 0.47$). Endowment predicted the BOT scores for Restrained Eaters such that assignment to the endowed condition generated an additional 1.9 positive thoughts about taking the product, $\beta = 1.98$, $SE = 0.55$, $t(100) = 3.59$, $p < 0.001$. BOT scores of Unrestrained Eaters was not predicted by
endowment nor were scores in the predicted direction, namely for the ice cream sandwich decision. We believe these findings hint at Restrained Eaters’ relationship to food, particularly a hedonic food item. Unrestrained Eaters appeared to go with their initial instinct of wanting to take the ice cream (or not take the shampoo) whereas Restrained Eaters were more susceptible to instructions to reconsider a food decision.

Fig. 5. Mean Balance of Thought scores as a function of endowment and eaters type for shampoo and ice cream.

Our findings support Query Theory predictions regarding the effect of endowment on structure of thoughts (SOT). The mean SOT of endowed participants ($M_{SOT} = 0.12$, $SE_{SOT} = 0.08$) was significantly higher than the mean SOT of unendowed participants ($M_{SOT} = -0.11$, $SE_{SOT} = 0.08$), $t(201.9) = -2.03$, $p < 0.05$. Regressing endowment on the
structure of thoughts reveals that assignment to the endowed condition caused a 0.24 increase in a participant’s SOT ($t(202) = 2.03, p < 0.05$).

To test for effects of endowment and eater type on SOT, we included an interaction term between endowment and eater type in a regression on decision. Restrained Eaters endowed with a product had a 0.43 higher SOT score than their unendowed peers, $\beta = 0.43$, $t(200) = 1.80, p < 0.05$. There was a main effect of eater type on decision where Restrained Eaters had a 0.44 lower SOT score than Unrestrained Eaters, $\beta = -0.44$, $t(200) = -2.67, p < 0.001$. Each panel of Figure 6a-d shows the SOT scores Restrained and Unrestrained Eaters by product and endowment. Analysis reveals endowment only caused significant differences in SOT scores of Restrained Eaters making a decision about the shampoo, $\beta = 0.57$, $t(49) = 2.40, p < 0.05$ (Figure 6a) but not ice cream (Figure 6b). Endowment did not cause a significant difference among Unrestrained Eaters faced with the shampoo (Figure 6c) or ice cream decision (Figure 6d). Interestingly, Unrestrained Eaters endowed and unendowed with the ice cream both had positive SOT scores. In fact, unendowed Unrestrained Eaters had higher SOT scores than their endowed peers, though this difference was not significant. The decision of Unrestrained Eaters faced with the ice cream appeared to have been decided once presented with the option of having the ice cream. On the other hand, Restrained Eaters appeared to have applied a stronger resistance to the temptation. While all Restrained Eaters were likely tempted by the offer of ice cream, unendowed Restrained Eaters maintained their resolve by generating negative reasons for ice cream taking.
Fig. 6a-b. Scatterplot of Structure of Thoughts of Restrained Eaters

Figure 6a. Unendowed (M = -0.49, SE = 0.18) versus Endowed (M = 0.07, SE = 0.16) with Shampoo (p < 0.05). Bars denote ±1 SEM.

Figure 6b. Unendowed (M = -0.17, SE = 0.18) versus Endowed (M = 0.17, SE = 0.15) with Ice Cream (p = 0.16). Bars denote ±1 SEM.

Fig. 6c-d. Scatterplot of Structure of Thoughts of Unrestrained Eaters

Figure 6c. Unendowed (M = -0.18, SE = 0.16) versus Endowed (M = 0.10, SE = 0.18) with Shampoo (p = 0.25). Bars denote ±1 SEM.

Figure 6d. Unendowed (M = 0.40, SE = 0.15) versus Endowed (M = 0.16, SE = 0.16) with Ice Cream (p = 0.29). Bars denote ±1 SEM.

Product Decisions. To test Hypotheses 2, we tested for the predictive power of SOT on product decisions. As Query Theory and Hypothesis 2a predicts, we found an
increase in SOT score significantly predicted an increase in the likelihood of taking the product, OR = 1.89, z = 7.35, \( p < 0.001 \). We find SOT has a significant impact on the probability of taking a product.

Hypothesis 2b and 2c predicted structure of thoughts generated by Restrained Eaters and Unrestrained Eaters would predict their product decisions. Figure 7a-d shows the logistic regressions of decision on SOT scores for ice cream and shampoo by eater types. We see that for all eater types, no matter the product, SOT scores significantly predicted decision. This finding supports Query Theory’s hypothesis concerning thoughts listed: thoughts generated at the moment of a decision predict behavior. We focus on Restrained and Unrestrained Eaters’ ice cream decision since we are most interested in this behavior. In Figure 7b, we see Restrained Eaters with a SOT score of 1 had a 0.66 probability of taking the ice cream. In Figure 7d, we see Unrestrained Eaters had a slightly higher probability of taking the ice cream: 0.84. Participants with negative SOT scores had a much lower probability of taking the ice cream. For Restrained Eaters with a SOT score of -1, this probability was only 0.04 and for Unrestrained Eaters this probability was 0.07 (Figure 7b and 7d, respectively). It appears negative SOT had a particularly potent effect on ice cream decisions, regardless of eater type.
Lastly, we predicted a significant interaction of endowment and SOT on decision for all participants and by eater type. We do not find a significant interaction of endowment and SOT on decision for all participants (Hypothesis 3a). However, the main effect of SOT on decision remained significant, $\beta = 0.31$, $t(200) = 7.27$, $p < 0.001$. Each additional positive aspect listed increased the likelihood of taking the product by 10 percentage points.
To test Hypothesis 3b and 3c, we regressed the decision on endowment and SOT of Restrained Eaters and on Unrestrained Eaters in order to isolate the effects of each variable (Table 2a-b). In both models, the main effect of SOT on the decision remained statistically significant when including endowment in the model (Restrained Eaters: $\beta = 0.17$, SE = 0.06, $p < 0.01$; Unrestrained Eaters: $\beta = 0.38$, SE = 0.05, $p < 0.001$); however, endowment did not. We did not find a significant interaction of endowment and SOT for Unrestrained Eaters (Hypothesis 3c). It appears, for Unrestrained Eaters, SOT was the primary motivator for their behavior. On the other hand, we found a positive and significant interaction effect of endowment and SOT on decision for Restrained Eaters ($\beta = 0.20$, SE = 0.08, $p < .05$). As predicted by Hypothesis 3b, Restrained Eaters endowed with product and generating thoughts in favor of their position had a higher likelihood of taking the product. This suggests that thoughts generated may be the primary motivator for taking the ice cream among endowed Restrained Eaters rather than endowment alone.

**Table 2a.** Linear Regression Results of the Interaction of Structure of Thoughts and Endowment for Restrained Eaters.

<table>
<thead>
<tr>
<th>Variable</th>
<th>$\beta$</th>
<th>Standard Error</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interception</td>
<td>0.28</td>
<td>0.05</td>
<td>4.957</td>
<td>$&lt; 0.001$</td>
</tr>
<tr>
<td>Structure of Thoughts</td>
<td>0.17</td>
<td>0.06</td>
<td>2.71</td>
<td>$&lt; 0.01$</td>
</tr>
<tr>
<td>Endowment</td>
<td>0.10</td>
<td>0.07</td>
<td>1.37</td>
<td>$p = 0.17$</td>
</tr>
<tr>
<td>Structure of Thoughts * Endowment</td>
<td>0.20</td>
<td>0.08</td>
<td>2.29</td>
<td>$&lt; 0.05$</td>
</tr>
</tbody>
</table>

**Table 2b.** Linear Regression Results of the Interaction of Structure of Thoughts and Endowment for Unrestrained Eaters.
### Unrestrained Eaters: Interaction of Structure of Thoughts and Endowment

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>Standard Error</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>0.45</td>
<td>0.05</td>
<td>8.42</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Structure of Thoughts</td>
<td>0.38</td>
<td>0.05</td>
<td>6.54</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Endowment</td>
<td>-0.08</td>
<td>0.07</td>
<td>-1.10</td>
<td>p = 0.27</td>
</tr>
<tr>
<td>Structure of Thoughts * Endowment</td>
<td>-0.03</td>
<td>0.09</td>
<td>-0.34</td>
<td>p = 0.73</td>
</tr>
</tbody>
</table>

**Discussion**

The objective of Study 1 was to gauge the feasibility of using thought lists as a mechanism-based intervention to overcome threats to self-control. We predicted that endowment, regardless of participant eater type, would have an effect on decision. We found the decision of Restrained Eaters was caused by assignment to endowment condition and that thoughts lists were a significant predictor of behavior. We found that the behavior of Unrestrained Eaters was not caused by endowment but was also significantly predicted by thoughts listed.

We found assignment to the endowed condition had a strong effect on Restrained Eaters when it came to ice cream; they took the ice cream at a significantly higher rate than their unendowed peers. Unrestrained Eaters appeared to have a more hedonic approach to their ice cream decision. Not only was there no effect of endowment on their decision, unendowed Unrestrained Eaters chose the ice cream the most. While we expected there to be a stronger endowment effect, as seen in past studies it nonetheless operated in the predicted direction (Kahneman Knetsch & Thaler, 1991; Kahneman & Tversky, 2000). We also expected a stronger effect of endowment on structure of
thoughts, though these were also in the predicted direction. For Restrained Eaters, endowed participants had positive SOT scores while unendowed Restrained Eaters had negative SOT scores. Findings suggest that all Restrained Eaters were tempted by the ice cream but that unendowed Restrained Eaters were able to maintain their resolve and more easily think negatively about the decision (see Figure 5). This finding suggests that all Restrained Eaters in the study did not want to take the ice cream but that the presence of an external cue overwhelmed the physical and/or cognitive load of endowed participants.

We found SOT significantly predicted the decision for all eaters and products. While positive SOT was predictive of ice cream taking for all participants, it appeared the effects of negative SOT scores were more persuasive in choosing time over ice cream. For Unrestrained Eaters, we found SOT as the primary motivator for behavior. This finding was somewhat expected given the high rate of unendowed Unrestrained Eaters taking who took the ice cream. For Restrained Eaters, endowment and SOT worked together to predict decision. As predicted, endowment, the presence or absence of an external cue, appeared to cause behavior but that SOT appeared to be a better predictor of behavior.

These findings supported evidence for patterning an intervention off the method and results of Johnson et al. (2007) to investigate whether changing the order of thoughts could also change the decisions that Restrained Eaters make about unhealthy foods. Johnson et al (2007) tested the effectiveness of manipulating thoughts about a decision to keep or exchange a mug. They found that when endowed participants who were instructed to begin their lists by giving reasons against taking the mug, as opposed to listing reasons for it, they chose not to take the mug. Coaching Restrained Eaters to begin...
their thought lists about unhealthy foods with a reason against taking it should have the same or similar results. For this reason, we crafted an intervention not about endowment, but an intervention that targets the order and valence of thoughts (Study 2). Specifically for Restrained Eaters, we believed researchers could coach dieters to first summon one disadvantage whenever facing temptation from an unhealthy food. This kind of intervention could be conducted in the field and would greatly boost external validity.

This controlled lab study demonstrated the robust causal power of the endowment effect, and we were able to pinpoint how it operates on Restrained Eaters. Our sample did not rely on clinical populations of disordered eaters, but instead targeted Restrained Eaters using the RRS. This practice makes the results generalizable to the large number of currently dieting Americans. However, like many studies conducted on university campuses, our sample was not a diverse representation of a larger population. We also did not track the eating behaviors/decisions of our participants after the experiment so it is impossible to know whether Restrained Eaters who took the ice cream (or did not take the ice cream) experienced disinhibited eating or not.

**Conclusion**

This study extends recent findings in the field of decision-making and behavioral economics to Restrained Eaters. It tested the usefulness of Query Theory to understand the cognitive processes and behavior of Restrained Eaters compared to Unrestrained Eaters. We found evidence for a causal effect of endowment on the decision of Restrained Eaters and evidence of thought lists generated as a strong predictor of behavior. In Study 2, we further test whether thoughts play a critical role in the decision making process for Restrained and Unrestrained Eaters by manipulating the order in
which participants consider a decision. By using thoughts as a tool to change behavior, this paradigm could help many Restrained Eaters accomplish their health goals and decease episodes of disinhibition.

Chapter 2

Study 2: The Effects of Thought Reversal on the Decision of Restrained Eaters

Study 1 tested the prospect of Query Theory as a tool to help chronic dieters make healthier decisions when faced with tempting food items. In addition to replicating the endowment effect among Restrained Eaters, we found that endowed Restrained Eaters produced more advantageous thoughts and were more likely to take an unhealthy food than unendowed Restrained Eaters who generated disadvantageous thoughts (Majd, Conley, & Weber, 2017). Among Unrestrained Eaters, the endowment effect was not as strong and that Unrestrained Eaters likely based their ice cream decisions on physiological need. However, we did find that thoughts generated by all participants significantly predicted behavior. The next step in this line of research follows the logic and design of Johnson and colleagues (2007). In this study (Majd, Conley & Weber, in prep), we tested the efficacy of Query Theory thought reversals in the context of endowment to influence healthy eating behavior among Restrained Eaters. We tested whether manipulating the order of thoughts by changing the order in which participants considered their decision would reverse the usual robust findings associated with the endowment effect and change participants’ decision to take or not take an ice cream sandwich.

Based on previous research findings of Study 1, we tested the following hypotheses for effects of thought reversal on behavior:
**Hypothesis 4a.** There will be a main effect of endowment on decision, but in the reverse direction of Study 1; endowed participants will choose to take products less than unendowed participants because the order of thoughts considered is reversed.

**Hypothesis 4b.** There will be a main effect of endowment on the decision of Restrained Eaters in the reverse direction. Endowed Restrained Eaters will choose to take products less than Restrained Eaters in the unendowed condition because the order of thoughts considered is reversed.

**Hypothesis 4c.** There will be a main effect of endowment on the decision of Unrestrained Eaters in the reverse direction. Endowed Unrestrained Eaters will choose to take products less than Unrestrained Eaters in the unendowed condition because the order of thoughts considered is reversed.

**Hypothesis 5a.** There will be a main effect of structure of thoughts generated by participants on product decision.

**Hypothesis 5b.** There will be a main effect of structure of thoughts generated by Restrained Eaters on product decision.

**Hypothesis 5c.** There will be a main effect of structure of thoughts generated by Unrestrained Eaters on product decision.

**Hypothesis 6.** Changing the order of queries will reverse the endowment effect for Restrained Eaters.

**Methodology**

**Participants.** A total of 166 participants (65% female, 18-24 years old) completed the study. The majority of participants were female with some college or a bachelor’s degree (72%) and with an average income below $25,000. All participants were recruited online through the Psychology Department Participant Pool. All experiments were conducted from September to November 2016 after 1pm, as was done in Study 1, to control for time-of-day.

**Study Design and Procedure.** Study 2 was a 2 x 1 (endowed vs. unendowed; ice cream vs. time) between subjects design with a total of 162 participants, with 74 Restrained Eaters as determined by the Revised Restraint Scale (Herman & Polivy, 1980). Participants were recruited through Columbia University Psychology Participant Pool. Participants were randomly assigned to an endowment condition (endowed or
unendowed) and were either given the ice cream sandwich (endowed condition) or shown a photo of the ice cream sandwich (unendowed). All participants were offered the chance to keep the product or exchange the product for a shorter version of a distractor study.

Before finalizing their decision, participants in both conditions were instructed to list thoughts in reverse order (opposite the status quo suggested by their endowment condition). Endowed participants were instructed to first list reasons against keeping the product before listing reasons for keeping the product. Unendowed participants were instructed to first list reasons for keeping the product before listing reasons against keeping the product (Appendix E). After recording their thoughts, all participants made a decision to keep the product or not. Participants then coded each thought listed as an advantage for taking the product, a disadvantage, or neither. We chose to have participants code each of their thoughts to eliminate any ambiguity as to whether or not each thought was considered an argument for or against a particular choice option.

Finally, all participants filled out the Revised Restraint Scale (Herman & Polivy, 1980) to determine their eating type.

Measures. Results were analyzed using R Studio version 3.2. Using linear regression, we report the beta coefficients, standard errors, and p-values with values less than .05 considered statistically significant. Where appropriate, we tested for differences in means using t-tests. The following 4 measures were used in the analyses:

Endowment. Endowment condition was used in the analysis as a binary treatment to investigate a causal link on both thoughts listed and the decision to take the product.
Product Decision. A participant’s decision to take the ice cream versus reduce the length of the distractor study was the binary dependent variable. Researchers recorded each participant’s final decision.

Balance of Thoughts. A positive balance of thought score indicated a participant listed more advantages for taking the product than disadvantages. A negative BOT indicated a participant listed more disadvantages for taking the product than advantages. BOT was used as a continuous measure to test for a diminished or eliminated endowment effect.

Balance of thoughts captures the content of valence generated by participants. BOT was calculated by subtracting the total number of value-decreasing thoughts (i.e. disadvantageous thoughts) from the total number of value-increasing thoughts (i.e. advantageous thoughts) generated and coded by each participant (Johnson et. al., 2007).

Structure of Thoughts. Structure of thoughts captures the order and valence of thoughts generated. It is a continuous measure capturing the order of thoughts and BOT produced by each participant. SOT is calculated using the same method developed in Johnson and colleagues (2007): the standard median rank difference (SMRD) (i.e. order) and BOT (i.e. content).

A negative SOT indicated a greater proportion of disadvantageous thoughts listed early on in the list. For example, if the first thought about the ice cream sandwich was, “This ice cream will make me feel sick,” followed by more disadvantageous thoughts than advantageous thoughts, participant’s SOT score would be negative. A positive SOT indicates the opposite. For example, if the first thought was, “I would like a dessert,” followed by more advantageous thoughts than disadvantageous thoughts, this
participant’s SOT would be positive. SOT was regressed on endowment to test whether endowment condition caused SOT scores.

_Revised Restraint Scale._ The 10-item RRS was used in the analysis as a covariate. RRS generates 2 factors of eater types: Restrained and Unrestrained Eaters, and is not used as a continuous scale since the original restraint scale was revised. Participants scoring 15 or higher were categorized as Restrained Eaters and those below as Unrestrained Eaters. The RRS had a Cronbach alpha of .91, indicating strong internal consistency.

**Results**

_Endowment._ Endowment significantly predicted participants' decisions to take or not take the ice cream, $\beta = -0.19, t(162) = -2.64, p < 0.01$. As posited by Hypothesis 4a, we found a reverse effect of endowment on decision. Overall, 27.9% endowed participants took the ice cream compared to 47.5% of unendowed participants. On average, endowed participants were 19 percentage points less likely to take the ice cream compared to unendowed participants.

Participant’s eater type alone did not predict decision to take ice cream, $\beta = -0.03; t(164) = -0.52, p = 0.59$. Endowment vs. non-endowment (completely correlated/confounded with consumption-discouraging vs. consumption-encouraging BOT), however, did cause different choice decisions among Restrained Eaters. As predicted by Hypothesis 4b, 23.0% of endowed Restrained Eaters took the ice cream compared to nearly half of unendowed Restrained Eaters (48.7%) (Figure 8). Endowed Restrained Eaters were 25.4 percentage points less likely to take the ice cream than unendowed Restrained Eaters, $\beta = -0.25, t(72) = -2.34, p < 0.05$. Endowment did not
causally affect the decisions of Unrestrained Eaters, $\beta = -0.14$, $t(90) = -1.45$, $p = 0.15$, although observed differences were in the predicted direction (31.9% vs. 48.7%, endowed vs. unendowed respectively) (Hypothesis 4c). Our results indicate we found a complete reversal of the endowment effect for Restrained Eaters and, nearly, for Unrestrained Eaters. As we found in Study 1, Unrestrained Eaters appear to be less affected by endowment than Restrained Eaters. While Unrestrained Eaters appear to still be making a decision based on physiological or purely hedonic desires, Restrained Eaters seem to be more thoughtful of their decision. We explore the effect of thought reversal on decisions next.

**Fig. 8.** Percent of Restrained and Unrestrained Eaters taking the ice cream by endowment condition. Endowment caused a difference in choice among Restrained Eaters. Endowed Restrained Eaters were 25.4 percentage points less likely to take the ice cream than unendowed Restrained Eaters, $\beta = -0.25$, $t(72) = -2.34$, $p < 0.05$. Bars denote ±1 SEM.

**Order, Content & Structure of Thoughts.** In this study, participants were instructed to reverse the natural query order depending on assignment to endowment condition. Query Theory posits that instructed query order will result in a greater number
of those thoughts. In other words, when negative thoughts are generated first, as instructed, participants generate more of those thoughts, as predicted by Query Theory. Figures 9 & 10 show the mean standard median rank (SMRD) and mean balance of thought scores (BOT), respectively, by endowment and eater type. As a manipulation check, in Figure 9, we saw all participants followed instructions to list negative thoughts first if endowed and positive thoughts first if unendowed. We also find endowment significantly predicted SMRD scores of Restrained Eaters, $\beta = -0.49$, $t(72) = -2.62$, $p < 0.01$, and Unrestrained Eaters, $\beta = -0.66$, $t(72) = -3.94$, $p < 0.001$, where assignment to endowed condition predicted a negative SMRD score; participants listing negative reasons first.

**Fig. 9.** Mean standard median rank (SMRD) scores of Restrained and Unrestrained Eaters.
We also found a significant effect of endowment on BOT in the predicted direction. On average, assignment to endowment caused participants to list an additional 1.27 negative thoughts about the decision, $\beta = -1.27$, $t(164) = -3.75$, $p < 0.001$. While the BOT of endowed Restrained Eaters was in the predicted, negative direction, we also found unendowed Restrained Eaters generating more disadvantages than advantages. Interestingly, the mean BOT score of unendowed Restrained Eaters was negative; implying that despite beginning with positive reasons for taking the ice cream, unendowed Restrained Eaters were still able to list more negative reasons for taking the product than positive ones. This finding is similar to the BOT scores of endowed Restrained Eaters in Study 1 faced with the ice cream decision (Figure 5); they also had difficulty generating advantages for ice cream taking. This finding suggests that
Restrained Eaters, independent of endowment or order, still maintain a strong, negative affiliation with certain types of food and behaviors.

As predicted by Query Theory, endowment combined with query order drove SOT scores in our sample. Participants endowed with ice cream had, on average, a lower SOT score than those who were unendowed, $\beta = -0.63$, $t(164) = -4.93$, $p < 0.001$. Overall, endowed participants listed more disadvantageous thoughts for keeping the product and listed these negative thoughts earlier in their listing ($M_{SOT} = -0.30$, $SE_{SOT} = 0.08$), whereas unendowed participants listed more advantageous and listed those thoughts earlier ($M_{SOT} = 0.30$, $SE_{SOT} = 0.13$). By eater type, endowment drove the SOT scores of Restrained Eaters, $\beta = -0.53$, $t(72) = -2.94$, $p < 0.01$, and Unrestrained Eaters, $\beta = -0.69$, $t(90) = -3.90$, $p < 0.001$. For both eater types, assignment to the endowed condition predicted a decrease in SOT scores (see Figure 11).

![Fig. 11a-b. Scatterplot of Structure of Thoughts of Restrained and Unrestrained Eaters](image)

We also found that SOT predicted the decision of all participants, $OR = 2.20$, $z = 3.88$, $p < 0.001$ (Hypothesis 5a). An SOT score of 1 significantly predicted a .55 increase
in the probability of taking the ice cream. That effect is promising, but our analysis centered on the behavior of Restrained Eaters and Unrestrained Eaters. We hypothesized (Hypothesis 5b) that aspects generated by Restrained Eaters would predict their decisions. We found this prediction to be true for Restrained Eaters such that an SOT score of 1 predicted a .54 probability in the likelihood of taking the ice cream and an SOT score of -1 predicted a .21 SOT probability of taking the ice cream, OR = 2.07, z = 2.31, p < 0.05 (Figure 12a). This finding suggests that the order and content of thoughts generated at the time of decision played a large role in influencing the decision for Restrained Eaters when directly presented with a hedonic snack. We also found SOT predicted the decision of Unrestrained Eaters, OR = 2.33, z = 3.07, p < 0.01 (Hypothesis 5c) (Figure 12b). We found the probability of Unrestrained Eaters taking the ice cream was very similar to the probability of Restrained Eaters. Unrestrained Eaters with an SOT of 1 had a .55 probability of taking the ice cream and a .19 probability with an SOT of -1. These results suggest that together, endowment and thoughts influence the decision to take the ice cream. This makes intuitive sense; endowed Restrained Eaters who primarily list advantages of taking the product are more likely to take it than their peers who primarily list disadvantages.
Lastly, we ran an analysis to test whether changing the order of queries would reverse the endowment effect for Restrained Eaters (Hypothesis 6). To test for a reversal of endowment effect, we regressed the decision to take ice cream on endowment and SOT for Restrained Eaters to isolate the effects of each indicator variable. The main effects of both SOT on decision and endowment on decision were no longer significant when included together in the model. However, we found a positive, significant interaction of endowment and SOT on decision, $\beta = 0.31$, $t(70) = 2.37$, $p < 0.05$. This finding suggests the decision to take ice cream depended on the Restrained Eater being both endowed and having a positive SOT score. For example, an endowed Restrained Eater with a negative SOT score was 31 percentage points less likely to take the ice cream than an endowed Restrained Eater with a positive SOT score. This suggests that together, endowment and thoughts influence the decision to take the ice cream.

**Discussion**
Study 2 is the first to test the effects of thought reversal on the decision to take or not take a hedonic food item. Among Restrained Eaters, we succeeded in reversing the endowment effect such that unendowed Restrained Eaters chose to take the ice cream at a significantly higher rate than their endowed peers. Second, for both Restrained and Unrestrained Eaters, we found assignment to endowment condition predicted thoughts listed in the reverse direction of Study 1 due to Study 2 manipulation; unendowed participants primarily listed reasons for taking the product early on, which lead to listing more of those positive thoughts, overall. The opposite was true for participants endowed with the ice cream. SOT also significantly predicted decision in the expected direction: negative SOT score decreased the likelihood of taking the product and positive SOT scores increased the likelihood.

Like in Study 1, we found the decisions of Unrestrained Eaters to be somewhat predicted by endowment, but not as strongly as anticipated. There was no significant difference between the percent of unendowed and endowed ice cream takers. We believe their decisions in Study 2 were, one again, driven by a combination of instant gratification and physiological drivers. Since negative SOT scores still predicted a decrease in likelihood of ice cream taking, perhaps this reversal would be more effective on Unrestrained Eaters if researchers were to produce more disadvantageous thoughts for them to consider. Unlike Restrained Eaters, Unrestrained Eaters appeared to have no trouble generating positive thoughts about enjoying the ice cream.

In this study, we presented one way in which the decisions of Restrained Eaters could be influenced under the adverse condition of an external cue. By telling endowed Restrained Eaters to explicitly consider the decision to take the ice cream sandwich in the
reverse order (i.e. listing negative reasons for taking the product first as opposed to considering reasons favoring the default), we were able to reverse the effect of endowment on decision. Put another way, we suppressed the temptation of Restrained Eaters to “act now” by asking them to consider the alternative action first. For endowed Restrained Eaters, we believe the thought reversal task came quite naturally, as evidenced by the order and valence of their thoughts. Restrained Eaters living in environments filled with external and cognitive cues are often faced with temptation they must avoid, therefore it is possible Restrained Eaters already employ a thought reversal-like process in real life. This also explains why unendowed Restrained Eaters had some difficulty producing advantageous thoughts about the taking the ice cream. This task likely asked them to consider a genre of thoughts they normally do not allow themselves to consider. In fact, this task may have even felt like somewhat of a break to freely think about enjoying a hedonic food item.

We demonstrated reverse thought listing is a promising intervention tool to aid Restrained Eaters who are endowed with a tempting food item. If thought reversals can be unobtrusively implemented in natural environments, then Restrained Eaters may have more success keeping behaviors in line with goals. More research is needed to determine how effective reverse order thoughts can be at changing behaviors if Restrained Eaters are aware of the thought order manipulation. Research exploring the transparency and psychological reactance in the context of “nudges” suggests that transparency does not diminish the effectiveness of a nudge (Thaler & Sunstein, 2008; Sunstein, in press). Even so, research on food decisions and transparency is scarce and there are many researchers who hypothesize that nudges “work best in the dark” (Bovens, 2009, p.210).
Overall, we find our results to be promising because we were able to sway the decisions of Restrained Eaters when a hedonic snack was placed in front of them. This result aligns with our objective: changing the behaviors of Restrained Eaters in a way that is more in line with their goal. Considering the well-established predictive power between endowment and decision, we were happy to see that reversing the natural order of thought had such a significant impact on behavior in a way that more closely mimics the difficult decision a Restrained Eater actually makes in real life.

Conclusion

This research is the first attempt to apply Query Theory’s reverse thought order to better understand the complicated and conflicting behavior of Restrained Eaters. Overall, our findings advance the understanding of how Restrained Eaters consider food decisions and how decisions can be influenced by simply reverse ordering the thoughts listed. This Query Theory tool can be tested outside of laboratory environments and would be useful for dieters and health related policy-makers.

Chapter 3

Study 3 & 4: Evidence for Regulatory Focus Theory as an Intervention Tool to Assist Restrained Eaters

Study 3 and 4 are reanalyzing some components of the data from in Study 1 and 2, respectively, using a different psychological theory. Using thought lists from our previous studies, we calculated a regulatory focus score for participants by coding each of their thoughts as promotion or prevention. The objective of these studies was to test whether exposure to a hedonic food, or endowment, had an effect on the regulatory focus of participants. In Study 3, we wanted to see whether participants in the endowed
condition were more promotion focused than those in the unendowed condition as evidenced by the thoughts they listed as they were making their decisions. Then, in Study 4, we were interested in whether regulatory focus of thoughts generated changed when prompted to reverse the order of thoughts listed. We felt the endowed condition closely replicated the exposure condition in Sengupta and Zhou’s (2007) study. In their study, participants were presented with either a piece of chocolate cake or a bowl of salad before measuring their focus. They found that participants presented with the chocolate cake were more promotion focused and opted to take the chocolate cake while those presented with the salad were more prevention focused and opted to take the salad. In Study 3 and 4, we were also interested in whether regulatory focus orientation predicted decision. Results of these studies suggested that regulatory focus induction may turn out to be a way to influence the decisions of Restrained Eaters, a hypothesis that was tested in Study 5.

Using participants’ thoughts from Study 1 and 2, we were able to determine the regulatory focus of each thought (i.e. prevention or promotion) and the overall regulatory focus of the thought lists of each participant. We used a novel metric, focus of thoughts, to determine the overall regulatory focus of each list, which is further explained below. For the present studies, we based our hypotheses on what we found in Study 1 and Study 2 with the assumption that there would be a main effect of endowment on thoughts coded as prevention or promotion and that regulatory focus of thoughts would predict decision. Hypotheses and results for Study 3 and 4 are exploratory in nature due to the lack of theoretical backing. We present the methodology and results of Study 3 and 4 together
and only the results of the ice cream decision because it is the decision of interest. Our hypotheses were:

**Exploratory Hypothesis 7a (Study 3 & 4).** There will be a main effect of endowment on the regulatory focus of all participants.

**Exploratory Hypothesis 7b (Study 3 & 4).** There will be a main effect of endowment on the regulatory focus of Restrained Eaters.

**Exploratory Hypothesis 7c (Study 3 & 4).** There will be a main effect of endowment on the regulatory focus of Unrestrained Eaters.

**Exploratory Hypothesis 8a (Study 3 & 4).** The regulatory focus of thoughts generated will predict the decisions of participants.

**Exploratory Hypothesis 8b (Study 3 & 4).** The regulatory focus of thoughts generated will predict the decisions of Restrained Eaters.

**Exploratory Hypothesis 8c (Study 3 & 4).** The regulatory focus of thoughts generated will predict the decisions of Unrestrained Eaters.

**Methodology**

**Measures.** To measure regulatory focus of participants, Study 3 used Study 1 data and Study 4 used Study 2 data. The methodologies and measures of Study 3 and 4 are those of Study 1 and 2 and therefore not repeated below. We did develop an additional measure, and an innovation from typical regulatory focus analyses, to determine the order and valence of regulatory focus, which we are calling the focus of thoughts (FOT), computed from the thoughts collected.

**Focus of Thoughts.** In order to test whether endowment predicted regulatory focus, two independent researchers coded each thought generated by participants as either a promotion thought or prevention thought (Study 3: intercoder correlation $r = .91$; Study 4: intercoder correlation $r = .78$). Participants often explicitly stated what they might gain by taking the product (“I am hungry and need lunch”) or what they might lose (“I am not going home so it will melt”), making promotion and prevention coding straightforward and consistent. Similar to Study 1 and 2, we first calculated the valence and order of
aspects before standardizing and averaging the two scores. The valence of thoughts was calculated by taking the difference between the number of promotion focus thoughts and the number of prevention focus thoughts. A positive valence indicated more promotion thoughts listed than prevention thoughts. To calculate the order, we used the same procedure to calculate the standard median rank Studies 1 and 2. Between -1 and 1, a positive order score indicates thoughts listed early on were promotion focus.

After the order and valence were standardized and averaged, this score is referred to as the focus of thoughts (FOT). Similar to structure of thoughts, positive FOT scores indicated a greater prominence of promotion thoughts (i.e. earlier and more numerous than prevention thoughts). Negative FOT scores indicated a greater prominence of prevention thoughts.

Results

Effect of Endowment on Focus of Thoughts. Did endowment predict a change in the focus of thoughts of participants? In Study 3, we tested whether there was a main effect of the endowment manipulation of Study 1 on focus of thought scores (FOT). Overall, we found endowment did not cause changes in FOT produced by participants, $\beta = 0.35$, $t(202) = 1.11$, $p = 0.26$. In other words, endowment did not affect a participant’s propensity to list prevention or promotion thoughts and we reject Exploratory Hypothesis 7a for Study 3. In Study 4, when assignment to endowment in Study 2 was accompanied with explicit thought listing instructions that reversed the natural order observed in Study 1, we found a main effect of “endowment” (actually negative BOT) on FOT of participants (Exploratory Hypothesis 7a). Assignment to the negative rather than positive BOT condition predicted a -0.61 decrease in the FOT score of all participants, $\beta = -0.61$,
SE = 0.11, t(164) = -5.38, p < 0.01. The effect of assignment to the negative BOT condition on FOT was such that those endowed with the ice cream sandwich produced more prevention thoughts than unendowed participants.

For Restrained Eaters in Study 3 and 4, we found a significant main effect of endowment on FOT of Restrained Eaters which means we failed to reject Exploratory Hypothesis 7b (Study 3: β = 0.36, SE = 0.16, t(92.9) = 2.25, p < 0.05; Study 4: β = -0.65, SE = 0.15, t(72) = -4.18, p < 0.001). In Study 3, Restrained Eaters endowed with the ice cream had a 0.36 higher FOT score than their unendowed peers, implying more promotion-focused thoughts. This significant relationship was explained entirely by FOT of ice cream but not shampoo. Endowment caused a 0.52 increase in the FOT of Restrained Eaters when presented with the ice cream, β = 0.52, t(49) = 2.02, p < 0.05, but had no effect when presented with the shampoo, β = 0.21, p = 0.29. In Study 4, Restrained Eaters assigned to the endowment produced significantly more prevention thoughts than unendowed Restrained Eaters. Figure 13a-b helps visualize the significant main effects of endowment, and the direction of effects, on FOT for the ice cream decision of Restrained Eaters in both studies.

For Unrestrained Eaters in Study 3, we reject Exploratory Hypothesis 7c: overall, there was no effect of endowment on FOT. However, endowment did predict FOT scores of ice cream where assignment to the endowed condition for ice cream predicted a 0.54 decrease in the FOT scores of Unrestrained Eaters, β = -0.54, t(49) = -2.74, p < 0.01, but not shampoo, β = 0.17, p = 0.27. Like in Study 1, this significant main effect was in the opposite direction we predicted. Remember, in Study 1, we found unendowed Unrestrained Eaters to be the highest ice cream takers with advantageous thoughts to
supporting this decision. This finding is perhaps an example of how environmental cues do little to influence the decisions of Unrestrained Eaters.

For Study 4, we confirm Exploratory Hypothesis 7c: Unrestrained Eaters assigned to the endowed condition produced predominately prevention thoughts, $\beta = -0.58$, $t(90) = -3.54$, $p < 0.01$. In our Study 3 and 4 samples, assignment to endowment condition significantly predicted the FOT of both eater types when making a decision about ice cream. Figure 13c-d helps visualize the significant main effects of endowment and direction of effects on FOT for the ice cream decision of Unrestrained Eaters in both studies.

**Fig. 13a-b. Study 3 & 4: Scatterplot of Restrained Eaters’ Focus of Thoughts of Ice Cream**

Figure 13a. Study 3: Restrained Eaters’ Ice Cream Decision: Unendowed (M = -0.43, SE = 0.16) versus Endowed (M = 0.09, SE = 0.20) with Ice Cream ($p < 0.05$). Bars denote ±1 SEM.

Figure 13b. Study 4: Restrained Eaters’ Ice Cream Decision: Unendowed (M = 0.24, SE = 0.11) versus Endowed (M = -0.40, SE = 0.11) with Ice Cream ($p < 0.05$). Bars denote ±1 SEM.
The significant main effects of endowment on FOT for ice cream suggest assignment to endowment caused Restrained and Unrestrained Eaters to consider similar factors of the ice cream as they did in Study 1 and 2. It appears advantageous/disadvantageous thought and promotion/prevention focused thoughts are generated under the same conditions, namely for Restrained Eaters. In both Study 1 and 3, Restrained Eaters randomly assigned to endowed condition appeared to cause Restrained Eaters to generate thoughts in favor of maintaining their status quo (i.e. advantages) and focusing on the gain or non-gain aspects of the decision. We found the opposite behavior among Restrained Eaters in Study 2 and 4. However, like Study 2, this reversal of regulatory focus could simply reflect participants closely following instructions. In order to more appropriately test the fit of Regulatory Focus Theory within Query Theory, we must determine whether order of prevention/promotion thoughts was associated with the overall balance of prevention/promotion thoughts generated.
Order & Content of Thoughts. According to Query Theory, the first choice option considered during a thought list has a large advantage over the other choice because arguments for other options are temporarily inhibited as response competitors. Furthermore, Query Theory posits that instructed query order will result in a greater number of those thoughts. For example, under a Query Theory framework, thought list starting with negative reasons for a decision should, overall, have more negative reasons for a decision than positive reasons. Applying Query Theory’s framework to Study 3 and 4, we tested whether the order of focus orientation thoughts produced would be positively correlated with a greater number of thoughts of the same focus. For example, we anticipated finding a thought list starting with prevention thoughts should, overall, have more prevention reasons than promotion reasons. We initially tested whether this was true for all participants and then by eater type.

In Study 3, we found the overall order and content of thoughts coded as promotion and prevention were moderately and positively correlated with one another, $r(202) = 0.47, p < 0.001, 95\% \text{ CI:}[0.29, 0.52]$. The order and content of Restrained and Unrestrained Eaters were both moderately and positively correlated (Restrained Eaters: $r(100) = 0.48, p < 0.001, 95\% \text{ CI:}[0.23, 0.55]$; Unrestrained Eaters: $r(100) = 0.46, p < 0.001, 95\% \text{ CI:}[0.22, 0.55]$) (Figure 14). Participants who began their lists with promotion-focused thoughts went on to list more promotion thoughts than prevention. The same was true for those leading with prevention thoughts. Had there been no association between the order and overall content of promotion and prevention thoughts, the correlation would have been negative and not significantly different than zero.
Fig. 14. A scatterplot showing the relationship between order and valence for thoughts in Study 3. We found a positive, strong correlation between the order and content of thoughts when coded for promotion or prevention, $r(202) = 0.47$, $p < 0.001$, 95% CI: [0.29, 0.52].

In Study 4, we also found a significant, positive but weak correlation between the order in which focus orientation thoughts were produced with the number of thoughts produced with the same focus orientation, $r(164) = 0.27$, $p < 0.01$, 95% CI: [0.12, 0.40] (Figure 15). We found a the order and valence of thoughts produced by Unrestrained Eaters to be moderately and significantly correlated, $r(90) = 0.42$, $p < 0.001$, 95% CI: [0.23, 0.57], but the correlation for Restrained Eaters to be weak and not significant from zero, $r(90) = 0.08$, $p = 0.42$, 95% CI: [-0.14, 0.30]. Although in the predicted direction, we did not find that the focus of the initial thoughts significantly correlated with generating more thoughts of the same focus for Restrained Eaters. Among unendowed/positive SOT instructed Restrained Eaters instructed to begin by listing
positive thoughts for taking the ice cream, we found their initial thoughts to be primarily promotion focused (M = 0.34, SD = 0.13). However, the overall valence of thoughts listed suggested a mixture of both promotion and prevention thoughts, as indicated by the large standard error (M = 0.1, SD = 0.39). While this research and results are exploratory, this analysis sheds some light on the association between the order-valence when using Regulatory Focus Theory. Even though it is not as strong of an association we see using Query Theory, nonetheless, it is interesting to find an association at all. Even though it is tempting to equate all advantage thoughts with promotion, we know the relationship is not that interchangeable. For example, “I can get a lunch if I leave earlier” is considered a disadvantage by the participant but is considered promotion focus in nature because the participant is concerned with what can be gained. Conversely, an advantage for taking the ice cream sandwich can also be prevention focused like this statement of non-loss: “I'm here anyways so I might as well complete the study and get free ice cream.” We explore this topic more in Chapter 5.
Fig. 15. A scatterplot showing the relationship between order and valence for thoughts in Study 4. We found a positive, weak correlation between the order and content of thoughts when coded for promotion or prevention, $r(164) = 0.27$, $p < 0.01$, 95% CI: [0.12, 0.40].

**Product Decisions.** This final section centers on testing Exploratory Hypotheses 10a-c: Does Focus of Thoughts predict their decision to take or not take the ice cream sandwich? As in all previous hypotheses, we first test this relationship for all participants and then by eater type. We conducted a logistic regression to test whether FOT predicted decision and how that likelihood changed as FOT changed. In Study 3, a logistic regression analysis of decision on FOT for all participants (Exploratory Hypothesis 8a) found that FOT had a significant impact on the probability of taking either product for our sample, OR $= 2.17$, $z = 4.01$, $p < 0.001$. This implies that a 1 unit change in FOT changes the odds of taking the product by a factor of 2.17 (or a .60 likelihood). For all participants in Study 4, we found their FOT also predicted decision, OR $= 1.56$, $z = 2.15$, $p < 0.05$. This implies that a 1 unit change in FOT changes the odds of taking the product.
by a factor of 1.56. We also find that a participant with an FOT score of 1 had a 0.47 likelihood of taking the ice cream compared to an 0.26 likelihood for someone with an FOT score of -1. We confirm Hypothesis 8a for Study 4.

As hypothesized by Exploratory Hypotheses 8b and 8c, FOT scores of both Restrained and Unrestrained Eaters predicted their decisions in Study 3 (Restrained Eaters: OR = 2.65, z = 3.24, $p < 0.01$; Unrestrained Eaters: OR = 1.72, z = 2.10, $p < 0.05$), although the effect of FOT seems to be stronger for Restrained Eaters (Figure 16a & 19b. Taking a closer look at product decisions, we found shampoo decisions were not predicted by FOT scores of either eater type but that ice cream decisions were. These findings suggest that promotion thoughts predicted taking a product for both Restrained and Unrestrained Eaters whereas prevention thoughts decrease the likelihood of taking a product.

**Fig. 16a-b.** Logistic Regression of Ice Cream Decisions of Restrained Eaters

*Figure 16a. Study 3: Restrained Eaters’ Predicted Ice Cream Decision (OR = 4.64, z = 3.11, $p < 0.01$).*

*Figure 16b. Study 4: Restrained Eaters’ Predicted Ice Cream Decision (OR = 2.28, z = 2.30, $p < 0.05$).*
For Study 4, we can also confirm Exploratory Hypothesis 8b: the decision of Restrained Eaters was predicted by FOT, OR = 2.28, z = 2.30, p < 0.05. As seen in Figure 16b, as thoughts become increasingly more promotion focused, the likelihood of taking the ice cream increased and as thoughts become increasingly more prevention focus, the likelihood of taking the ice cream decreased. For Unrestrained Eaters, we found a different relationship between FOT and decision. We found the focus orientation of Unrestrained Eaters did not predict their decision, OR = 1.24, z = 0.83, p = 0.40, therefore rejecting Exploratory Hypothesis 10c (Figure 16d). Similar to the original thought reversal study findings (Study 2), endowment did not causally affect the decision of Unrestrained Eaters; the percentage of endowed versus unendowed Unrestrained Eaters taking the ice cream was not significant (31.9% vs. 48.7%). Although there was an effect of endowment on FOT, FOT did not influence their decision. For Unrestrained Eaters, it appears that decision was neither caused by endowment nor predicted by the overall regulatory focus of thoughts listed.
Discussion

Study 3 and 4 were the first studies to apply regulatory focus coding to Query Theory’s framework and behavioral paradigm. We found several Query Theory assumptions regarding endowment, thoughts and decisions remained true when coded as promotion or prevention. First, in Study 3 and 4, we found a main effect of endowment on focus of thoughts. In Study 3, Restrained Eaters endowed with the ice cream generated promotion focused thoughts. This is in line with previous research on Regulatory Focus Theory and endowment; participants endowed are typically more promotion focused whereas unendowed participants are typically more prevention focus (Appelt, et al., 2009). The endowed employ a gain maximizing eager strategy to ensure status quo and the unendowed employ a loss-minimizing vigilant strategy. There is some evidence suggesting that Restrained Eaters exposed to the hedonic snack caused a heightened promotion focus, which caused Restrained Eaters to cognitively fixate on the upside that occurs from instant gratification of desire. In Study 4, we found a reverse relationship between endowment and FOT. Specially, those assigned to the endowed condition now had negative FOT scores, implying overall prevention focus thoughts, and those assigned to the unendowed condition had positive FOT scores, implying overall promotion focus thoughts.

Next, we found moderate, positive and significant correlation between the order and valence for regulatory focus coded thoughts in Study 3 for both Restrained and Unrestrained Eaters. This finding supports an important Query Theory assumption that instructed query order will result in a greater number of those thoughts. As for Study 4, we found that order was significantly and positively correlated with overall valence of thoughts listed for Unrestrained Eaters but not Restrained Eaters. We believe a
Restrained Eaters’ resistance or inexperience in justifying “bad” behavior could explain this weak correlation. While the valence of thoughts among Restrained Eaters was positive, the variance in the data suggests that many Restrained Eaters had a difficult generating an eager strategy. Furthermore, if we assume that an external cue causes a heightened promotion focus, the thought reversal order may not have been enough for Restrained Eaters to disproportionately focus on reasons for ice cream taking.

Lastly, in Study 3, we found FOT predicted the decision of Restrained and Unrestrained Eaters in the expected direction. As FOT became more promotion focused (i.e. positive), the likelihood of taking the ice cream increased for both Restrained and Unrestrained Eaters. This finding is supported by previous research demonstrating an increase in promotion focus predicts choosing a hedonic snack over a healthier option (Sengupta & Zhou, 2008). It is also possible that for Restrained Eaters restraint was salient and was used as a justification for their decision. In Study 4, we found FOT predicted the decision of Restrained Eaters in the same direction as Study 3 but that FOT did not significantly predict the decision of Unrestrained Eaters. This finding may partly be explained by the lack of effect external cues have on Unrestrained Eaters and the ultimate decision being driven by cravings and/or physiology.

We believe these results are promising moving forward as we continue to explore the potential for using regulatory focus inductions as a way to influence the food decisions of Restrained Eaters. Our findings suggest that prevention focus thoughts can influence a participant’s decision not to take the product whereas promotion influences the decision to take the product. For Restrained Eaters, it seems as though simple exposure to hedonic foods did cause a promotion focus orientation, an impulse to take the
product and a failure to stick to health goals. While this is a widely agreed upon finding, Study 3 is the first to confirm that this behavior is true for Restrained Eaters. We also saw in Study 4 that reversing the order of thoughts listed resulted in an increase in prevention focus thoughts among endowed participants and an increase in promotion focus thoughts among unendowed participants. Following this logic, prevention focus thoughts may help overcome that impulse (Shah & Kruglanski, 2003; Zhou & Pham, 2004).

Conclusion

Study 3 and 4 results are the first to use the focus orientation of thoughts produced by participants to predict product the decision to take or not take a hedonic snack. In Study 5, we test the effectiveness of regulatory focus inductions on decisions.

Chapter 4

Study 5: The Effects of Regulatory Focus Inductions on the Decisions of Restrained Eaters

Because promotion-oriented thoughts predicted the decision to take ice cream in Studies 3 and 4, we tested the effects of promotion and prevention regulatory focus inductions on decision in Study 5. We wanted to test whether different focus inductions had an effect on the decisions of Restrained Eaters. We based our methodology and hypotheses for Study 5 on our previous research as well as past research that uses Regulatory Focus Theory inductions as a way to influence the decisions of participants. Previous work has demonstrated the link between indulgence and promotion and vigilance and prevention for food decisions and beyond (Shah & Kruglanski, 2003; Zhou & Pham, 2004; Sengupta & Zhou, 2007; Mukhopadhyay & Johar, 2009) Sengupta and Zhou (2007). In addition, some researchers have found that various prevention inductions
were effective in influencing the decisions of their participants towards less impulsive choices. The behavior of a Restrained Eater faced with a trigger(s) who makes an anti-goal oriented choice could be described as an impulsive. Contrary to these findings, Liberman et al. (1999) demonstrated that individuals who were more promotion focused were more likely to be unendowed and prevention focused individuals were more likely to be endowed. It is important to note that our hypotheses do not go against Liberman et al.’s (1999) findings. While Liberman et al. (1999) found their results using non-hedonic items; we believe our hypotheses specifically apply only to tempting food items and not other situations.

To properly test whether Regulatory Focus Theory could work an intervention tool among Restrained Eaters, we tested the effects of three different inductions on decision: a promotion induction, a prevention induction or no induction. Participants were randomly assigned to one of the three inductions. Based on previous research, we hypothesized the promotion induction would cause more ice cream taking (than control) and that prevention induction would cause less ice cream taking (than control). In Study 5, we changed our methodology used in Study 1 and 2 to shorten the experiment time. Since we were still using ice cream as the hedonic food item, we did not want it to melt during the study. Since essay writing was used as our method of induction, a task that could potentially take several minutes, we no longer had participants code each of their thoughts as an advantage or disadvantage. In addition, all participants were endowed with the ice cream sandwich. Our predictions for Study 5 were based on a combination of Query Theory hypotheses and Regulatory Focus Theory induction hypotheses.
**Hypothesis 11.** There will be a main effect of induction on decision such that participants assigned to the prevention induction will cause less ice cream taking (compared to control) and promotion induction will cause more ice cream taking (compared to control).

**Hypothesis 12.** Assignment to induction will predict thoughts listed by participants. Participants in the prevention induction will generate prevention focus thoughts whereas participants in the promotion induction will generate promotion focus thoughts, as measured by FOT score.

**Hypothesis 13.** Focus of thoughts will predict the decision of participants to take or not take the ice cream.

**Methodology**

**Participants.** A total of 152 participants completed the study. 52% of all participants were female with the majority of participants (80%) between the ages of 18-24 years. All participants were recruited online through the Psychology Department Participant Pool. Data was collected in September to November 2016 after 1pm to control for time-of-day confounds.

**Study Design and Procedure.** Study 5 was a 3 x 1 (induction: prevention vs. promotion vs. no induction; decision: ice cream vs. dollar) between subjects design with a total of with 50% of participants categorized as Restrained Eaters as determined by the Revised Restraint Scale (Herman & Polivy, 1980). After providing informed consent, all participants were given an ice cream sandwich and were told they could keep the ice cream sandwich or exchange it for a dollar later on in the study. The wording used was the same as in the wording used in the endowment effect paradigm for endowed participants. All participants were then randomly assigned to an induction condition: promotion, prevention or no induction. Focus was induced via priming using the Regulatory Focus Induction Instrument (Freitas & Higgins, 2002; Higgins, Roney, Crowe & Hymes, 1994). This instrument primes participants into thinking about their hopes and
aspirations (promotion), their duties and obligations (prevention) or about their day (no induction). The promotion induction was worded as follows:

But first, we would like you to think about how your current hopes and aspirations are different now from what they were when you were growing up. In other words, what accomplishments would you ideally like to meet at this point in your life? What accomplishments did you ideally want to meet when you were a child? In the space below, please write a brief essay describing how your hopes and aspirations have changed from when you were a child to now.

The prevention induction was worded as follows:

But first, we would like you to think about how your current duties and obligations are different now from what they were when you were growing up. In other words, what responsibilities do you think you ought to meet at this point in your life? What responsibilities did you think you ought to meet when you were a child? In the space below, please write a brief essay describing how your duties and obligations have changed from when you were a child to now.

And, finally, the no induction was worded as follows:

But first, please write a brief essay about your day. You can write about any topic of your choosing. When you are finished, please click the arrow button at the bottom to move onto the next screen.

After completing the essay prime, participants were instructed to list the thoughts they were having about their decision. There were just instructions to list thoughts without further orders. After recording their thoughts, all participants made a decision to keep the product or not. Finally, all participants filled out the 11-item Regulatory Focus Questionnaire in order to determine their regulatory focus (Higgins et al., 2001) the Revised Restraint Scale (Herman & Polivy, 1980) to classify each participant as a Restrained or Unrestrained Eater.

Measures. When using linear regression, we below report the beta coefficients, standard errors, and p-values with values less than .05 considered statistically significant.
Where appropriate, we tested for differences in means using t-tests. The following 4 measures were used in the analyses:

*Induction.* Induction was used in the analysis as a treatment to investigate a causal link on both thoughts listed and the decision to take the product.

*Product Decision.* A participant’s decision to take the ice cream versus the dollar bill was the binary dependent variable. Researchers recorded each participant’s final decision.

*Focus of Thoughts.* In order to test whether induction predicted thoughts listed, two independent researchers coded each thought generated by participants as either a promotion thought or prevention thought (intercoder correlation $r = .85$). Similar to all studies prior mentioned in this dissertation, we first calculated the valence of thoughts and order before standardizing and averaging the two scores. This was done for thoughts coded as promotion and prevention using the independent coders. As always, the valence of thoughts was calculated by taking the difference between the number of promotion focus thoughts and the number of prevention focus thoughts. A positive valence score indicated more promotion thoughts listed than prevention thoughts. To calculate the order, we used the same procedure to calculate standard median rank in Studies 1-4. Between -1 and 1, a positive order score indicated thoughts listed early on were promotion focus. Once standardized and averaged, this score was known as the Focus of Thoughts (FOT) for thoughts coded according to Regulatory Focus Theory.

*Regulatory Focus Questionnaire.* The 11-item Regulatory Focus Questionnaire was used in the analysis as a covariate. Participants were categorized as promotion dominant or prevention predominant depending on their score. The promotion subset (six
questions, \( M = 3.20, \ SD = 0.40, \ \alpha = 0.71 \) measured individuals’ subjective history of being effective in promotion motivation. The prevention subset (five questions, \( M = 3.00, \ SD = 0.60, \ \alpha = 0.79 \)) measures individuals’ subjective history of being effective in prevention motivation. This scale, therefore, captures individual differences in their promotion versus prevention effectiveness.

*Revised Restraint Scale.* The 10-item RRS was used in the analysis as a covariate. RRS generates 2 factors of eater types: Restrained Eaters and Unrestrained Eaters. Participants scoring 15 or higher were categorized as Restrained Eaters and those below as Unrestrained Eaters. Given that 50\% of all participants were categorized as Restrained Eaters, the logic follows that the overall mean score on the RRS was 14.56 (\( SD = 5.55 \)). The RRS had a Cronbach alpha of .91, indicating strong internal consistency.

**Results**

*Regulatory Focus Induction.* In Study 5, we hypothesized that there would be a main effect of induction on decision. We hypothesized that the prevention induction, which increases one’s sensitivity to ought-related consequences of behaviors (i.e. health aspects), would mitigate against the promotion focus, which involves a disproportionate emphasis on the potential upside (versus downside) associated with eating the ice cream. We predicted the opposite focus would serve to change this behavior. We posited that participants assigned to the prevention condition, regardless of eater type, would take the ice cream with the lowest frequency. There is an effect of induction but also a very large standard error. We found participants took the ice cream at equivalent rates in all three conditions (Figure 17). A regression analysis of decision on induction revealed no main effect of induction (\( \beta = 0.04, \ SE = 0.04, \ t(150) = 1.01, \ p = 0.31 \)), thus we rejected
Hypothesis 11. Restrained Eaters in the promotion induction did not choose to take the ice cream significantly more than all other conditions. In addition, there was no significant interaction effect between induction and eater type ($\beta = 0.01$, $t(148) = 0.18$, $p = 0.83$). As can be seen in Figure 17, there were no significant differences between Restrained and Unrestrained Eaters in the different inductions.

A notable finding is the rate at which participants in the control (no induction) condition chose to take the ice cream. While we expected the percent of ice cream taking participants in the control group to reside between the promotion and prevention inductions, the rate at which the control group took the ice cream is lower than expected when compared to Study 1 findings. This control condition was meant to simply mimic the endowed condition in Study 1, where we found 43% of participants taking the product. In this study, just 30% of participants in the control condition, both Restrained and Unrestrained Eaters, took the ice cream.

![Fig. 17. Percent of participants taking the ice cream by induction and eater type. There was no effect of induction on decision.](image-url)
We did a post-hoc planned contrast analysis to see whether there were significant differences between our primary group of interest: Restrained Eaters induced into prevention versus promotion. We found no significant differences between ice cream taking between the groups.

To investigate why the inductions failed to change behavior, we checked whether the inductions did indeed place participants into certain regulatory states. Using two methods, we measured the regulatory focus content of the thoughts participants listed regarding their ice cream decision. We used one mechanical and one manual method to measure the focus of thoughts. The results using the manual method are reported in the section below. Our mechanical method was the Linguistic Inquiry and Word Count (LIWC) software (Pennebaker et al., 2015). LIWC software enables researchers to create and upload custom dictionaries to investigate specific linguistic markers. Management researchers created and validated a regulatory focus dictionary (Appendix F) in order to measure the promotion and prevention content, independently, in CEO letters to shareholders (Gamache et al., 2015). Entrepreneurship researchers put that same dictionary to use in analyzing the type of questions female entrepreneurs field at venture capital pitch competitions (Kanze, Huang, Conley & Higgins, 2017).

We analyzed our participants’ thoughts in the regulatory focus LIWC dictionary. Overall, participants assigned to the prevention induction condition did not score significantly higher on prevention than their counterparts in promotion or control conditions. Similarly, participants in the promotion induction condition did not score significantly higher on promotion than their counterparts in prevention or control conditions. Based on our findings, it appears the inductions did not place participants in
regulatory states. On explanation for this finding is that the essay prompts were too broad and that an essay specifically about food or diet would have influenced decisions in the hypothesized directions.

**Focus of Thoughts.** While we did not find that induction caused a change in decision is it possible induction still predicted focus of thoughts? We hypothesized that participants assigned to the prevention induction would generate thoughts lists that were overall prevention in nature and that participants assigned to promotion or no induction conditions would generate thoughts more promotion in nature. A regression analysis revealed a moderate main effect of induction on FOT scores, $\beta = 0.11, t(150) = 1.71, p = 0.08$, in the predicted direction. An assignment to the prevention (or promotion) induction resulted in a 0.11 decrease (increase) in the overall FOT score. When looking at FOT scores by eater type, we find this modest, significant main effect is explained by the differences in FOT scores among Unrestrained Eaters, not Restrained Eaters. Unrestrained Eaters assigned to the promotion induction resulted in a 0.18 increase in FOT among Unrestrained Eaters and a 0.18 decrease if assigned to prevention, in general, $\beta = 0.18, t(74) = 1.91, p = 0.05$. But while there was a difference in FOT scores among Unrestrained Eaters assigned to promotion or prevention induction, neither of these scores was significantly different compared to the FOT scores in the control condition (Figure 18). As for Restrained Eaters, across all three inductions, there were no significant differences. Figure 18 helps visualize these results.
While we did not find significant differences in FOT scores among Unrestrained Eaters, the direction/sentiment of the thoughts were in the expected direction. The same cannot be said for Restrained Eaters. There was no main effect of induction on the FOT scores of Restrained Eaters, $\beta = 0.05$, $t(74) = 0.56$, $p = 0.57$, nor were any of the scores significantly different than zero. Most notable is the negative FOT scores of those assigned to the promotion condition. While we predicted the scores of these participants to be promotion in nature (i.e. positive FOT score), the mean score was just below zero ($M = -0.02$, $SE = 0.14$). Even when we remove the outlier in the promotion induction (FOT score = -2.29), the mean rises to 0.07 ($SE = 0.14$) but is still not significantly different than zero.
**Product Decision.** Finally, we tested whether thoughts generated predicted the decision of participants. Based on Study 3 and 4 findings, we hypothesized that thoughts listed by participants would predict their decision. Specifically, we predicted positive FOT scores would predict participants taking the ice cream over the dollar bill. Overall, we found this hypothesis to be true: participants with positive FOT scores were significantly more likely to take the ice cream over the dollar than those with negative FOT scores, OR = 2.23, z = 2.89, *p* < 0.01. As in previous studies, we were especially interested if this predictive relationship existed between both Restrained Eaters and Unrestrained Eaters and their respective decisions. Logistic regression analyses revealed FOTs of Restrained Eaters significantly predicted their decision to take the ice cream or the dollar bill, OR = 2.59, z = 2.30, *p* < 0.05, but less so for Unrestrained Eaters, OR = 1.93, z = 1.73, *p* = 0.08 (Figure 19). This finding is not surprising given that there was no effect of induction of the decision of Unrestrained Eaters. Unrestrained Eaters assigned to prevention, promotion or no induction conditions took the ice cream at nearly the same rate.
Logistic regression analyses for the promotion and prevention induction were not significant. This was to be expected given the significant skew of Focus of Thoughts due to induction assignment. However, for the no induction condition, we ran a logistic regression to further confirm the relationship between FOT scores and product decision. We found that FOT scores significantly predicted the decision of participants assigned to the no induction condition, OR = 2.66, z = 2.03, \( p < 0.05 \), such that an FOT score of 1 predicted a .5 probability of taking the ice cream over the money. An FOT of -1 predicted just a .12 probability of taking the ice cream.

Discussion

In Study 5, we tested whether regulatory focus inductions could be used to influence our participants’ decisions about taking or not taking an ice cream sandwich. Based on our previous findings outlined in this dissertation, we predicted that focus inductions would predict decision, such that participants assigned to a prevention induction would take the ice cream at a lower rate compared to participants with no
induction or a promotion induction. We also predicted participants in the promotion induction would chose to take the ice cream at a significantly higher rate than control or prevention participants. We also posited induction would predict FOT and that FOT would predict decision.

Overall, our results were unexpected and a number of our hypotheses were rejected based on our data. First, we found no effect of induction on participants’ decisions. While the decisions made were generally in the expected direction of our hypothesis, the differences between inductions were not significantly different. One explanation of this finding could be our essay inductions, which failed to properly induce participants into their respective focus states. While we went with a previously validated form of induction, the essays were perhaps not the best choices in this study. For one, the amount of time it took to write the essay might have resulted in a melted ice cream though no participants mentioned such during their aspect listing or to the researchers. Another possibility is that the inductions did not work due to the content of the essays written. Perhaps writing a promotion or prevention essay specifically about ice cream or food, in general, would have resulted in differences in ice cream taking.

We also rejected the hypothesis that induction predicted FOT scores, especially for Restrained Eaters. The thoughts of Unrestrained Eaters were in the right directions but the results of prevention and promotion inductions were not significantly different from the control induction. Interestingly, this finding hints at the possibility that the inductions worked, albeit not well. In general, the FOT scores of Restrained Eaters were not in the predicted direction; none of the inductions yielded FOT scores different than zero. If previous research suggesting exposure to a hedonic food item triggers a promotion focus
is accurate then perhaps our lack of significant differences between inductions has to do
with a baseline promotion level we did not consider. In other words, once Restrained
Eaters began writing the induction essay, they already had such a heightened level of
promotion that no induction could entirely undo it. Another possible explanation has to
do with the length of time Restrained Eaters had to make their decision (Ramanathan &
Menon, 2006; Bublitz et al., 2010; Dai et al. 2014). Researchers have found that when a
hedonic food item is available and the opportunity to make a decision is immediately
available, impulsive individuals will behave hedonically. However, the decision may be
different if there is a delay between when the hedonic item is presented and the actual
decision is made. It is possible that while writing and essay and aspect listing, Restrained
Eaters were able to rededicate themselves to more goal oriented behavior via their
thoughts. If the time delay is the reason behind our results, these inductions worked well
in that they influenced the decision of Restrained Eaters in a way that helps them reach
their health goals.

Despite a number of rejected hypotheses, we found our final hypothesis to be true;
FOT scores predicted decision. This finding is inline with our previous research findings
that the thoughts, and in this case FOT, is very predictive of behavior. This study was a
test to see whether regulatory focus could be induced such that thoughts generated would
be caused by induction and, therefore, influence decision. In addition to testing stronger
focus induction methods, future research could also focus on feelings after the decision.
Does the promotion focus continue for those who took the ice cream? Does the
prevention focus continue for those who took the dollar? Research suggests that a
prevention induction following a promotion choice should diminish the feeling of reward
and satisfaction garnered from the promotion choice. Perhaps this could be used as a way to correct behavior to be more goal oriented among Restrained Eaters. Scholarly evidence suggests that unwise choices and consumption is typically followed by guilt and regret (Rook, 1987). It would be interesting to test whether prevention induction following hedonic food intake would lower disinhibition behavior among Restrained Eaters.

This study had two main limitations, which can inform future research. First, we did not measure whether Restrained Eaters in this study were close or far away from their dietary goals. In other words, we did not measure whether participants considered themselves to be maintaining their weight loss or still trying to lose weight. Fuglestad and colleagues (2008; 2015) demonstrated that proximal distance from goals and regulatory focus predominance predicts the probability of reaching weight loss goals. It is possible proximal distance from goals and focus predominance would have explained the differences in ice cream taking among Restrained Eaters. Second, we did not ask participants when it was the last time they failed to make a healthy choice. A failure closer in time would make it difficult to change a Restrained Eater’s decision, regardless of induction. In future studies, distance from weight loss goal and time since last failure should be documented to help explain variance in findings.

Future studies using Regulatory Focus Theory should test the effectiveness of more context-focused inductions on decision, the impact of proximal distance from goals on decision, time since last dietary failure and a baseline measure of regulatory focus prior to ice cream exposure.

**Conclusion**
Study 5 was the first study to test the effects of regulatory focus inductions using a Query Theory framework. Although inductions did not cause changes in behavior, we still found thoughts predicted decision. Future research should focus on testing stronger regulatory focus inductions to see whether our results were a result of weak inductions or if other interventions are more effective at influencing behavior.

Chapter 5
Structure of Thoughts, Focus of Thoughts and Time Orientation as Predictors of Decision

In this dissertation, we tried to predict the behavior of Restrained and Unrestrained Eaters using the endowment effect and thought lists coded according to Query Theory and Regulatory Focus Theory. In all studies, we found that thoughts generated during the decision process were more consistent predictors of behavior than endowment. In the chapters above, we looked at thoughts via Query Theory, as advantages and disadvantages, and via Regulatory Focus Theory, as promotion and prevention. Both approaches were accurate predictors of behavior and appeared to be associated with one another but we have yet to really discuss this association in any depth. In the following section, using data from Studies 1-4, we compared the predictive abilities of Query Theory to the predictive abilities of Regulatory Focus. We also took our analysis a little deeper by looking at the thoughts coded according to Regulatory Focus Theory and Query Theory and look how mismatched thoughts (i.e. disadvantages-promotion and advantages-prevention) influenced our analyses. Finally, we discuss potential mechanisms, which may explain the generation of thoughts and behaviors of Restrained and Unrestrained Eaters.
Query Theory & Regulatory Focus Theory. What is the relationship between structure of thoughts and focus of thoughts? In Studies 1-4, we tested the predictive power of structure of thoughts and focus of thoughts for a food decision. SOT was determined by manual coding by the participants where participants coded each of their thoughts as an advantage, disadvantage or neither for taking the product. FOT was also a manual coding but done by trained researchers. Each thought was coded as a promotion or prevention focus thought. In the previous chapters, we viewed SOT and FOT separately; in this section we compare them to each other to determine which measure is a stronger predictor of behavior and is better at influencing the behaviors or Restrained Eaters.

One of the core principles of Query Theory is the order (i.e. standard median rank) and content (i.e. balance of thoughts) in which thoughts are listed effects decision and that the two measures should be correlated. We extrapolated this same assumption to our thoughts coded for promotion and prevention; the rationale being that thoughts of the same focus will group together (i.e. order) and that order will determine the overall valence of the thoughts listed. To check whether this principle holds true for both coding types and, if so, to what degree, we ran a series of Pearson’s correlation analyses measuring order and valence for Query Theory thoughts and for Regulatory Focus Theory thoughts. We found the SMRD and BOT measures of Query Theory to be moderately and significantly correlated in the expected, positive direction, $r = 0.53$, $t(266)=10.14$, $p < 0.001$, with a 95% confidence interval of 0.43 to 0.63 (Figure 20). In other words, as predicted by Query Theory, participants who listed advantages early on in the thought listing were likely to generate more advantages than disadvantages. For
thoughts according to regulatory focus, there was a significant, positive relationship
between order and valence but the correlation was weak, \( r = 0.33, t(266) = 5.81, p < 0.001 \), with a 95% confidence interval of 0.22 to 0.43 (Figure 21). The association
between the order and content of thoughts coded according to Query Theory appears to
be much stronger than thoughts coded for Regulatory Focus Theory.

Fig. 20. Query Theory (Studies 1 & 2): Correlation of Order and Content. As predicted
by Query Theory, the order and content of thoughts were positively correlated, \( r = 0.53, t(266) = 10.14, p < 0.001 \).
Fig. 21. Regulatory Focus Theory (Studies 3 & 4): Correlation of Order and Content. We found the order and content of thoughts were positively correlated, $r = 0.33$, $t(266) = 5.81$, $p < 0.001$.

Figures 22 and 23 are correlation matrices broken out by eater type and by order and content measures. We see that the association between Query Theory’s order and content are higher than that of Regulatory Focus. All correlation values displayed were significant at .05. Variables preceded by ‘QT’ indicate order (i.e. SMRD) and content (i.e. BOT) of thoughts coded as advantages/disadvantages/neither. ‘RF’ indicates the order and valence of thoughts coded as promotion/prevention. Among Restrained Eaters, Query Theory measures were moderately correlated, $r = 0.50$, $t(123) = 6.40$, $p < 0.001$, 95% CI: [0.36, 0.62]). Regulatory Focus Theory measures were also correlated but the association was weaker, $r = 0.26$, $t(123) = 3.01$, $p < 0.01$, 95% CI: [0.12, 0.42] (Figure 22). The associations between Query Theory and Regulatory Focus coding for Unrestrained Eaters was closer than for Restrained Eaters (Figure 23). Thoughts coded as advantages/disadvantages/neither were moderately correlated, $r = 0.54$, $t(141) = 7.60$, $p <
0.001, 95% CI: [0.41, 0.64], while thoughts coded as promotion/prevention were nearly moderately correlated, $r = 0.41, t(141) = 5.27, p < 0.01, 95\%$ CI: [0.25, 0.53]. These findings provide evidence of discriminate validity. Based on these findings, Query Theory and Regulatory Focus Theory appear to not be related. The correlations between the order and valence of the theories are low and, therefore, unrelated.

![Correlation matrix of Restrained Eaters’ order and content of thoughts when coded according to Query Theory vs. Regulatory Focus Theory. The association between order and content is stronger among thoughts coded for Query Theory ($r = 0.50, t(123) = 6.40, p < 0.001, 95\%$ CI: [0.36, 0.62] compared to Regulatory Focus Theory: $r = 0.26, t(123) = 3.01, p < 0.01$). All correlations shown are statistically significant at 0.05.](image-url)
Fig. 23. Correlation matrix of Unrestrained Eaters’ order and content of thoughts when coded according to Query Theory vs. Regulatory Focus Theory. Thoughts coded according to Query Theory were more closely associated than thoughts coded for Regulatory Focus Theory (Query Theory: $r = 0.54$, $t(141) = 7.60$, $p < 0.001$, 95% CI: [0.41, 0.64]; Regulatory Focus Theory: $r = 0.41$, $t(141) = 5.27$, $p < 0.01$, 95% CI: [0.25, 0.53]).

Lastly, we mapped structure of thoughts and focus of thoughts onto one another to test whether they were significantly different. Based on our findings above, we were not surprised to find they were moderately and significantly correlated with one another, $r = 0.56$, $t(266) = 10.99$, $p < 0.001$, 95% CI: [0.47, 0.63] (Figure 24). Figure 24 shows the structure of thought and focus of thought scores of 268 participants making the ice cream decision. Overall, it is clear that the two measures are related to one another, even when broken out by eater type. This finding is not so surprising given some of the overlapping results in Studies 1-4. Comparing the scatterplots of SOT and FOT by eater type and endowment conditions and the logistic regressions of SOT and FOT on decisions in the
chapters above, there is evidence that there are overlapping trends in the coding, although the relationship of order and content in this sample was stronger for Query Theory than Regulatory Focus Theory. We also conducted a logistic regression with both SOT and FOT as predictors of decision. When both SOT and FOT were included in the model, we found FOT was no longer a significant predictor of behavior (OR = 1.35, \( z = 1.48, p = 0.13 \)) but that SOT was still significant (OR = 2.75, \( z = 5.05, p < 0.001 \)). We believe thoughts coded using regulatory focus faired fairly well in this uncharted territory. Despite the fact we used regulatory focus coding in a novel approach that applied it to a framework that had never been done, it showed some promise in predicting behavior. And while our regulatory focus inductions failed to influence behavior in Study 5, we still found evidence that thoughts generated and coded for regulatory focus were strong predictors of behavior. From these correlations and from our results, it is clear the Query Theory approach is better at predicting and influencing decisions in this experimental context and using this methodology but regulatory focus certainly shows some promise.
In prior chapters, it was hard to ignore the association between advantage and promotion thoughts as well as disadvantage and prevention thoughts. For example, in Study 1, we witnessed the endowed condition predicting SOT scores such that, participants generated significantly more advantageous thoughts than disadvantageous and that a majority of those same thoughts were manually coded as promotion in Study 3. The same relationship was seen among disadvantageous thoughts and prevention. However, thoughts across our measures do not always fall so clearly into these two categories; there were thoughts that did not follow the advantage-promotion and disadvantage-prevention pairing. According to Regulatory Focus Theory, promotion focus emphasizes hopes, aspirations and advancements. These sentiments can be in the form of wanting gains (i.e. the presence of positives) and avoiding non-gains (i.e. the absence of positives). On the other hand, prevention focus emphasizes safety, responsibility and security. These feelings of prevention can be in the form of
maintaining non-losses (i.e. the absence of negatives) and avoiding losses (i.e. the presence of negatives). So while there is a clear connection between the definition of promotion and advantage, likewise for prevention and disadvantage, there were a number of instances in our sample in which these pairings were switched.

From Study 1 and 2, we had a total of 268 participants that generated 1145 unique thoughts about their decision to take or not take an ice cream sandwich. In Table 3, we see examples of actual thoughts generated by our participants coded as advantage/disadvantage/neither and promotion/prevention. In this table, we can more clearly see how thoughts generated can be coded differently depending on theory. For example, the advantage-prevention thought, “Five minutes isn't that much time, ice cream is worth it,” was an advantage because it was in favor of taking the ice cream but was also prevention focus because the participant was avoiding a loss of ice cream. The disadvantage-promotion thought, “I’d rather get calories from an ice cream I like better,” was an argument against taking the ice cream but was promotion focus in nature because the ice cream was not enough of a gain compared to what they could have from a different ice cream. “I could get this in the dining hall with a quick little swipe,” was thought of as neither an advantage nor disadvantage by the participant but was coded as a promotion thought because the participant is avoiding gaining something that was so easily accessible. “Why not?” was a prevention thought because this participant wanted to avoid losing the ice cream.
Table 3. Examples of how thoughts were coded under the two theories being used. The cross-classification of this table shows that there are examples of advantage-prevention and disadvantage-promotion thoughts, but that they were less common than advantage-promotion and disadvantage-prevention. The numbers in brackets are the counts of each type of combination for a total of 1145 unique thoughts.

<table>
<thead>
<tr>
<th>Query Theory</th>
<th>Regulatory Focus Theory</th>
<th>Promotion</th>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Advantage</strong></td>
<td>“I haven't eaten at all today so even ice cream would be nice for my energy levels.”</td>
<td>[406]</td>
<td>“Five minutes isn't that much time, ice cream is worth it.”</td>
</tr>
<tr>
<td><strong>Disadvantage</strong></td>
<td>“I’d rather get calories from an ice cream I like better.”</td>
<td>[149]</td>
<td>“Too much sugar might make me feel jittery.”</td>
</tr>
<tr>
<td><strong>Neither</strong></td>
<td>“I could get this in the dining hall with a quick little swipe.”</td>
<td>[51]</td>
<td>“Why not?”</td>
</tr>
</tbody>
</table>

We ran a logistic mixed-effects model by nesting thoughts coded using Regulatory Focus Theory and Query Theory within subjects to see which coding approach was better at predicting decision. We also included an interaction term of Regulatory Focus Theory coding and Query Theory coding to see whether the two effects were additive or possibly multiplicative. We found a significant, positive main effect of Query Theory advantage/disadvantage/neither thoughts on decision, OR = 1.52, z = 2.18, p < 0.05. There was no significant main effect of promotion/prevention coding on decision, p = 0.76. Lastly, the interaction of Regulatory Focused coded thoughts and Query Theory coded thoughts was not significant, p = 0.65. In other words, thoughts simply coded via Query Theory predicted decision with no added effect of promotion or prevention thoughts. For Restrained and Unrestrained Eaters, we also found a main effect of Query Theory coded thoughts on decision (Restrained Eaters: OR = 1.77, z = 304, p <
Unrestrained Eaters: OR = 2.81, z = 669, p < 0.01) but no other significant main effects or significant interactions.

Based on our findings, it appears the Query Theory approach predicting and influencing behavior using thought listing is the more reliable than Regulatory Focus Theory. First, we found that order and content of thoughts generated using Query Theory were more highly correlated and that this was also true when broken out by eater type. The order and content of promotion/prevention thoughts were also correlated but not as strongly. We also found that thoughts simply coded for Query Theory, that is not taking order or content into account, could significantly predict decision. Because one of the focuses of this research is to influence the behavior of Restrained Eaters, there is more evidence supporting the use of Query Theory over Regulatory Focus Theory. The self-coded thought lists appear to be a more reliable predictor of behavior leading up to the decision, which allows for more influence and confidence when creating interventions.

Mechanisms of Behavior. Previous research has separately examined the relationship between endowment (i.e. buyer vs. seller) and regulatory focus (Neale et al. 1987; Monga & Zhu, 2005; Schei et al., 2006; Appelt et al., 2009) and endowment and Query Theory (Johnson et al., 2007; Appelt et al., 2011). Research on motivation suggests that buyers, or those assigned to an unendowed condition, focus on minimizing losses and, therefore, adopted a prevention frame. Research from the field of judgment and decision making suggest buyers also focus on minimizing loses and, therefore, focus on the disadvantages of the offer. Motivation science research also suggests that sellers, or those assigned to an endowed condition, focus on maximizing gains and, therefore, adopt a promotion frame. Judgment and decision making researchers suggest buyers
focus on maintaining their status quo, therefore focus on the advantages for the status quo. While past research has demonstrated separately how two different approaches predict the same conclusion, we look at how these two approaches predict the same conclusion together and discuss the potential mechanisms driving decision. Although previous research testing the endowment effect has mostly focused on negotiations involving money, our studies examine the choice between time (or a dollar bill in Study 5) and ice cream. We believe the decisions of Unrestrained Eaters were explained primarily by preference and pleasure. Alternatively, we believe the effects of external cues and procrastination, or lack thereof, primarily explained the decisions of Restrained Eaters. The role of procrastination as a mechanism is discussed in greater detail later on in this chapter.

In Study 1, 2, and 5, we found no effect of endowment on the decision of Unrestrained Eaters. Endowment played a much more influential in the decision of Restrained Eaters than Unrestrained Eaters. In Study 1, Unrestrained Eaters chose to take the ice cream at the highest rate and generated advantages/promotion thoughts leading up to the decision. At no point during that experiment did the decision of Unrestrained Eaters appear to be open to influence. They were consistent in their support of ice cream taking and behaved as such. In Study 2, the thought reversal task, the rate at which unendowed Unrestrained Eaters chose the ice cream was slightly lower than those in the unendowed condition but, once again, the difference was not significant. Interestingly, endowed Unrestrained Eaters listed significantly more disadvantages-prevention thoughts, in order and valence (as the result of the unnatural-order thought listing instructions), which would usually predict no ice cream taking, suggesting that thoughts
mattered less for this group than their initial preference. It is possible the implicit natural order of Unrestrained Eaters neutralized the effects of the instructions to list thoughts in an unnatural order. Finally, in Study 5, we also found Unrestrained Eaters taking the ice cream at a higher rate compared to Restrained Eaters across all three conditions but these differences were also not significant. Furthermore, thoughts only moderately predicted decision. In our studies, most Unrestrained Eaters chose the ice cream over the alternative option. Previous research suggests hedonic items puts both eater types in a more heightened state of promotion, causing them to think more about the advantages and gains of ice cream taking, but that the thought process that follows for Unrestrained Eaters is far less influential than it is for Restrained Eaters (Shah & Kruglanski, 2003; Zhou & Pham, 2004; Sengupta & Zhou, 2007; Mukhopadhyay & Johar, 2009). We were able to see whether participants were more promotion focused after exposure to the ice cream versus the shampoo using the mean standard median rank (i.e. order) scores from Study 1. We found that both endowed eater types listed more promotion focus thoughts early on when generating thoughts about the ice cream than when generating thoughts about the shampoo (Restrained Eaters ice cream vs. shampoo: $M_{\text{ice}} = 0.38$, $SE_{\text{ice}} = 0.13$ vs. $M_{\text{shampoo}} = 0.15$, $SE_{\text{shampoo}} = 0.11$; Unrestrained Eaters ice cream vs. shampoo: $M_{\text{ice}} = 0.35$, $SE_{\text{ice}} = 0.07$ vs. $M_{\text{shampoo}} = 0.23$, $SE_{\text{shampoo}} = 0.08$). These scores were in the right direction but were not significantly different. Thinking back to the behavioral model of Restrained Eaters (Figure 1), Unrestrained Eaters undoubtedly experience a response to external and cognitive triggers but the level of response is not as heightened nor are the consequences of their reactions as damaging.
As predicted by our behavioral model of Restrained Eaters, endowment had a significant effect on decision. When endowed with the ice cream in Study 1, Restrained Eaters succumbed to the temptation of the ice cream whereas unendowed Restrained Eaters were able to demonstrate a strong inhibition and resistance to the temptation. In Study 2, the effects of endowment were reversed due to the aspect listing reversal. We found the decision of Restrained Eaters was partially explained by endowment and changes in the structure of thoughts. In Study 5, we found Restrained Eaters ice cream taking at the same rate as Unrestrained Eaters across all three conditions. Based on our findings, it appears that when Restrained Eaters are endowed with a tempting food item without intervention, they are likely to take it. When Restrained Eaters choose to give into this trigger, we believe they are partly acting on hedonism and procrastination, which were caused by thought listings.

Another possible process underlying behavior is procrastination. That is, resisting procrastination or giving into the temptation to procrastinate starting new healthy behaviors. Because Restrained Eaters spend so much time going on and off diets, they likely lack the initial motivation that comes from starting a new one. Aspirational thoughts of the future and relegating past imperfections to a previous period in life are often found among individuals who have recently committed themselves to behavioral change (Dai, Milkman, & Riis, 2014). Feelings of hope for the future self that can motivate a newly committed dieter for a period of time likely does not exist among the Restrained Eater who has tried to jump start a new diet/behavior but has seen themselves fail many times. If procrastination did play a role in driving behavior and thought content, we would expect advantage and promotion thoughts to be a mechanism to delay the
inevitable unpleasantness of restraint. The advantage and promotion thoughts are likely arguments for instant gratification, maximizing their pleasure in that moment and smaller sooner rewards (Li, 2008). Listing more advantages and gains and listing them early on allow Restrained Eaters to prioritize thinking about the present, ignoring the past and future. On the other hand, disadvantages and prevention thoughts listed early on and in greater numbers likely focus on making healthy choices and holding onto any motivation they currently have.

We were able to test this hypothesis using LIWC software (Pennebaker et al., 2015). We were able to capture the time orientation\(^3\) of each thought listed by participants the (i.e. past, present, future). LIWC calculates the percentage of each LIWC category found in a thought. For example, we could discover that 30% of all the words in a thought generated were present-focused and 5% past-focused. Percentages were based on the total number of words in the thought and how many words were present, past or future focused. We ran a nested logistic mixed-effects model to test whether past, present or future thoughts had an effect on decision of Restrained Eater.\(^4\) We found two of the three time orientations had a significant effect on outcome. Present tense orientations had a positive logit coefficient of 0.09, implying the increase of present tense verbs resulted in the increase likelihood of ice cream taking, \(\text{OR} = 1.05, z = 26.7, p < 0.001, 95\% \text{ CI:}\)

\[^3\] The LIWC dictionary identified past, present and future time orientation variables in the following way: Past orientation variables are a mix of past tense verbs and references to past events/times. Present orientation variables are present tense verbs and references to present events/times. Future orientation variables are future tense verbs and references to future events/times.

\[^4\] We also ran a nested logistic mixed-effects model to test whether positive or negative emotions found in the thoughts had an effect on the decision of Restrained Eaters. Neither positive nor negative emotions had an effect on decision.
We also found the future orientation had a negative logit coefficient of -0.19 implying the increase of future tense verbs resulted in a decrease in likelihood of ice cream taking, OR = 0.82, $z = -34.7, p < 0.001$, 95% CI: [0.81, 0.83]. We ran the same analysis for the thoughts of Unrestrained Eaters but found no significant results. If we think back to the conflicting goals of ingesting food and being healthy, endowment allows Restrained Eater the ability to choose to eat the ice cream. These results suggest thought generation in the endowed condition, via Query Theory, worked to suppress the rule of eating healthy (future thoughts) and elevated the desire for hedonic food (present thoughts).

These results are quite telling of the process that Restrained Eaters go through when making a decision about a hedonic stimulus. We posited the mechanism driving the decision of Restrained Eaters to be hedonic and procrastination. First, Restrained Eaters would experience an urge to behave in a hedonic manner when faced with our external cue. This would result in focusing on immediate pleasure and justification for procrastinating the start of healthy decisions to a later time. We believed this mechanism would manifest itself in the form of present predominant thoughts for ice cream taking and past and future thoughts for not taking. We found present and future tenses significantly predicted behavior in the expected direction. Past tense was not significant in predicting behavior. Perhaps Restrained Eaters refrain from thinking about past food decisions, as it likely contains painful memories of repeated failed attempts to gain control of their health.

An increased urge to behave in a hedonically pleasing manner comes from a Restrained Eaters’ heightened response to our external cue and a focus on immediate
pleasure over personal goals and obligations. In our studies, we believe it was possible that putting ice cream in front of Restrained Eaters without warning was quite overwhelming and potentially caused emotional distress. Research has demonstrated that sudden emotional distress inhibits the ability to think past the immediate present and choice. What follows is a breakdown of defense mechanisms, likely the ability to generate disadvantages or prevention reasoning, and a heightened desire for the hedonic stimuli (Vohs & Heatherton, 2000; Hofmann, Rauch, & Gawronski, 2007; Wagner et al., 2013). We believe that in this moment, advantageous and promotion thoughts supporting taking the ice cream were the thoughts that mostly easily came mind. An eagerness to generate positive thoughts were likely influenced by level of personal restraint; the more restraint they felt, the higher cognitive strain and the easier it was to produce positive reasons for keeping the ice cream. As for unendowed Restrained Eaters in Study 1 who were never tempted by the external cue, they were able to keep their resolve and think more rationally about their decision. Without an external or cognitive cue, these Restrained Eaters never had to deal with cognitive or physical triggers that breakdown determination. However, as we saw in Study 2, unendowed Restrained Eaters without the external temptation still became ice cream takers. For a Restrained Eater who spends a great deal of time and energy practicing cognitive and physical restraint, they likely think about food a lot, namely foods they cannot eat. Therefore, we were not surprised by the ability of these unendowed Restrained Eaters to easily recall good thoughts about ice cream. Furthermore, we believe the typing aloud task positively about the item made the temptation salient enough. The opposite process likely occurred for unendowed Restrained Eaters in Study 1 and endowed Restrained Eaters in Study 3. In both a
potentially helpful and detrimental way, thought generation brings a heightened awareness to the decision.

**Conclusion**

The literature on weight loss interventions and food behaviors aimed at improving the health and decisions of chronic dieters are vast but millions of Americans still fail to reach their health goals. There is a great deal of evidence demonstrating how an individual’s food decisions and behaviors are susceptible to influence (Loxton & Dawe, 2001; Fedoroff, Polivy, & Herman, 2003; Wansink, 2004; Wansink & van Ittersum, 2007; Stroebe et al., 2008). There is, however, a lack of research that specifically targets the decision of chronic dieters already face-to-face with a trigger and experiencing the effects of that trigger. In addition, there is no research that uses thought listings to examine the underlying process leading up to the decision. The present set of findings demonstrates that thoughts generated leading up to a food decision predicts behaviors. Our results also suggest Restrained Eaters are susceptible to external cues such as being endowed with the food and justify their choice of prioritizing satisfaction in the short term over the long term are caused by thought list order and valence. However, the effect of an external cue can be diminished, or eliminated, by changing the order in which thoughts are considered. We believe our theoretical contribution to the field of psychology is the demonstration that Query Theory, which has been used in a wide variety of areas, also applies to the food decisions of Restrained Eaters. This body of research is only begins to explore the possibilities of using Query Theory as a behavioral intervention tool for Restrained Eaters.
Results from Study 1 demonstrated no effect of endowment on Unrestrained Eaters but a strong effect of endowment on Restrained Eaters. The thoughts of participants for both eater types predicted their decisions in the end. Unrestrained Eaters, regardless of endowment, generally reasons for taking the product but we only saw this among endowed Restrained Eaters. Unendowed Restrained Eaters were able to successfully restrain themselves through endowment and thoughts generated. Study 2 revealed a reversal of the endowment effect for Restrained Eaters. The behavior of Unrestrained Eaters was also affected though the difference was not significant, once more suggesting their decisions were based off of feelings of wanting or needing. We found that changing the order in which Restrained Eaters considered ice cream taking significantly influenced their decisions. Study 3 and 4 recoded thoughts generated in Study 1 and 2 as promotion or prevention focus. Results revealed thoughts coded according to regulatory focus also predicted the decision of our participants and were associated with Query Theory coding. Findings also demonstrated promotion focus thoughts predicted ice cream taking whereas prevention focus thoughts predicted the opposite. We used results from Study 3 and 4 as justification to test the effectiveness of varying regulatory focus inductions to influence decision in Study 5. Study 5 inductions did not work to significantly alter the behavior of Restrained or Unrestrained Eaters; however, their thoughts still predicted behavior. Study 5 findings provided some interesting insight into the potential baseline focus of Restrained Eaters when presented with a hedonic choice. We believe Restrained Eaters heightened promotion focus, due to the external cue, may have affected the inductions.
Overall, these results provide support for the hypothesized heightened influence of external cues on Restrained Eaters and provide support for the use of thought based interventions as a way to curb behavior away from bad food choices and, potentially, disinhibition. The underlying mechanism of behavior for Unrestrained Eaters appears to be the simple desire (or no desire) to eat ice cream. The decision of Restrained Eaters is a bit more complicated due to restraint. Restraint causes a heightened response in Restrained Eaters the form of involuntary physical reactions and diminished, logical cognitive processing. Restrained Eaters choosing to take the ice cream use thought listing as a way to justify their decision, with the first thought generated being highly influential. Ice cream taking Restrained Eaters focus on present hedonic gains and instant gratification. They also use thought lists as a means of procrastination to starting healthy eating. Because Restrained Eaters spend most of their time restarting healthy behavior after a period of disinhibition, they lack a renewed sense of motivation that usually comes with a commitment to behavioral change. The thoughts of Restrained Eaters choosing the ice cream focus on the present while the thought of Restrained Eaters choosing not to take the ice cream focus on the future. How our Restrained Eaters felt after eating the ice cream, or not eating, should be the goal of future research. Tracking the subsequent decisions of our Restrained Eaters would determine whether these interventions prevented or encouraged a period of disinhibition.

We chose a subject matter that hypothetically influences every person, every day: what do I eat? We believe there are several ways our research can be applied beyond the lab to influence people’s decisions. We saw that thought generation can help guide people’s decisions away from bad choices. This influence can be applied in real food
decision settings. For example, when ordering food off a menu, there are ways to communicate disadvantages of items besides nutrition facts. Translating nutrition facts into more tangible, easily understood consequences (e.g. minutes of exercise needed) could help influence decisions. And since order and content of thoughts are correlated, that initial piece of disadvantageous information could result in more disadvantages considered by the decision maker. It would also be interesting to test the effect of social proofing online (e.g. customer ratings/comments) on decisions. Customers are able to rate/comment on almost anything online with many customers basing purchase decisions on comments. It is likely that the order in which these comments are read influences decisions, independent of overall ratings. In addition, we also believe it can be used to guide people towards good choices (i.e. guilt-free options). Focusing on little-known benefits of certain foods or ingredients may also help sway decisions and educate consumers.

Our studies are subject to limitations. First, the hedonic object remained the same across all experiments. This limits the generalizability of our findings to objects that are fleeting in nature. Would our results replicate if participants were given an item they could give away? While we do go beyond a hypothetical choice, future studies should attempt to replicate results using different stimuli to see if patterns of behavior still hold. Second, our experimental design is a slight departure from how everyday decisions about food are made. Third, in Chapter 5, we discussed the possibility that the object placed in front of our Restrained Eaters was emotionally overwhelming. Rarely is food placed in front of an individual without warning, though it certainly happens. Perhaps our behavioral interventions only work, and are best suited for, situations in which the
Restrained Eaters forfeits control, such as donuts at the office or a meal at a dinner party.

Fourth, our studies failed to manipulate regulatory focus. In future studies, we plan to use regulatory focus inductions about food decisions and behaviors specifically. Doing so will hopefully work effectively to influence thoughts and decisions. Fifth, participants in our studies were drawn from a largely homogenous population. Students at Columbia University are not a representative sample of the United States or certain areas of the United States. While restraint is psychological and should, in theory, replicate across varying demographics and cultures, it is beyond the scope of this dissertation to determine so. Future research should test the effects or endowment and thought reversal on populations outside of a university context.

To truly change habits, we believe people need to undo the idea that certain foods are off limits. For many, restraint and deprivation is actually the main cause of chronic dieting in the United States. It causes people to do irrational things, like disinhibition, and then to make up for this behavior later with another irrational response, restraint. We think the road to effortless restraint begins with people thinking wildly differently about food: nothing is off limits. However, when a person wants something, they should incorporate the findings of these studies by asking themselves: Is this decision worth it? And how much do I need to be happy? In other words, encourage people to make a more conscious decision by asking conscious questions. Bringing more consciousness to eating behavior has the potential to be very powerful but, first, people need to pause and recognize a cycle of behavior.
References


Weber E, & Johnson, E. Constructing preferences from memory. In: Lichtenstein S,


Appendices

Appendix A. Revised Restraint Scale (Polivy, Herman, & Wasch, 1978)

1. How often are you dieting?
   a. Rarely
   b. Sometimes
   c. Usually
   d. Always

2. What is the maximum amount of weight that you have ever lost within 1 month?
   a. 5-9lbs
   b. 10-14lbs
   c. 15-19lbs
   d. 20+ lbs

3. What is your maximum weight gain within a week?
   a. 0-1lbs
   b. 1.1-2lbs
   c. 2.1-3lbs
   d. 3.1-5lbs
   e. 5.1+lbs

4. In a typical week, how much does your weight fluctuate?
   a. 0-1lbs
   b. 1.1-2lbs
   c. 2.1-3lbs
   d. 3.1-5lbs
   e. 5.1+lbs

5. Would a weight fluctuation of 5 pounds affect the way you live your life?
   a. Not at all
   b. Slightly
   c. Moderately
   d. Very much

6. Do you eat sensibly before others and make up for it alone?
   a. Never
   b. Rarely
   c. Often
   d. Always

7. Do you give too much time and thought to food?
   a. Never
   b. Rarely
8. Do you have feelings of guilt after overeating?
   a. Never
   b. Rarely
   c. Often
   d. Always

9. How conscious are you of what you're eating?
   a. Not at all
   b. Slightly
   c. Moderately
   d. Extremely

10. How many pounds over your desired weight were you at your maximum weight?
    a. 0-1lbs
    b. 1-5lbs
    c. 6-10lbs
    d. 11-20lbs
    e. 21+lbs

Appendix B. Assignment to endowment condition: Endowed vs. Unendowed.
Participants were randomly assigned to an endowed condition or unendowed condition (Study 1 and 2). Study 5 only had participants in the endowed condition.

Product A (Endowed Condition)
The product on the table is yours to keep and take with you. Later on, you will have the chance to exchange the product for an opportunity to skip study 2. Please think about your choice. When you are ready, please move onto the next screen.

Choice A: Take product with you
Choice B: Skip study 2

Product A (Unendowed Condition)
A photo of Product A is shown above. You have a choice. You can either take the product with you at the end of the study or you can skip study 2. Please think about your choice. When you are ready, please move onto the next screen.

Choice A: Take product with you
Choice B: Skip study 2
Appendix C. Thought List Task.
Before disclosing their decision, all participants were asked type aloud all the thoughts they were considering about their decision. Participants saw one of two screens depending on assignment to endowment (Study 1 and 5).

**Your thoughts about the product (Endowed Condition)**

Before you indicate you preference for this product, please tell us everything you are thinking of as you consider this decision to take the product or not take the product.

We would like you to list any thoughts, both positive and negative, that you might have about this decision. We will ask you begin by listing reasons for not taking the product first before listing reasons for taking the product.

We understand that these are often highly subjective reactions, reflecting our personal situation and our own uses of the product. Thus there is no right or wrong answers. You should also try to write down what reasons come to you as fast as you can. Ignore spelling, grammar, and punctuation when you type. We ask that you enter your thoughts in the box below, one at a time.

Please type your first thought in the box below and, as soon as you are done, hit the "Enter" key to submit your thought.

[First thought goes here]

**Your thoughts about the product (Unendowed Condition)**

Before you indicate you preference for this product, please tell us everything you are thinking of as you consider this decision to take the product or not take the product.

We would like you to list any thoughts, both positive and negative, that you might have about this decision. We will ask you begin by listing reasons for taking the product first before listing reasons for not taking the product.

We understand that these are often highly subjective reactions, reflecting our personal situation and our own uses of the product. Thus there is no right or wrong answers. You should also try to write down what reasons come to you as fast as you can. Ignore spelling, grammar, and punctuation when you type. We ask that you enter your thoughts in the box below, one at a time.

Please type your first thought in the box below and, as soon as you are done, hit the "Enter" key to submit your thought.

[First thought goes here]
Appendix D. Coding of Thoughts.
All participants were asked to code each of their thoughts as an advantage, disadvantage or neither (Study 1 and 2).

<table>
<thead>
<tr>
<th>Thought 1:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did this thought concern an advantage of owning the product or disadvantage, or neither?</td>
</tr>
<tr>
<td>X Advantage</td>
</tr>
<tr>
<td>X Disadvantage</td>
</tr>
<tr>
<td>X Neither</td>
</tr>
</tbody>
</table>

Appendix E. Reversal Thought List Task.
Before disclosing their decision, all participants were asked type aloud all the thoughts they were considering about their decision. Participants saw one of two screens depending on assignment to endowment (Study 2).

Your thoughts about the product (Unendowed Condition)

Before you indicate you preference for this product, please tell us everything you are thinking of as you consider this decision to take the product or not take the product.

We would like you to begin by listing any positive reasons first followed by any negative reasons, that you might have about this decision. We will ask you begin by listing reasons for taking the product first before listing reasons for not taking the product.

We understand that these are often highly subjective reactions, reflecting our personal situation and our own uses of the product. Thus there is no right or wrong answers. You should also try to write down what reasons come to you as fast as you can. Ignore spelling, grammar, and punctuation when you type. We ask that you enter your thoughts in the box below, one at a time.

Please type your first thought in the box below and, as soon as you are done, hit the "Enter" key to submit your thought.

[First thought goes here]
Your thoughts about the product (Endowed Condition)

Before you indicate your preference for this product, please tell us everything you are thinking of as you consider this decision to take the product or not take the product.

We would like you to begin by listing any negative reasons first followed by any positive reasons, that you might have about this decision. We will ask you begin by listing reasons against taking the product first before listing reasons for taking the product.

We understand that these are often highly subjective reactions, reflecting our personal situation and our own uses of the product. Thus there is no right or wrong answers. You should also try to write down what reasons come to you as fast as you can. Ignore spelling, grammar, and punctuation when you type. We ask that you enter your thoughts in the box below, one at a time.

Please type your first thought in the box below and, as soon as you are done, hit the "Enter" key to submit your thought.

[First thought goes here]


Using the LIWC dictionary (Pennebaker et al., 2015), we tested for differences regulatory focus between induction essays.

<table>
<thead>
<tr>
<th>Promotion Focus</th>
<th>Prevention Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Accomplish</td>
<td>15. Improve</td>
</tr>
<tr>
<td>2. Achieve</td>
<td>16. Increase</td>
</tr>
<tr>
<td>3. Aspire</td>
<td>17. Momentum</td>
</tr>
<tr>
<td>4. Aspiration</td>
<td>18. Obtain</td>
</tr>
<tr>
<td>5. Advancement</td>
<td>19. Optimistic</td>
</tr>
<tr>
<td>6. Attain</td>
<td>20. Progress</td>
</tr>
<tr>
<td>7. Desire</td>
<td>21. Promotion</td>
</tr>
<tr>
<td>8. Earn</td>
<td>22. Promoting</td>
</tr>
<tr>
<td>9. Expand</td>
<td>23. Speed</td>
</tr>
<tr>
<td>11. Gain</td>
<td>25. Toward</td>
</tr>
<tr>
<td>12. Hope</td>
<td>26. Velocity</td>
</tr>
<tr>
<td>13. Hoping</td>
<td>27. Wish</td>
</tr>
<tr>
<td>14. Ideal</td>
<td></td>
</tr>
<tr>
<td>15. Improve</td>
<td>28. Accuracy</td>
</tr>
<tr>
<td>16. Increase</td>
<td>29. Afraid</td>
</tr>
<tr>
<td>17. Momentum</td>
<td>30. Anxious</td>
</tr>
<tr>
<td>18. Obtain</td>
<td>31. Avoid</td>
</tr>
<tr>
<td>19. Optimistic</td>
<td>32. Careful</td>
</tr>
<tr>
<td>20. Progress</td>
<td>33. Conservative</td>
</tr>
<tr>
<td>21. Promotion</td>
<td>34. Defend</td>
</tr>
<tr>
<td>22. Promoting</td>
<td>35. Duty</td>
</tr>
<tr>
<td>23. Speed</td>
<td>36. Escape</td>
</tr>
<tr>
<td>24. Swift</td>
<td>37. Escaping</td>
</tr>
<tr>
<td>25. Toward</td>
<td>38. Evade</td>
</tr>
<tr>
<td>26. Velocity</td>
<td>39. Fail</td>
</tr>
<tr>
<td>27. Wish</td>
<td>40. Fear</td>
</tr>
<tr>
<td>28. Accuracy</td>
<td>41. Loss</td>
</tr>
<tr>
<td>29. Afraid</td>
<td></td>
</tr>
<tr>
<td>30. Anxious</td>
<td></td>
</tr>
<tr>
<td>31. Avoid</td>
<td></td>
</tr>
<tr>
<td>32. Careful</td>
<td></td>
</tr>
<tr>
<td>33. Conservative</td>
<td></td>
</tr>
<tr>
<td>34. Defend</td>
<td></td>
</tr>
<tr>
<td>35. Duty</td>
<td></td>
</tr>
<tr>
<td>36. Escape</td>
<td></td>
</tr>
<tr>
<td>37. Escaping</td>
<td></td>
</tr>
<tr>
<td>38. Evade</td>
<td></td>
</tr>
<tr>
<td>39. Fail</td>
<td></td>
</tr>
<tr>
<td>40. Fear</td>
<td></td>
</tr>
<tr>
<td>41. Loss</td>
<td></td>
</tr>
<tr>
<td>42. Obligation</td>
<td></td>
</tr>
<tr>
<td>43. Ought</td>
<td></td>
</tr>
<tr>
<td>44. Pain</td>
<td></td>
</tr>
<tr>
<td>45. Prevent</td>
<td></td>
</tr>
<tr>
<td>46. Protect</td>
<td></td>
</tr>
<tr>
<td>47. Responsible</td>
<td></td>
</tr>
<tr>
<td>48. Risk</td>
<td></td>
</tr>
<tr>
<td>49. Safety</td>
<td></td>
</tr>
<tr>
<td>50. Security</td>
<td></td>
</tr>
<tr>
<td>51. Threat</td>
<td></td>
</tr>
<tr>
<td>52. Vigilance</td>
<td></td>
</tr>
</tbody>
</table>