

YOU ARE WHAT YOU BELIEVE: LEVERAGING IMPLICIT THEORY TO  
FOSTER HEALTHY BEHAVIORS

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## ABSTRACT

The rising cost of healthcare remains mystifying on a global scale. Some of the main factors contributing to the exorbitant costs in healthcare are doctors' visits and hospital readmissions, many of which result from preventable diseases, such as obesity. Adoption of simple health practices, such as reducing unhealthy food consumption, could help prevent these diseases. Despite this, a considerable number of adults fail to adopt preventive behaviors. In the current research, we explore how people can be nudged toward adopting healthy practices. Specifically, drawing upon implicit theory (Dweck, Chiu, & Hong 1995), we argue and show that people who have a fixed mindset (also known as entity theorists) are likely to engage in more unhealthy consumption, compared with those who have a growth mindset (also known as growth theorists). Our findings show that priming people with a growth mindset, a mindset where people perceive that people and their behaviors can change, reduces unhealthy consumption. The research presented here has significant managerial implications because it could change how we encourage and approach individuals to adopt healthier behaviors through persuasive messaging, resulting in improved health outcomes. Finally, the study results add to the current literature on implicit beliefs can impact people's behaviors, as well as to literature on persuasive messaging.

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# CHAPTER 1

## INTRODUCTION

The cost of healthcare has continued to increase substantially over the years. President Nixon enacted Health Maintenance Organizations (HMO) to cut costs in 1973. More than forty years later, the U.S. government is still attempting to reduce costs while the gross domestic product for healthcare has increased to nearly 20% (Myers, 2019). Under the current law, national health spending is projected to grow at an average rate of 5.5 percent per year, reaching nearly \$6.0 trillion by 2027 (CMS.gov, 2019). While there are many factors contributing to the rise in healthcare costs, some of the primary reasons include a rise in chronic conditions, many of which are avoidable. For example, obesity, which costs the US health system \$147 billion a year, has been steadily increasing in the United States. Preventive behaviors, such as reducing unhealthy food consumption, could help to reduce the growing trend of being overweight and or obese (CDC.gov, 2019).

To control the rising health problems, people are exposed to different preventive messages, encouraging them to adopt preventive behaviors, such as reducing unhealthy food consumption (see, Figure 1 for some examples). Despite exposure to such preventive messages, people continue to consume unhealthy food. Accordingly, one of the main concerns for policy makers is understanding how such preventive messaging could be made more effective (Wadhwa & Zhang, 2019). Research suggests that small changes in preventive messaging could make them more effective (e.g., Meyerowitz & Chaiken, 1987; Wadhwa and Zhang, 2019). The current research contributes to this body of research by exploring whether the type of implicit beliefs people hold about whether

people and the world around them are fixed (entity theorists) or changeable (growth theorists; Dweck, Chiu, & Hong, 1995; Dweck & Leggett, 1988) can impact people’s likelihood to consume unhealthy food. If implicit belief in fixedness or changeability of people can affect unhealthy food consumption, it will have important implications for designing messaging targeted at reducing obesity.

<b>Message</b>	<b>Campaign</b>
“Skip seconds...Lose your gut”	Small steps
“Enjoy your food, but eat less”	USDA (MyPlate)
“Eat a variety of colorful fruits and vegetables every day”	5-A-day
“Low in calories, full of nutrients, reduces your risk of chronic disease...fill half your plate with fruits and vegetables at every meal. Fresh, frozen, dried, canned- they all count. Choose a variety of colors to stay healthy and fit. Your body will thank you.”	Eat smart, move more
“It’s not a diet, it’s a lifestyle”	CDC
“The temptation to eat unhealthy food is hard to fight, but it’s a fight that you and your community can win”	YFood Fight (YMCA)

Figure 1.1 Healthy Eating Campaign Messages. Adapted from Puhl, R., Peterson, J. L., & Luedicke, J. (2013). Fighting obesity or obese persons? Public perceptions of obesity-related health messages. *International Journal of Obesity*, 37(6), 774-782.

As alluded to earlier, one of the critical drivers of rising health care costs is preventable problems like obesity. Obesity can cause many health problems, including diabetes, cardiovascular disease, back pain, depression, body image disturbance, and sleep disorders (Akinnusi, Saliba, Porhomayon, & El-Solh, 2012). To better understand how obesity is established, it should be noted that people between the Body Mass Index (BMI) of 25.0 and 29.9 are perceived as overweight. Those above the BMI of 30.0 are perceived to be obese. Data ranging from 2009 to 2017 indicate that over 70 million U.S.

residents are obese, and recent reports project that by 2030, half of all adults (115 million adults) in the United States will be obese (U.S. Department of Health & Human Services, 2020). Additionally, data ranging from 2017 to 2018 indicate that 42.4% (age-adjusted) of U.S. residents are obese, and the prevalence of severe obesity was 9.2%. (Hales et al., 2020).

Unhealthy eating is one of the primary causes of obesity (Kuzbicka & Rachon, 2013). Despite a belief that obesity is a result of genetics, studies indicate that obesity can be predominantly attributed to unhealthy eating behavior (Jasinska et al., 2012; Wing, 2004). Studies show that between 2013 and 2016, approximately 37% or 84 million adults living in the US consumed fast food (Fryar, C. D., Hughes, J. P., Herrick, K. A., & Ahluwalia, N., 2018). The consumption of fast food, sugary drinks, desserts, candy, and unhealthy snacking behavior leads to an increased BMI and obesity (Heerman et al., 2017). The combined effects of these unhealthy eating behaviors have led to an obesity epidemic (Herman et al., 2017).

Given the consistent increase in unhealthy food consumption, it is critical to understand the psychological drivers of unhealthy consumption. Drawing upon implicit theory (Dweck et al., 1995), we propose that one important driver of unhealthy consumption is that people believe that their traits are fixed, not changeable; that is, they believe that people and the world around them cannot be changed. Specifically, we argue that people with a fixed mindset are more likely to consume unhealthy food. We further propose that inducing a growth versus a fixed mindset in people should make them more receptive to preventive messaging, encouraging them to reduce their unhealthy food consumption. Consistent with past research (Burnette, 2010; Moyun & Xiaolan, 2003;

Plaks & Chasteen, 2013), in this research, people with a growth mindset (i.e., those who believe that people and the world are changeable) are referred to as incremental theorists, while those with a fixed mindset are referred to as entity theorists. In a similar vein, beliefs entity theorists hold are referred to as entity-like beliefs, and beliefs incremental theorists hold are referred to as growth-like beliefs (Ajzen & Madden, 1986).

We argue that one of the reasons why entity theorists are likely to eat more unhealthy food, compared with incremental theorists, is because of lack of perceived behavioral control. Perceived behavioral control is a person's belief as to how easy or difficult it is to perform the behavior (Ajzen & Madden, 1986). In other words, it taps into whether a behavior is under one's voluntary control or not. Perceived behavioral control has been shown to impact preventive behaviors (Ellis et al. 2016). We propose that entity theorists are likely to believe that a behavior is not under their control which, in turn, could impact their intention to consume unhealthy, indulgent food.

In sum, we seek to achieve the following objectives: (1) explore how a growth versus a fixed mindset can impact an individual's preferences related to unhealthy eating behavior (2) examine if manipulating people's implicit beliefs would impact unhealthy food consumption; specifically, we examine if priming people with a growth versus a fixed mindset could impact people's intention to consume unhealthy food (3) examine if perceived behavioral control mediates the impact of mindset on health behaviors and (4) examine whether a growth mindset could lead people to experience enhanced behavioral control, thus encouraging them to adopt preventative behaviors, such as consuming less unhealthy foods.

The current research study seeks to make different theoretical and managerial contributions. First, priming a mindset through messaging is an inexpensive solution that could nudge people to reduce their unhealthy consumption. According to the National Health and Nutrition Examination Survey (Hartman et al. 2017), the intake of calories in the US population is increasing every year. Adults living in the US are consuming a substantial amount of detrimental calories from fast food, leading to obesity. If such unhealthy food consumption is not controlled, health issues will continue to upsurge, and obesity rates will continue on an upward trajectory. Thus, an understanding of how implicit beliefs can impact unhealthy consumption will help physicians develop better interventive solutions for their patients and help insurers and policy makers design better messaging. Based on the findings of this research, we will conclude with some suggestions on how medical experts and general people could benefit from current findings.

Second, this study will add to the existing literature on implicit beliefs. While much research on implicit beliefs has focused on how they can impact different domains of our life, such as intelligence, to the best of our knowledge, there is no body of work to examine the impact of implicit theory on persuasive messaging discouraging unhealthy eating. Notably, while the current study is focused on adult U.S. residents who are likely overweight or obese based on statistics, findings of the current research could also be applied to other conditions, which are also preventable diseases if properly educated on nutrition and preventative care.

In the sections that follow, we first describe the relevant literature and then discuss the study conducted as well as examine the current research hypotheses. This is followed by a discussion of the results and research implications.

### Conceptual Development

In the following paragraphs, we first review research on implicit theory. We then draw upon this research to derive our hypotheses.

#### *Implicit Theory: Fixed versus Growth Mindset*

Implicit theory, as explored by Dweck, Chiu, and Hong (1995), suggests that individuals have implicit beliefs about their abilities, such as how intelligent they are. Specifically, people have implicit beliefs about whether human attributes are changeable (Dweck, 1999). While some people, known as entity theorists, believe that traits and ability are fixed constructs over which they have no control, others who subscribe to incremental theory have a growth mindset and believe that people and their behaviors can be changed through effort (Dweck, 1996; see also, Dweck, Chiu, & Hong, 1995). Specifically, incremental theorists have a growth mindset, leading them to believe traits are not fixed; rather, people can grow over time. Implicit beliefs about one's abilities can have far-reaching consequences on behaviors. For example, people who subscribe to a fixed mindset have been shown to feel helpless in the face of adversities, which leads them to engage in self-detrimental behaviors (Shroder et al., 2019). In contrast, those with a growth mindset fare better in the face of adversities.

Research has shown that different factors can impact people's implicit beliefs . For example, exploring the role of culture, Rattan, Savani, Naidu, & Dweck (2012) show that Americans are more prone to believing that some individuals have the potential to

become highly intelligent later on in life, compared with South Asians who believe that intelligence is more of a fixed trait. Their findings suggest that people's belief about whether individual traits are fixed or growth is shaped by culture, such that Americans believe individual traits, such as intelligence, are more pliable. Other research in this domain suggests that while implicit beliefs are shaped by culture, such beliefs could also be primed. For example, Mueller and Dweck (1998) show that praising children for intelligence could make them believe that intelligence is a fixed entity like construct, rather than a growth construct, which can grow. Other research demonstrated how participants who read an article, which made them believe that intelligence is a fixed construct, were less likely to take a tutorial and make effort attributions when they received negative feedback. This suggests that implicit beliefs could be primed; merely being exposed to information, which suggests that traits are fixed versus growth could impact people's implicit beliefs about traits (Chiu, Dweck, & Tong, 1997).

### Implicit Theory and Motivation

Implicit beliefs can have a long-lasting impact on people's judgment and behaviors. For example, research exploring the effect of implicit beliefs also suggests that entity theorists are less likely to consider situational influences when drawing inferences about people's behaviors; rather, they are more likely to attribute people's behaviors to their individual traits. On the other hand, growth theorists are more likely to take into account situational influences (Molden, Plak, & Dweck 2006). In a similar vein, entity theorists are less likely to work with a partner following a conflict situation than growth theorists who work with their partners to think of potential solutions (Kammrath & Dweck, 2006).

Not only can implicit beliefs impact people's judgment, but an extensive body of research suggests that implicit beliefs can also impact people's motivation. For example, entity theorists are more likely to perceive themselves as helpless in the face of failure and, therefore, are more likely to give up (Dweck, 1996; James 2019). In contrast, growth theorists are more likely to persist in their efforts even in the face of failure, making them more likely to succeed in their endeavors (Dweck, 1996, James, 2019).

Much of the research on implicit theory is conducted in the domain of intelligence. To elaborate, as the first test of implicit theory, Dweck (1996) used the theory to explain why some students are motivated to work harder, while others are more likely to give up. Dweck (1996) found that students who subscribed to a fixed mindset (i.e., are entity theorists) experience low self-esteem in the face of failure, making them more prone to giving up. In contrast, those who subscribe to a growth mindset (i.e., are implicit theorists) react differently when faced with failure. Unlike entity theorists, these students immediately began to consider different ways of approaching the tasks, thereby increasing their efforts to achieve desired outcomes (Dweck, 1996). In subsequent research, it was found that entity theorists are motivated by the idea of affirming their traits, which they perceive are fixed. On the other hand, implicit theorists are motivated to refine their traits, which they perceive are changeable (Chen & Tutwiler, 2017).

In sum, research in this domain suggests that entity theorists attribute failure to global, stable factors, which leads to maladaptive reactions to setbacks and challenges (Dweck, 1999). Incremental theorists attribute setbacks to unstable, controllable factors, which leads to more adaptive regulatory reactions, such as taking remedial action (Hong, Chiu, Dweck, Lin, & Wan, 1999).

## Overview of Research Hypotheses and Studies

Drawing upon the implicit theory, we propose that one primary reason why people do not adopt healthy practices is that they perceive people and the world around them to be fixed constructs. These people, who are also known as entity theorists, believe that people and behaviors cannot be changed. We hypothesize that entity theorists should consume more unhealthy food than incremental theorists, who have a growth mindset and, therefore, believe that people and the world around them can change. More formally, we hypothesize:

*Hypothesis 1:* Implicit beliefs affect the likelihood of consuming unhealthy food, such that those who have a fixed mindset should indicate a greater intention to consume unhealthy food than those who have a growth mindset.

Some research suggests that situationally cues, priming a growth mindset, can influence behaviors (Chiu et al. 1997; Xu et al. 2020). For example, Xu et (2020) primed half of the participants (tenth graders) with a growth mindset about learning and found that tenth graders who were primed with a growth mindset performed better on several learning tasks, compared with those who were not primed with such a mindset. Drawing upon these findings, we propose that situational cues that induce a growth mindset in people should reduce the amount of unhealthy food people want to consume, especially when they are informed of the negative consequences of unhealthy eating. Specifically, we hypothesize:

*Hypothesis 2:* Situational cues which can induce a growth mindset should make people more receptive to a healthy eating message and, therefore, reduce unhealthy food consumption, compared with situational primes which can induce a fixed mindset.

We further argue that implicit beliefs can impact perceived behavioral control, such that people with a fixed mindset should experience a lack of perceived behavioral control, compared with people with a growth mindset. As alluded to earlier, perceived behavioral control refers to beliefs about the presence of factors that may further or hinder the performance of the behavior (Ajzen, 2002). Entity theorists often attribute failure to stable factors, leading to maladaptive reactions. However, implicit theorists attribute setbacks and challenges to unstable yet controllable factors, which lead to more adaptive regulatory reactions (Hong et al., 1999). Research shows that perceived behavioral control can significantly impact people's motivation, such that a perceived loss of behavioral control demotivates people (Armitage, 2005; Ellis et al 2016). More specifically, we hypothesize:

*Hypothesis 3:* People with a fixed mindset should experience a greater lack of perceived behavioral control, compared with those with a growth mindset.

Based on a synthesis of the aforementioned findings, we further argue that a growth mindset could lead people to experience enhanced behavioral control, thus encouraging them to adopt preventative behaviors, such as consuming less unhealthy foods. More specifically:

*Hypothesis 4:* Perceived behavioral control should mediate the impact of induced mindset on unhealthy eating behaviors, such that those with a growth mindset should consume less unhealthy food, compared with those with a fixed mindset.

We conducted two studies to examine the aforementioned hypotheses. In Chapter 2, we report the first experiment, which tests Hypothesis 1. That is, it focuses on whether

people's implicit belief can impact their likelihood to consume unhealthy food. Specifically, we test whether people who have an implicit belief that things are fixed (entity theorists) are likely to show an intention to consume more unhealthy foods, compared with those who believe that things can change (implicit theorists). To meet this objective, in this study, we measure people's implicit beliefs.

In Chapter 3, we report the second experiment, which focuses on whether manipulating implicit beliefs could impact unhealthy food consumption. Specifically, study 2 examines hypotheses 2 through 4. To test these hypotheses, participants were primed with either a fixed or a growth mindset. Subsequently, we measured participants' unhealthy food consumption intention. We conclude with Chapter 4, which details the theoretical and managerial implications, limitations, and directions for future research. All the data was collected and analyzed by Michael James. No participants were excluded, unless otherwise reported.

## **CHAPTER 2**

### **STUDY 1 - IMPLICIT THEORY: GROWTH, MINDSET, AND HEALTH DECISIONS**

#### **Introduction**

While most research on implicit theories focuses on intelligence and other related constructs, some recent research has used implicit theory to explain health outcomes. For example, Fitz, Kaufman, & Moore (2015) investigated the relationship between lay theories of cigarette smoking and expectations to smoke between smokers and nonsmokers. Fitz et al. (2015) found that nonsmokers, who are incremental theorists, that is, those who have a growth mindset and believe that smoking is a more growth construct, indicated a greater likelihood to smoke in the future, compared with those who were entity theorists (i.e., those who believe that smoking is a fixed entity like trait). Moreover, amongst smokers, incremental theorists predicted a higher likelihood of quitting smoking than entity theorists.

In a related study, Kasimatis, Miller, & Marcussen (1996) examined the impact of implicit theory on athletic coordination. Their findings show that college athletes who were told that athletic coordination was mostly learned (growth condition) reported significantly higher motivation to pursue the new type of exercise after experiencing difficulty than those who believed that athletic coordination was genetically determined (entity condition).

More relevant to the current research, Burnette (2010) found that dieters who held entity-like beliefs about body weight were less likely to self-regulate effectively after

dieting setbacks than those who had growth beliefs about body weight. Specifically, when dieters encountered a challenge with weight loss, incremental theorists adopted mastery-oriented coping strategies and increased their effort to achieve the weight loss (Burnette, 2010). In contrast, entity theorists tend to adopt avoidant coping strategies such as disengagement from their goals and relationship partners (Burnette, 2010; for similar findings see, Parent & Alquist, 2016). Not only do incremental theorists persevere more in the face of setbacks, but they also set more aggressive goals (Beruchahvili, Moio & Heisley 2014). Moreover, people who hold growth beliefs about body weight are more likely to associate shame with body weight. This effect is mediated through stronger self-responsibility attributions (Burnette, Hoyt, Dweck, & Gussman, p. 14, 2017). In sum, research on implicit theories suggests that lay theories about whether people and their behaviors are fixed or could grow can have a far-reaching impact on people's behaviors.

Research on implicit theory has primarily focused on the impact of entity-like versus incremental beliefs on intelligence. Some research, which has focused on health, has not explored how implicit theory can encourage the adoption of preventive behaviors targeted at chronic conditions, such as obesity. Thus, it is not clear if these findings can help impact intention to consume unhealthy food consumption.

This experiment's primary objective was to test Hypothesis 1, which, as alluded to earlier, suggests that entity versus incremental theorists impacts people's likelihood to consume unhealthy food. Specifically, entity theorists should indicate a desire to consume more unhealthy food, compared with incremental theorists.

## Design, Participants, and Procedure

Two hundred and one participants (74 Females; 127 Males; Mean Age= 37.37) recruited from Amazon Mechanical Turk (Mturk) participated in the survey for a small compensation. The study followed a simple design with implicit belief as a measured variable.

Participants were told that they would be asked to indicate their preferences for various consumer products. In the guise of this consumer preference study, participants were asked to indicate their food preferences. Specifically, participants were asked to imagine and respond to two different scenarios. In the first scenario, they were asked to imagine that they had stopped by an ice-cream store to get a scoop of ice cream. (*See Appendix F*) They were further asked to imagine that the person at the counter asked them if they wanted to add any toppings. Participants were then asked to indicate the number of toppings they wanted. They could choose anything between zero and twelve toppings. The number of toppings they decided to add to the ice cream was one of the primary dependent measures.

Participants were then asked to imagine that they had stopped by a store to get lunch and ordered a burger, and they had a choice to add a side of French fries to their order. They were asked to indicate their likelihood of adding French fries to their order. (*See Appendix G*). The likelihood to add fries became the second dependent measure. In addition to these two measures, we included a third measure (*See Appendix E*). Since this was the first study, we had added multiple items to test which of these three measures would be appropriate for the final research.

After responding to the consumption measures, participants responded to an implicit belief scale widely used in past research (adopted from Levy et al., 1998); See Appendix I). This scale includes three items, which measure how people believe people have a fixed mindset. This scale includes three items: (1) *The kind of person someone is, is something fundamental about them, and it can't be changed very much*; (2) *People can do things differently, but the important parts of who they are can't really be changed*; (3) *Everyone is a certain kind of person, and there is not much that they can do to really change that*. These three questions were anchored on a seven-point Likert scale (1:Strongly Disagree-7: Strong Agree)

A person's belief about health and healthy behaviors can affect their choices of food, as well as other healthy habits (Parent & Alquist, 2016). Therefore, after a few filler tasks, participants were also asked to indicate their general health beliefs on three seven-point scale (1: Not at all/7: Very Much) items: (1) It is important to be healthy; (2) It is important to pay attention to what I eat; and (3) It is important to exercise. Finally, participants responded to an attention check and various demographics, including age and gender.

We also included various attention checks toward the end. Attention checks are a simple way to determine who is paying attention to your study instructions (Abbey, J. D., & Meloy, M. G. (2017). The attention check also helps to mitigate the evolving world of machine learning and other big-data methods, which have become targets for bots and professional survey takers, threatening data integrity. Respondents were asked to read the following statement and answer accordingly:

*People eat and drink throughout the day. We want to learn about how many times a day you eat and drink. This page is to see if you are reading the instructions carefully. For the questions that follow this paragraph, please give the answer none to each item. Please just ignore the text of the questions and type the word none as your answer. Thank you for answering these questions.*

A total of 40 participants failed the attention check indicating that they responded randomly and, therefore, were removed before analyses. Removing these participants left us with 161 participants.

## Results

### *Demographic Summary*

Demographic statistics of the sample is given in Table 2.1.

Table 2.1

*Frequencies and Percentages for the Variables Describing the Sample (N =161)*

Variables	<i>n</i>	%
<b>Gender</b>		
Female	61	37.9
Male	100	62.1
Age	18-74	37.37 <sub>μ</sub>
<b>Ethnicity</b>		
African American	19	11.8
Asian	11	6.8
Caucasian	117	72.7
Hispanic	8	5.0
Other	11	6.8
Do not wish to answer	2	1.2
<b>Annual household income</b>		
Less than \$25,000	26	16.1
	39	24.2

Variables	<i>n</i>	%
\$25,001 to \$50,000	43	26.7
\$50,001 to \$70,000	51	31.7
\$70,001 to \$100,000	2	1.2

*Descriptive Statistics and Cronbach's Alpha for the Major Study Variables*

Descriptive statistics and Cronbach's alpha for the major study variables are shown in Table 2.2. Per Nunnally and Bernstein (1994), a measure is moderately reliable if its Cronbach's alpha is .70 or higher. Given this criterion, the implicit theory measure was reliable. The mean for implicit personality theory was 4.53 (*SD* = 1.52), thus indicating a slight preference for the fixed nature of personality.

Table 2.2

*Descriptive Statistics for Dependent and Independent Measures (N = 161)*

Variables	$\alpha$	Range	<i>M</i>	<i>SD</i>
Healthy eating behavior				
<i>Number of toppings</i>	--	0 to 12	5.29	3.74
<i>Getting fries with the burger</i>	--	1 to 7	5.28	1.82
Implicit beliefs	.92	1 to 7	4.53	1.52

**Note.** Higher scores indicate more ice cream toppings, having fries with a burger, and a belief in a implicit beliefs.

Next, we present results on our main dependent measures:

### *Ice cream Toppings*

Prior to conducting the regression procedures, the assumptions of normality, linearity, and homoscedasticity were assessed. Multi-collinearity between the predictors was also checked. Per Norusis (1994), the assumption of normality is met when the points in the normal probability plot are clustered towards the diagonal. As the points were clustered towards the diagonal in the two normal probability plots (*see Appendix A*), the assumption of normality was met. The linearity and homoscedasticity assumptions are met when the studentized deleted residuals' plot by the standardized predicted values yields a random scatter (Norusis, 1994). All two plots yielded a random scatter (*see Appendix B*); thus, the assumptions of linearity and homoscedasticity were met.

A regression analysis with implicit belief as an independent measure and ice-cream toppings as a dependent measure revealed a significant effect of implicit belief ( $R^2 = .204$ ,  $\beta = .45$ ,  $t(160) = 6.38$ ,  $p < .001$ ). The regression for this study suggests that participants who had entity-like beliefs intended to consume more ice-cream toppings than those who had growth beliefs. While all participants engaged in unhealthy eating habits, the quantity consumed varied based on their implicit beliefs. This provides support for the first hypothesis (see Table 2.3 below).

Table 2.3

#### *Multiple Linear Regression Results for the Number of Toppings Model (N = 161)*

Variables	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>
Implicit beliefs	3.92	.61	.45	6.38***

*Note.* Overall model  $F(1, 159) = 40.72$ ,  $p < .001$ ,  $R^2 = .204$ .

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

**French Fries:** We examined the impact of implicit belief on the choice of French fries. After checking for normality, a regression analyses with implicit belief as an independent measure and choice of French fries as a dependent measure revealed a significant impact of implicit belief, such that those with an entity like belief were more likely to choose French fries, compared with those with growth beliefs ( $R^2 = .084$ ,  $\beta = .29$ ,  $t(160) = 3.82$ ,  $p < .001$ ). In line with the ice-cream toppings results, implicit beliefs impacted unhealthy food consumption, thus providing further support for hypothesis 1.

Table 2.4

*Multiple Linear Regression Results for the Choice to Have French Fries (N = 161)*

Variables	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>
Implicit beliefs	.44	.11	.29	3.82***

*Note.* Overall model  $F(1, 159) = 14.61$ ,  $p < .001$ ,  $R^2 = .084$ .

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

*Testing Health Beliefs, Age and Income as Alternative Accounts:* Next we examine, if health beliefs, age and income were significant as covariates.

### *Health Measures*

A person's belief about health and healthy behaviors can affect their choices of food, as well as other healthy habits (Parent & Alquist, 2016). These measures included respondents' beliefs about the importance of being healthy, exercising, and eating healthy. Even after controlling for health beliefs, implicit traits significantly impacted people's consumption of unhealthy food.

Table 2.5

*Pearson Correlations between the Age, Income, Healthy Food Choices, and Implicit Theory of Personality (N=161)*

Variables	1	2	3	4	5
1 Age					
2 Income	.07				
3 Getting fries with burger	-.13	.03			
4 Number of toppings	.02	-.12	.25**		
5 Implicit beliefs	-.00	-.04	.45***	.29***	
6 Health beliefs	.10	-.11	-.20*	.06	.03

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

#### *Age as a Correlate*

Job et al. (2018) show that there exist age-related differences in implicit theory, such that as people grow older, they are more likely to believe that they have the willpower to change. Additionally, the authors show that this belief in willpower could manifest in eating habits, spending, alcohol consumption, etc. As shown in Table 2.5, the results indicate that age was not correlated with either the choice of burger or choice of toppings.

#### *Income as a Correlate*

One could argue that participants chose fewer toppings or opted not to get fries with their burgers for financial reasons, such as a desire to save money. While there is no reason to believe that a growth mindset would lead to a desire to save money, we wanted to examine the possibility of ruling it out as a significant predictor variable. If saving money is influencing the results, then the relationship between income and the number of

toppings should be positively correlated. However, we did not find that relationship to be significant (See Table 2.5).

## Discussion

It was hypothesized that people who have a growth mindset, that is those who believe that people can change, should consume less unhealthy food—findings of this study support this Hypothesis 1. Specifically, the findings reveal that those who subscribed to an entity belief indicated an intention to consume a higher number of toppings and were more likely to order French fries with a burger. The corollary to this would be that those who had a growth mindset and believed that behaviors could change (i.e., incremental theorists) ordered fewer toppings and were less likely to order French fries with their hamburger.

These findings make multiple contributions. First, the present investigation suggests that one primary reason why people do not adopt healthy practices, such as consuming less unhealthy food, is that they perceive their personality to be a stable, fixed trait-like entity. Second, while past research examining the impact of implicit theories on unhealthy behaviors has examined the impact of inducing fixed versus growth mindsets related to the specific behavior (e.g., people's mindset related to whether addiction behaviors can be changed or are fixed), this is the first research which looks at people's general beliefs about whether or not they believe personalities can be changed on unhealthy food consumption. In other words, these items did not measure people's beliefs specifically about health; rather, the implicit belief measures used in this study examined people's beliefs about whether people can, in general, change or not. Even after

controlling for health beliefs, the effects were consistent. Moreover, neither age nor income affected the results.

While this study adds to our knowledge of how implicit theories impact unhealthy food consumption, one limitation of this study is that we measured implicit beliefs. In the next study, we examine whether situationally priming a fixed versus a growth mindset would lead to similar results. If inducing a fixed versus a growth mindset could also lead to similar effects, then that would have critical implications for health messaging. Specifically, it would inform how health messaging could be designed better.

## CHAPTER 3

### STUDY 2 - MINDSET AND EFFECTIVE MESSAGING

#### Introduction

Persuasive messaging to influence behavior is a complicated endeavor. Messaging is more important in the year 2020 because of COVID-19, where studies show that those who are obese are likely to be more impacted by the virus if contracted. Those who were already suffering from obesity are more at-risk during quarantine for gaining weight (WebMd, 2020). A recent study conducted by WebMD explained that there was a 266% increase in candy eating in the last two weeks of March, compared to February, among its 1.4 million monthly active members. Similarly, there was a 54% increase in eating carb-heavy foods like bread. Data provided by W.W. (formerly Weight Watchers) shows their members who are using the app to record consumption are reportedly consuming almost 40% more baking ingredients than they did before the lockdown. In a poll of more than 1,000 U.S. readers of WebMD, nearly half of the women and almost one-quarter of the men said they gained weight due to COVID restrictions. A separate poll of 900 international readers found more than half of men and about a third of women reporting weight gain.

Over the years, the evolution of messaging platforms has expanded drastically. Messaging mediums such as print, T.V., direct or group communication, text, billboard, surveying, internet, and various social platforms make it that much more important to get it right because of the expanded reach possibilities. In recent years, communication research has made great strides in advancing the science of message design and effects (Harrington, Lane, 2013). When relaying persuasive messaging, many nuances must be considered, such as the tone, language, comprehension of terminology, and relevance to

the intended audience. Messaging becomes more complicated when you have a condition, such as obesity, that is pervasive and extends beyond socioeconomic status and education.

As alluded to before and displayed in Figure 3.1, the obesity rate among adults has increased by nearly 42% from 2007 to 2016, according to CDC obesity data rates (CDC, 2019). There is a clear association between the rising cost of health care and the increase of obesity, which suggests that America is trending in the wrong direction when it comes to healthcare. There are many potential reasons for this discouraging trend; reasons range from ineffective messaging, patients not following doctors' orders, failure of physicians to recognize the needs and expectations of patients, and omission of physicians to recognize the mental anguish of their patients' illnesses (Anstett M.D. PhD., 1980).

One area of relative agreement within the scientific community is that there are considerable costs associated with weight stigma—negative attitudes toward and the devaluing and denigration of people perceived to carry excess weight (Major, Eliezer, & Rieck, 2012). As such, it is important to focus on health messaging targeted at reducing obesity.

### Obesity Rates Among Adults, 2007-2016

■ Adults ■ Women ■ Men

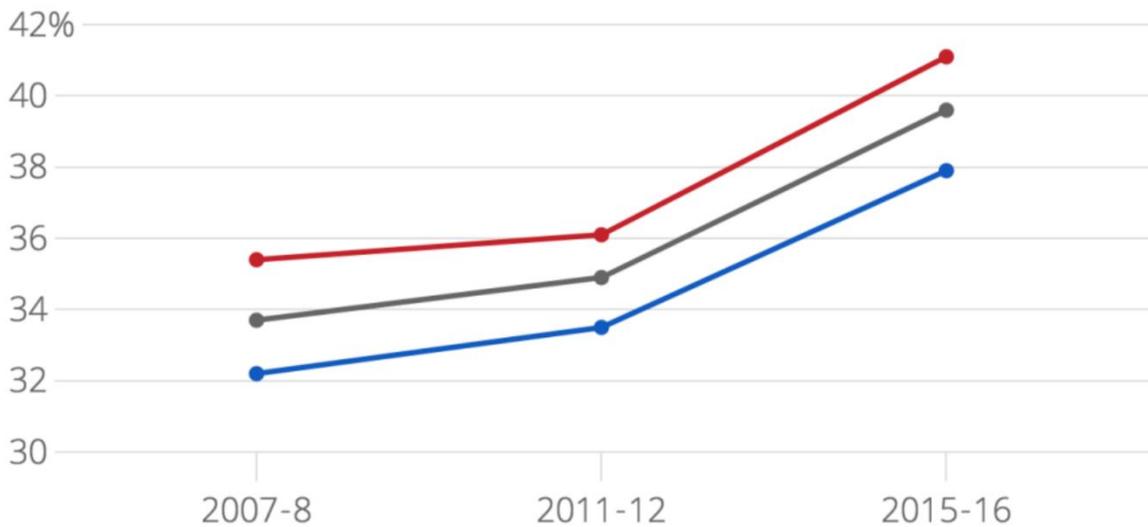


Figure 3.1. Obesity Rates. Reproduced from Centers for Disease and Prevention.

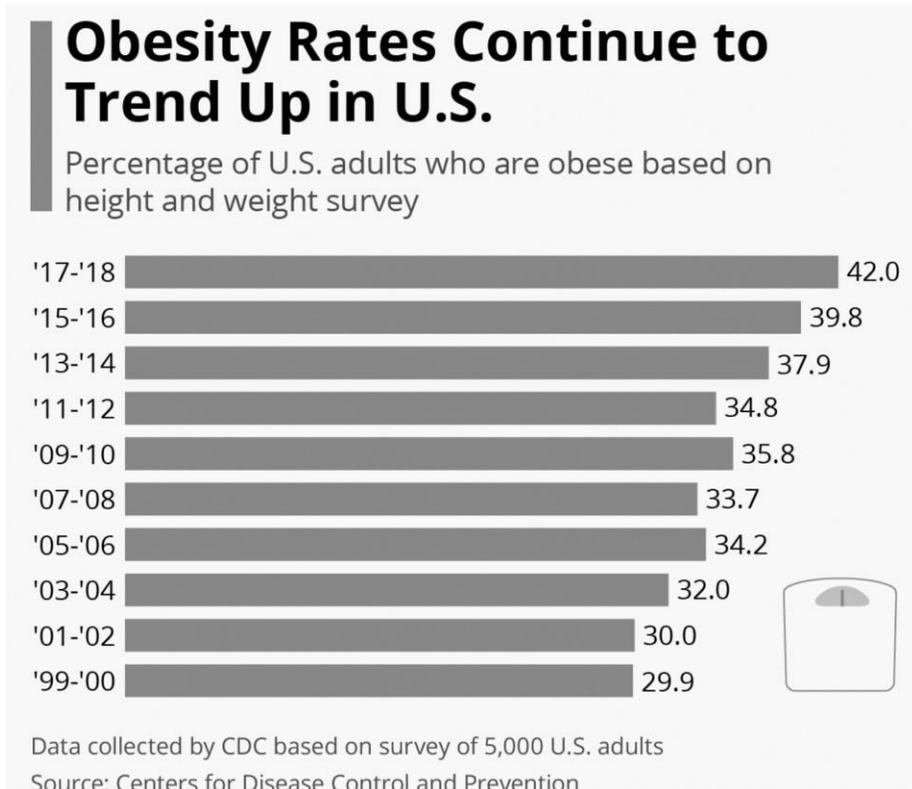


Figure 3.2. Obesity Trends.

Figure 3.2 shows a year-over-year increase dating back to 1999 through 2018 using a sample size of 5,000 participating U.S. adults. This survey, therefore, shows that in the last two decades, obesity has increased by 12% for American adults.

Past research suggests that patients' beliefs in the unchangeability of weight may decrease the influence of expert advice or evidence contrary to their beliefs (Davies, 1997). Moreover, research on implicit theory seems to suggest that situational cues that prime a growth mindset could positively impact behaviors (Xu et al. 2020). As such, we argue that situationally priming people with a growth mindset could increase receptiveness to a health message and, thus, reduce the amount of unhealthy food they intend to consume.

To achieve these objectives, in the current study, subsequent to a mindset manipulation, we exposed people to a health message and then measured their unhealthy food consumption. This is especially important because an area that is often overlooked in the healthcare sector is the actual messaging the patients are provided once they complete their doctor's visit, which comes in the form of a pamphlet, brochure, or face to face. The educational literature provided to patients intends to demonstrate the quality of having utility or the need for applicability. The goal of health messages is to educate with the anticipation that those receiving the message will follow directions to improve quality of life.

In the current times of COVID-19, The rapid spread of the virus has emphasized the need for effective health communications to coordinate individual behavior and mitigate disease transmission (Banker, S., & Park, J. 2020). We have seen a paradigm

shift worldwide when it comes to surveying and checking people before they are allowed to enter the facility, which has become essential during this crisis. This leads to the thought of what if patients were prescreened to identify their mindset before engaging with the doctor? Would messaging that is matched with people's mindset be received better and therefore be more effective? It is important to recognize that an educational message may not have the same influence on all people, and pedagogical strategies may not be sufficient to stimulate action on health disparities (Gollust, 2014).

Research has already demonstrated that small changes in preventive messaging positively impact health behaviors. For example, a study conducted by Wadhwa and Zhang, 2019 showed that slight changes in messaging, such as using appropriate numerical formats, can increase readers' likelihood to adopt preventive behaviors communicated in the message. Other research shows that using vivid images to present health risks can enhance the effectiveness of health messages (Wadhwa and Karatas, 2020).

A considerable number of doctor offices expose their patients to persuasive health messages. Research in persuasive message design has demonstrated that message content can be manipulated to varying persuasive effects (Stephenson, Benoit, & Tsschida, 2001). The authors created eight message conditions which were written to vary involvement, strength of argument, and source credibility. The results indicated that cognitive responses mediate the argument strength-attitude relationship for high to moderately high involvement participants. Additionally, the models tested indicated the limited role of source credibility. In effect, the authors showed that persuasive messaging can affect receivers' cognition.

A synthesis of aforementioned research suggests that persuasive messaging can impact people's cognition and behaviors. Importantly, growth versus a fixed mindset could be situationally primed through messaging. Thus in this study we examine if preventive messaging persuading people to engage in healthy consumption could have differential effects based on whether they have been primed with a growth or a fixed mindset.

As a reminder, in study 1, we measured implicit belief. The findings from study 1 support the first hypothesis. People who have a growth mindset that is those who believe that people can change consume less unhealthy food. Additionally, those who hold a fixed mindset were less likely to reduce their unhealthy food consumption.

Based on the findings of Study 1, we argue that people's receptivity to different preventive messages could depend on whether they have adopted a growth or a fixed mindset. Our first objective was to examine if manipulating people's implicit belief would impact unhealthy food consumption in this study. Specifically, we test Hypothesis 2, which suggests that people who are encouraged to adopt a growth mindset are more receptive to the health messaging they are exposed to. To elaborate, people who have adopted a growth mindset should show a reduced desire to consume unhealthy food, compared with those who have a fixed mindset.

The second objective of study 2 is to examine the impact of mindset on perceived behavioral control (Hypothesis 3). It was hypothesized that mindset does affect behavioral control. We argue that a growth mindset could lead people to experience enhanced behavioral control, thus encouraging them to adopt preventative behaviors, such as consuming less unhealthy foods.

A third objective of Study 2 is to examine if perceived behavioral control mediates the impact of mindset on health behaviors (Hypothesis 4). The perception of behavioral control is critical to understanding why individuals make certain health-related decisions. A high level of perceived control should strengthen a person's intention to perform the behavior, and increase effort and perseverance (Ajzen, 1991). The proposed conceptual model is illustrated below:

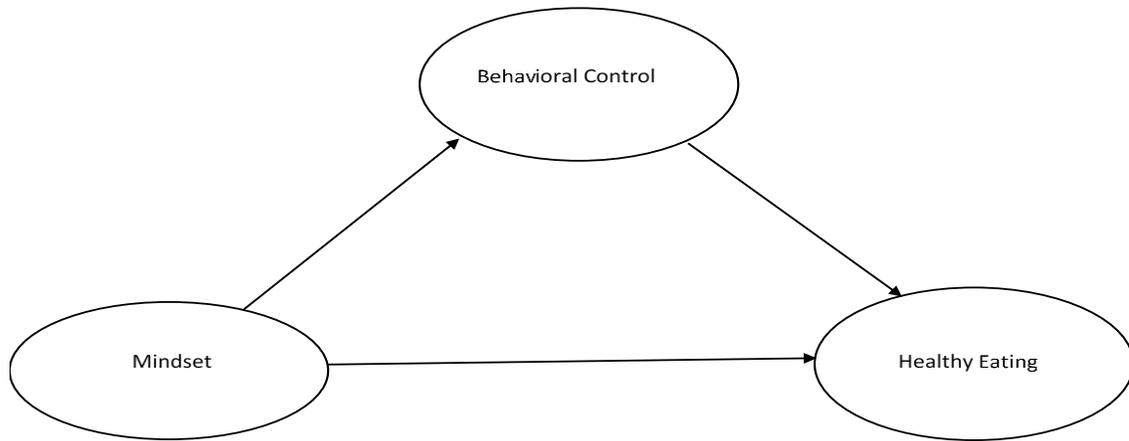


Figure 3.3. Conceptual Model.

### Design, Participants, and Procedure

This study was conducted on Amazon Mechanical Turk. Two hundred and fifty-two participants were recruited to participate in a short study administered through Qualtrics. All participants were 18 years or older and resided in the United States. Participants were offered a small monetary incentive of \$0.40 for their participation. Attention checks were included in this study in the form of two questions. One of the

questions inquired about whether or not participants took a break while taking the survey. The other asked about any technical difficulties that participants may have faced.

This study followed a two-cell (Mindset: Fixed vs. Growth) between-subjects design with behavioral control as the measured factor.

Participants were randomly assigned to one of the two mindset conditions. In the growth mindset condition, participants read the following paragraph:

*Research examining people's personalities and behaviors shows that personality traits are not stable—they can and often do gradually change across the life span. For example, people tend to become more resilient as they age. Personality traits can impact people's behaviors and decision-making. As such, how people behave and also decide changes with time. Some research shows that personalities evolve quite a bit throughout a person's life, even without any conscious effort from the person. Other studies show that some people can intentionally change their own personality through sustained personal effort and careful goal-setting. Based on your past experiences, detail one incident wherein you felt that personalities can change.*

After reading the paragraph, participants were asked to vividly describe one incident from their lives, wherein they felt that personalities could change.

Those in the fixed mindset condition read the following paragraph:

*Research examining people's personalities and behaviors, individuals are born with a certain type of personality, and this personality does not change as time passes. Personality is shaped by early life experiences and tend to stay stable over time. As such, how people behave and decide also remains stable over time. Some*

*research shows that personalities are like cement, which once developed in the childhood, remain that way for the rest of the time. Some studies show that even when people intentionally want to change their personality, they are unable to do so. A part of this can be attribute to the fact that one is born with a certain personality and all the early influences cements the personality.*

After reading the paragraph, participants were asked to describe one incident from their lives vividly, wherein they felt that personalities remain stable over time.

Subsequently, in a purportedly unrelated study, all participants saw a health message. Participants saw a gender-neutral image of an individual showing body fat accompanied by the following message, “Increasing numbers of US adults suffer from obesity today. The number of deaths caused by obesity has gone up since last year. Eat Healthy!” (adapted from Wadhwa and Zhang 2019; See Appendix K). Participants evaluated the message on how well it was communicated.

Once participants had read the message, they moved on to another study, purportedly designed to understand people’s food preferences. In the first part of the study, participants were asked to imagine that they had gotten a burger for lunch and could choose between two sides, a salad, or French fries. As in Study 1 and consistent with past research (see for e.g., Russell et al., 2015), participants were asked to indicate their preference using a seven-point Likert scale (1: Very Likely to Choose Fries; 7: Very Likely to Choose Salad).

The respondents were then asked to proceed to the next section and were presented with another scenario. This time, respondents were asked to imagine that they

had stopped by an ice-cream store and were asked to indicate the number of toppings they would want on their ice cream. Specifically, participants were told that there was a promotion going on and they could add as many toppings as they wished at no additional cost. The respondent was also told that each additional topping adds 70 calories. The respondents were provided 12 topping choices and could select from 0 to 12 toppings.

Once the respondents had made their food selection, they were asked to answer three questions to determine behavioral control and ranked it on a seven-point Likert scale, with one being strongly disagree and seven being strongly agree. (See Appendix J)

*1) Avoiding unhealthy food in the future is entirely up to me. 2) I don't think unhealthy food consumption is in my control. 3) I think how much food I consume is in my control.*

(adapted from Ajzen, 1991).

After completing the behavioral control questions, as in Study 1, participants were asked to respond to the three implicit belief measures. The three measures used were exactly the same as those used in Study 2. Specifically, these measures are *1) The kind of person someone is, is something basic about them, and it can't be changed much. 2) People can do things differently, but the important parts of who they are can't really be changed. 3) Everyone is a certain kind of person, and there is not much that they can do to really change that* (Chiu et al., 1997). These measures were included to examine if the results found in Study 1 would be replicated.

As in Study 1, participants were asked to indicate their general health beliefs using three items following several filler tasks. The three items were the same as those used in Study 1 (1) It is important to be healthy; (2) It is important to pay attention to what I eat, and (3) It is important to exercise. The respondents then proceeded to the last

section inquiring about demographic information such as age, gender, race, and income. To mitigate the risk of respondents not taking the survey seriously, we included certain questions asking if they were distracted at any time while taking the survey. To avoid bots, we included a checkbox to check off a specific item in a photo.

## Results

### *Assessing Univariate Normality*

It is critical to assess normality as it is an underlying assumption in the statistical procedures employed in this study. Furthermore, if the normality assumption is violated, then interpretations and inferences may not be reliable or valid (Razali & Wah, 2011). Univariate normality was assessed via the skewness and kurtosis indices of the variables measured using an interval or ratio scale. Per Kline (2015), a variable is normally distributed if its skewness index (i.e., skewness statistic/ SE) is below three and its kurtosis index (i.e., kurtosis statistic/SE) is below 20. As shown in Table 3.1, only two of the measures were highly skewed. Accordingly, the two variables (i.e., a implicit beliefs attitudes toward health) were transformed via a natural log function (Tabachnick & Fidell, 2018). Since the skewness index of the transformed variables was within the acceptable range (i.e., -.13 for fixed theory and .34 for attitudes toward health), these transformed variables were used in subsequent inferential procedures. For ease of interpretation, however, the original metric was used for all descriptive statistics.

Table 3.1

*Results Assessing the Univariate Normality of the Study Variables (N = 252)*

Variables	Skewness		Kurtosis	
	Statistic	Index	Statistic	Index
Healthy eating behavior				
Fries vs. salad	-.51	-3.35	-1.26	-4.10
Number of toppings	-.05	-.29	-1.25	-4.08
Behavioral control	-.46	-3.03	-.41	-1.35
Mindset	-.95	-6.22	.24	.78
Attitudes towards health	.81	-5.28	.45	1.48

*Note.* *SE* for skewness statistic = .14. *SE* for kurtosis statistic = .31.

#### *Checking for Outliers*

According to Tabachnick and Fidell (2018), cases whose standardized values fell above the absolute value of 3.29 of the z-skew coefficient were deemed univariate outliers. None of the cases met this criterion; thus, there were no univariate outliers.

#### Descriptive Statistics for the Study Variables

##### *Variables Describing the Sample*

Slightly more than half of the sample were primed with a growth mindset (50.4%). More than half of the sample consisted of males (59.1%). Respondents were between 21 and 73 years old; the mean age was 38.56 ( $SD = 10.67$ ). They have lived between one and 73 years living in the US; the mean number of years spent in the US was 35.10 ( $SD = 13.26$ ). The majority of the respondents were Native English speakers (95.2%), Caucasian (61.5%), and took the study very seriously (83.3%). The sample was well-represented in terms of income level (see Table 7). 65.4% of the sample fell within the income range of \$25,000 to \$70,000.

### *Descriptive Statistics and Cronbach's Alpha for the Major Study Variables*

*Descriptives for Food Consumption Measures:* The mean for food item choice was 4.50 ( $SD = 2.18$ ), thus indicating that, on average, the sample skewed slightly towards the healthy salad choice. The mean number of toppings for an order of ice cream was 6.26 ( $SD = 3.67$ ). Given that the highest possible number was 12, this number was within the middle of the range.

*Behavioral Control:* Descriptive statistics and Cronbach's alpha for the main study variables are shown in Table 3.3. According to Nunnally and Bernstein (1994), a measure is moderately reliable if its Cronbach's alpha is .70 or higher. The initial behavioral control measure consisted of three items; alpha, however, was only .50. Since the second item only had an item-total correlation of .27, it was dropped from the measure; Cronbach's alpha increased to .80 when this item was deleted.

The mean behavioral control score was 5.85 ( $SD = .90$ ); thus, the respondents generally believed that healthy eating behavior was under their control. The mean for implicit personality theory was 4.88 ( $SD = 1.46$ ), thus indicating a slight preference for the fixed nature of personality. The respondents had incredibly positive attitudes toward health ( $M = 6.09$ ,  $SD = .77$ ).

### *Preliminary Screening Procedures*

Univariate normality was assessed via the skewness and kurtosis indices of the variables measured using an interval or ratio scale. Per Kline (2015), a variable is normally distributed if its skewness index (i.e., skewness statistic/ SE) is below three and its kurtosis index (i.e., kurtosis statistic/SE) is below 20. As shown in Table 3.4, only two of the measures were highly skewed. Accordingly, the two variables (i.e., a implicit

beliefs attitudes toward health) were transformed via a natural log function (Tabachnick & Fidell, 2018). Since the skewness index of the transformed variables was within the acceptable range (i.e., -.13 for fixed theory and .34 for attitudes toward health), these transformed variables were used in subsequent inferential procedures. For ease of interpretation; however, the original metric was used for all descriptive statistics.

Table 3.2

*Frequencies and Percentages for the Variables Describing the Sample (N =252)*

Variables	N	%
Mindset		
Malleable	127	50.4
Fixed	125	49.6
Gender		
Female	103	40.9
Male	149	59.1
English proficiency		
Native English	240	95.2
Not native, speak very well	9	3.6
Not native, speak moderately well	1	.4
Not native, don't speak well	2	.8
Ethnicity		
African American	31	12.3
Asian	10	4.0
Caucasian	155	61.5
Hispanic	14	5.6
Other	33	13.1
Multi-racial	6	2.4
Refused to answer	3	1.2
Annual household income		
Less than \$25,000	25	9.9
\$25,000 to \$50,000	82	32.5
\$50,001 to \$70,000	83	32.9
\$70,001 to \$100,000	54	21.4
More than \$100,000	4	1.6
How seriously took survey		
A little	6	2.4
Somewhat	14	5.6
Moderately	22	8.7
Very	210	83.3

Table 3.3

*Descriptive Statistics and Cronbach's Alpha for the Study Variables (N = 242)*

Variables	$\alpha$	Range	<i>M</i>	<i>SD</i>
Age	--	21 to 73	38.56	10.67
Years spent in the U.S.	--	1 to 73	35.10	13.26
Healthy eating behavior				
Fries vs. salad	--	1 to 7	4.50	2.18
Number of toppings	--	0 to 12	6.26	3.67
Behavioral control	.80	3 to 7	5.85	.90
Implicit beliefs	.91	1 to 7	4.88	1.46
Attitudes towards health	.76	3 to 7	6.09	.77

*Note.* Higher scores indicate a preference for salad, more ice cream toppings, greater behavioral control, belief in implicit beliefs, and more positive attitudes toward health.

Table 3.4

*Results Assessing the Univariate Normality of the Study Variables (N = 252)*

Variables	Skewness		Kurtosis	
	Statistic	Index	Statistic	Index
Healthy eating behavior				
Fries vs. salad	-.51	-3.35	-1.26	-4.10
Number of toppings	-.05	-.29	-1.25	-4.08
Behavioral control	-.46	-3.03	-.41	-1.35
Implicit beliefs	-.95	-6.22	.24	.78
Attitudes towards health	.81	-5.28	.45	1.48

*Note.* *SE* for skewness statistic = .14. *SE* for kurtosis statistic = .31.

## Main Findings

### *Impact of Mindset on Choice of Side*

The independent t-test results in Table 3.5 reveal that mindset (Growth was coded as 1, while Fixed was coded as 2) had a significant effect on the choice for fries vs. salad,  $t(245) = 2.93, p = .004$ . Participants with a growth mindset significantly preferred having a salad over fries ( $M = 4.90, SD = 2.02$ ) than participants with a fixed mindset ( $M = 4.10, SD = 2.28$ ). These findings provide support for hypothesis 2; inducing a growth mindset reduced intention to consume French Fries.

We further examined if age, gender, and income were significant as covariates. We included age as a covariate because previous research has indicated that age does have an effect on food choices (see for e.g., Drewnowski & Shultz, 2001). Additionally, gender has been shown to impact food choices (Ferraro et al., 2005). Finally, we included income as prior research has indicated that socioeconomic status, specifically income, has an effect on food choices (see for e.g., Dammann & Smith, 2009). Only income had a significant main effect on the choice of side,  $F(1, 245) = 4.05, p = .045$ , therefore, income was controlled for in subsequent analyses. As shown in Table 3.6, even after income was included as a covariate, the mindset manipulation significantly affected choice for salad,  $F(1, 245) = 8.94, p = .003$ . Those with a growth mindset had a greater preference for salad ( $M = 4.92, SE = .19$ ) compared with those with a fixed mindset ( $M = 4.11, SE = .19$ ).

### *Impact of Mindset on Number of Toppings*

The independent t-test results in Table 3.5 reveal that mindset did not significantly affect the choice for number of toppings  $t(250) = 1.66, p = .098$ . Participants with both growth ( $M = 6.64, SD = 3.78$ ) and fixed mindsets ( $M = 5.87, SD = 3.54$ )

preferred a similar number of toppings. After income was controlled for, the mindset manipulation did not significantly affect the number of toppings,  $F(1, 245) = 0.73, p = .109$ .

It should be noted that in this study, we did tell all participants that toppings were free, which could have negated the effect of mindset manipulation. In other words, given the toppings were free, people in both the mindsets likely wanted to take advantage of the promotion. It is especially important to note that the promotion was a limited time offer, which wouldn't have been available in future and this could have made those with a growth mindset take advantage of it more.

#### *Impact of Mindset on Behavioral Control*

We looked at the impact of mindset on behavioral control. As with the choice of fries and toppings, income was controlled for. The mindset manipulation marginally affected behavioral control ( $F(1, 245) = 3.68, p = .056$ ). Specifically, those with a growth mindset experienced significantly lower behavioral control ( $M = 5.73, SE = .08$ ) compared with those in the fixed mindset ( $M = 5.95, SE = .08$ ). These results are inconsistent with Hypothesis 3. Previous research suggests that those with a growth mindset would experience more behavioral control. Therefore, our results stand in contrast to those studies. Future research should further examine the relationship between implicit beliefs and perceived behavioral control.

Table 3.5

*Descriptive Statistics and Independent t-test Results for Mindset and Healthy Eating Behavior (N = 252)*

Variables	Growth Mindset		Entity Mindset		df	t
	M	SD	M	SD		
Healthy eating behavior						
Fries vs. salad <sup>1</sup>	4.90	2.02	4.10	2.28	245	2.93
Number of toppings	6.64	3.78	5.87	3.54	250	1.66
Behavioral control	5.76	.91	5.95	.87	250	-1.75

<sup>1</sup> Degrees of freedom due to unequal variances controlled for.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

Table 3.6

*Adjusted Means, Standard Errors, and ANCOVA Results for Mindset and Healthy Eating Behavior after Controlling for Income (N = 252)*

Variables	Growth		Entity		df	F
	M	SE	M	SE		
Healthy eating behavior						
Fries vs. salad	4.92	.19	4.11	.19	1, 245	8.94 **
Number of toppings	6.64	.33	5.90	.33	1, 245	.73
Behavioral control	5.73	.08	5.95	.08	1, 245	3.68

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

#### *Mediating Role of Behavioral Control*

Next, we test Hypothesis 4, which states that behavioral control should mediate the impact of growth versus fixed mindset on the choice of fries versus salad.

Specifically, we examine if growth, compared with fixed mindset, increases perceived

behavioral control, which, in turn, increases reduces the amount of unhealthy food consumed.

To test this hypothesis, the Hayes (2013) PROCESS SPSS macro (Model 4) was used and analyzed by the researcher. According to Hayes (2013), a variable is a mediator when the following conditions are met: the independent variable predicts the mediator, the independent variable predicts the dependent variable, the mediating variable predicts the dependent variable, and the indirect effect of the independent variable on the dependent variable via the mediating variable is statistically significant. According to Hayes (2013), the indirect effect was tested via bootstrapping; 10,000 bootstrap samples were used to test the indirect effect's significance.

#### *Results for Choosing Fries vs. Salad*

As shown in Table 3.7, after controlling for income, mindset had a marginal effect on behavioral control,  $p = .056$  thus, the first criterion for mediation was met. Further, the type of mindset significantly predicted the choice for fries vs. salad,  $p = .004$ ; therefore, the second criterion for mediation was met. Behavioral control, however, did not significantly predict choice for fries vs. salad,  $p = .71$ ; the third criterion was not met. Finally, the indirect effect of mindset on the choice of fries vs. salad was not significant,  $p = .54$ . Because only two out of the four criteria for mediation was fulfilled, behavioral control did not mediate the relationship between the type of mindset and choice of fries vs. salad.

Table 3.7

*Results Testing the Mediating Effect Behavioral Control on Mindset and Choosing Fries vs. Salad (N = 252)*

Variables	Behavioral Control		Fries vs. Salad	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Growth vs. Fixed	.22	.11	.80 **	.27
Income	.12	.06	.28	.14
Behavioral control	--	--	-.06	.16
	$R^2 = .030$		$R^2 = .050$	
	$F(2, 245) = 3.73,$		$F(3, 244) = 4.26,$	
	$p = .025$		$p = .006$	

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

#### *Results for the Number of Toppings*

The findings in Table 3.8, based on Hayes (2017), reveal that, after controlling for income, mindset marginally predicted behavioral control,  $p = .056$ ; thus, the first criterion for mediation was met. Further, mindset did not significantly predict number of toppings,  $p = .191$ ; therefore, the second criterion for mediation was not met. Behavioral control significantly predicted number of toppings,  $p = .015$ ; the third criterion was fulfilled. However, the indirect effect of mindset on number of toppings was not significant,  $p = .167$ . Because only two out of the four criteria for mediation were fulfilled, behavioral control did not mediate the relationship between mindset and number of toppings.

Table 3.8

*Results Testing the Mediating Effect Behavioral Control on Mindset and Number of Toppings (N = 252)*

Variables	Behavioral Control		Toppings	
	<i>B</i>	<i>SE</i>	<i>B</i>	<i>SE</i>
Growth vs. Fixed	.22	.11	-.61	.46
Income	.12	.06	-.13	.24
Behavioral control	--	--	-.64 **	.26
	$R^2 = .030$		$R^2 = .037$	
	$F(2, 245) = 3.73,$		$F(3, 244) = 3.12,$	
	$p = .025$		$p = .027$	

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .

#### Discussion and Limitations

The study findings suggest that situationally priming a growth mindset can reduce the likelihood of unhealthy food consumption. However, we did not find support for hypothesis 3, as mindset did not appear to impact the perception of behavioral control. Finally, while the findings of this study elucidate that a growth mindset does reduce unhealthy food consumption, perceived behavioral control did not mediate the impact of mindset on unhealthy eating behaviors.

This study makes important contributions. Health communication research and practice traditionally have focused on changing individual behaviors, such as their habits (Niederdeppe et al., 2015). Every patient is different, and their treatment is catered specifically for their condition. Likewise, the messaging should also be uniquely developed to be more persuasive. This study is the first to show that situationally priming people with a growth mindset could encourage them to reduce their unhealthy food

consumption. In other words, through the means of a simple intervention, doctors could increase the welfare of their patients. Taking this approach can also start the process of seeing the rise in obesity and being overweight numbers regress instead of increase annually, which would result in the cost of care to attenuate.

Some limitations must be considered. The study's purpose was to investigate if a growth versus fixed mindset impacts an individual's choices related to the consumption of unhealthy foods. However, one limitation of this study was that it was conducted on Mechanical Turk. As such, we could only measure intention to consume unhealthy food consumption. Future research should investigate this relationship on actual consumption to obtain additional insight.

## **CHAPTER 4**

### **GENERAL DISCUSSION**

Given the consistent increase in unhealthy food consumption, it is critical to understand unhealthy food consumption's psychological drivers. Unhealthy eating is one of the primary causes of obesity, which leads to increased hospitalizations and chronic medical conditions (Kuzbicka & Rachon, 2013). The rise in healthcare costs due to poor eating habits has become an issue of concern among physical and dietitians in the last 20 years (Rattan et al., 2015). In most cases, patients do not observe a healthy eating lifestyle, which makes it difficult for them to avoid chronic illnesses that are likely to impact their health negatively. It is presumed that healthy eating practices influenced by behavior change have a long-lasting impact on individuals' well-being psychological and physical well-being (Rattan et al., 2015). Therefore, the study results will be of great importance to dietitians and physicians who are likely to inform patients about the need to adapt behavior-based eating practices. By focusing on behavior, patients are likely to learn new positive eating habits that are less harmful and avoid chronic illnesses such as obesity. According to Drewnowski (2012), most patients with chronic illnesses such as obesity have an unhealthy eating diet and the need to use evidence-based results to convenience them about positive eating habits (Rattan et al., 2015).

The research presented here draws upon implicit theory and purports that one critical driver of unhealthy food consumption is implicit beliefs about themselves and their world. We argued that people with a fixed mindset are more likely to consume unhealthy foods. Furthermore, we proposed that inducing a growth mindset in people

should make them more receptive to compensatory messaging, encouraging them to reduce their unhealthy food consumption.

The research objectives included exploring how growth versus fixed mindset impacts an individual's choices to engage in unhealthy eating behavior. We examined the effects of mindset manipulation on unhealthy food consumption. Additionally, we examined behavioral control's role as a potential mediator in the relationship between mindset and unhealthy eating behaviors. Finally, we examined whether a growth mindset could lead people to experience enhanced behavioral control, encouraging them to consume less unhealthy foods. We found support for both hypotheses 1 and 2 but failed to find support for hypotheses 3 and 4. Therefore, the study indicates that implicit beliefs affect the likelihood of consuming unhealthy food, and inducing a growth mindset should reduce unhealthy food consumption. However, mindset did not impact the perception of behavioral control in this study. Finally, perceived behavioral control was not found to mediate the impact of mindset on unhealthy eating behaviors.

#### Practical Implications

A breakthrough in further developing persuasive health messages for improved health is needed because many professionals today make decisions without empirical evidence of effectiveness (Nabi, 2015). The disadvantage advocacy groups, state, or federal agencies have attempted to convey persuasive health messages with the limited funding they have, compared to industries with the financial power to protect their profits. It is estimated that companies can outspend public health advocates by at least 100 to 1 when the marketing budgets promoting their products are considered

(Niederdeppe, 2015). These findings therefore help us understand how persuasive messaging can be made more effective.

Public health messages can be made more effective if we bridge the science and practitioner gap to better understand implicit beliefs and how persuasive messaging can be a change agent. Much literature provided by doctor's offices talks about the condition, causes, and repercussions but tends to leave out the light at the end of the tunnel to motivate and encourage change. Persuasive messaging should be fact based, but also discuss the benefit to health and the impact on overall lives.

This research further builds on previous work on the relationship between changeability beliefs about weight through messaging and tying mindset with behavioral control. This study could be utilized by doctors to address specific medical conditions more effectively, specifically new diagnoses, by incorporating persuasive messaging into a patient's treatment plan. These messages could incorporate mindset manipulation and encourage growth-oriented mindsets by illustrating the patient's ability to change their behavior and subsequent symptoms. Dietitians and medical practitioners can use the information to encourage clients to adopt healthy eating behaviors despite their age brackets.

Research on implicit theory is significant because it can help change how we encourage and approach individuals to adopt healthier behaviors through persuasive messaging instead of the current "one size fits all" approach. Further understanding of people's mindset can help reduce chronic conditions and lower the cost of care by reducing unnecessary emergency room visits. Most importantly, creating healthier environments and longer life expectancy.

## Theoretical Contributions

Researchers can use the study findings to replicate the study results using other research methodologies on how mindset can be manipulated to improve healthy eating behaviors. This is based on the assumption that positive behavior can be learned, and individuals can integrate new healthy eating practices aligned with the new behavior learned. This is likely to improve people's quality of life by reducing the emergent, chronic illnesses that are likely to impact their health negatively.

The study results have far-reaching implications and contributions to the current literature. First, the purpose of study one was to investigate the relationship between entity theorists, implicit theorists, and behavior change as far as unhealthy eating is concerned. The study results suggested that individuals who believed that behavior could change were more likely to adopt healthy eating practices than implicit theorists who believed that behavior change could not influence their eating habits. The study results add to the current literature by demonstrating the association between implicit beliefs and unhealthy eating behaviors.

Before the study was conducted, it was not known if incremental theorists are more or less likely to consume less unhealthy food than entity theorists. Therefore, the study results add to the current literature on how implicit can influence healthy eating habits, especially if individuals believe that behavior change would positively influence their eating habits; this is important because it was unknown how growth versus fixed mindset impacts individuals' eating habits. The study filled the current literature gap by establishing that individuals with a growth mindset were less likely to engage in unhealthy eating behaviors than those with a fixed mindset.

In study two, the focus was to investigate if behavioral control mediates the relationship between implicit personality theory and healthy eating behavior. The secondary purpose was to investigate the extent to which compensation messages influence healthy eating behaviors among individuals. Before this study, there was a literature gap whereby limited research was conducted to investigate behavioral control as a mediator between mindset and unhealthy eating behavior. Therefore, the study results add to the current literature on behavioral control's role in mediating relationships between implicit personality theory and healthy eating behavior among individuals, which was not known before the study was conducted. Findings of the current study show that situationally priming a growth mindset could negatively impact perceived behavioral control. Of course, these are only preliminary findings and future research should further explore the relationship between the two.

Finally, this study contributes to literature on persuasive messaging by elucidating that people are more receptive to persuasive messaging when the situational cues activate a growth mindset in people, compared with when it activates a fixed mindset in people.

#### Limitations

While the study evidence is valuable regarding how incremental theorists are likely to consume less unhealthy food than entity theorists, several limitations should be stated, which are likely to influence the interpretations of study findings. Therefore, the findings of studies one and two should be interpreted in the context of the following limitations.

First, it should be noted that both studies were quantitative cross-sectional. According to Drewnowski (2012), cross-sectional studies are prone to manipulations and

biases. Such aspects are likely to have a negative impact on the data collected because the researcher could not validate the nature of the information collected using a cross-sectional design. This means that a cross-sectional research design could be less effective in investigating individual mindset and healthy eating behaviors.

The limited scope was another limitation in the study. In particular, study one focused on only one aspect. This includes evaluating how implicit theory and growth theories influence the type of food individuals eat. Therefore, the study's focus was to explore whether entity theorists eat more unhealthy food than incremental theorists who believed that behavior change could influence the type of food an individual eats.

In study two, some limitations must be considered in line with the study findings. The study's purpose was to investigate if behavioral control is likely to mediate the relationship between implicit personality theory and healthy eating behaviors. The study was only limited to implicit personality theory and healthy eating behaviors. Because behavior can be learned and changed from one person to another, focusing on implicit theory and unhealthy eating behavior could limit the study results if alternative theories and other eating behaviors are excluded from the study.

Lastly, study one was based on hypothetical scenarios. The essence is that the study was not conducted in real settings with actual participants but was based on hypothetical assumptions. In such instances, the study findings are less likely to be true in real-world settings while the hypothetical scenarios are withheld.

In both studies, the researcher recruited a homogenous sample to take part in the study. Using a homogenous sample to conduct a study has several limitations, including biased responses to address the research questions. Such practices are likely to influence

the interpretation of study results among scholars and other researchers who consider it less representative and generalizable to other settings.

### Future Research

The study findings open up further avenues of research. First, the study results suggested no statistically significant relationship between food choice, behavioral control, and healthy attitudes towards healthy eating. It is important to understand that age and gender could significantly influence the nature of food an individual eats. Therefore, further research is needed to investigate how gender and age could influence an individual's eating habits. Once income was controlled, the study revealed that the persuasive messaging impacted selecting a healthier choice. Further research can explore income inequality and determine the impact on healthy behavior and choices.

Finally, in this paper, we recruited intention measures. Future research could focus on the impact of situationally inducing a growth mindset through preventive messaging on patients' likelihood to adopt health eating and therefore on their weight.

By using the present study as a blueprint, scholars can use the study findings to conduct further research on how personality traits influence healthy eating behavior among individuals. In summary, the study findings can be applied to the practice by helping dieticians recommend appropriate personality traits and behaviors focused on healthy eating practices. Recommending healthy eating practices among people has the capacity of improving their living standards and health outcomes.

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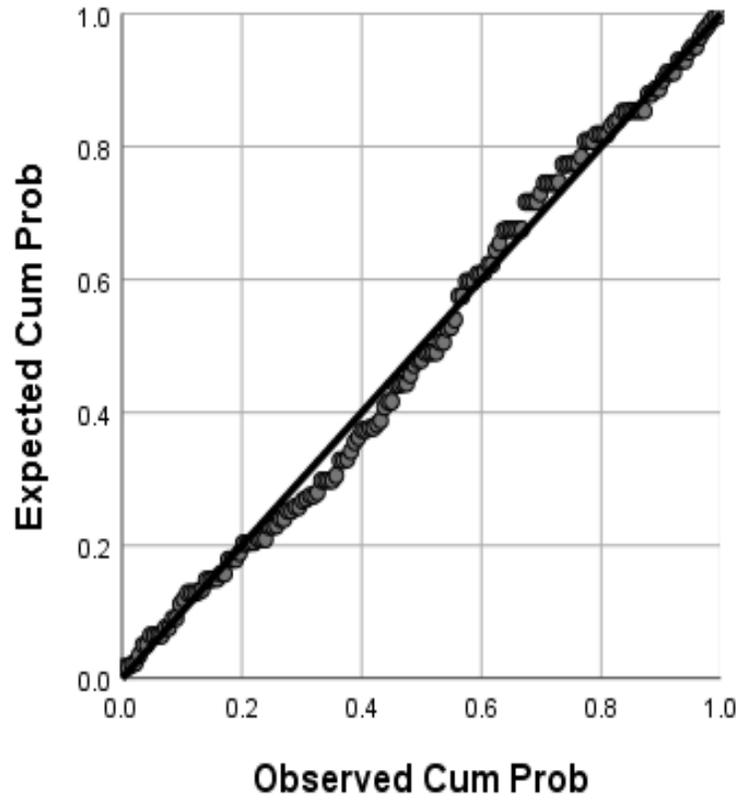
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**APPENDIX A**

**NORMAL PROBABILITY PLOT FOR THE TWO EATING BEHAVIOR**

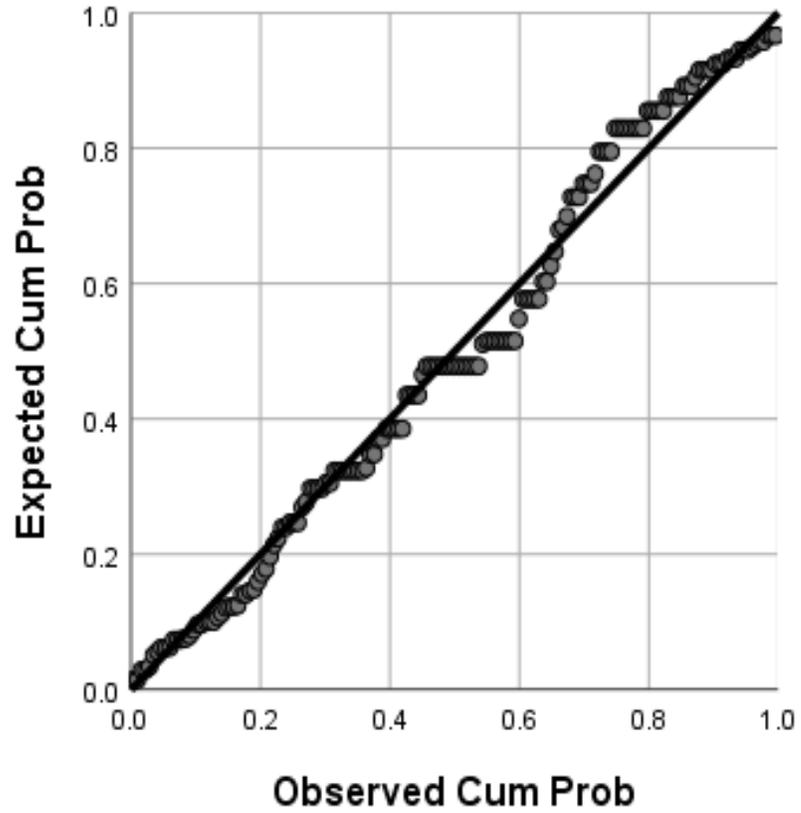
**MODELS**



**APPENDIX B**

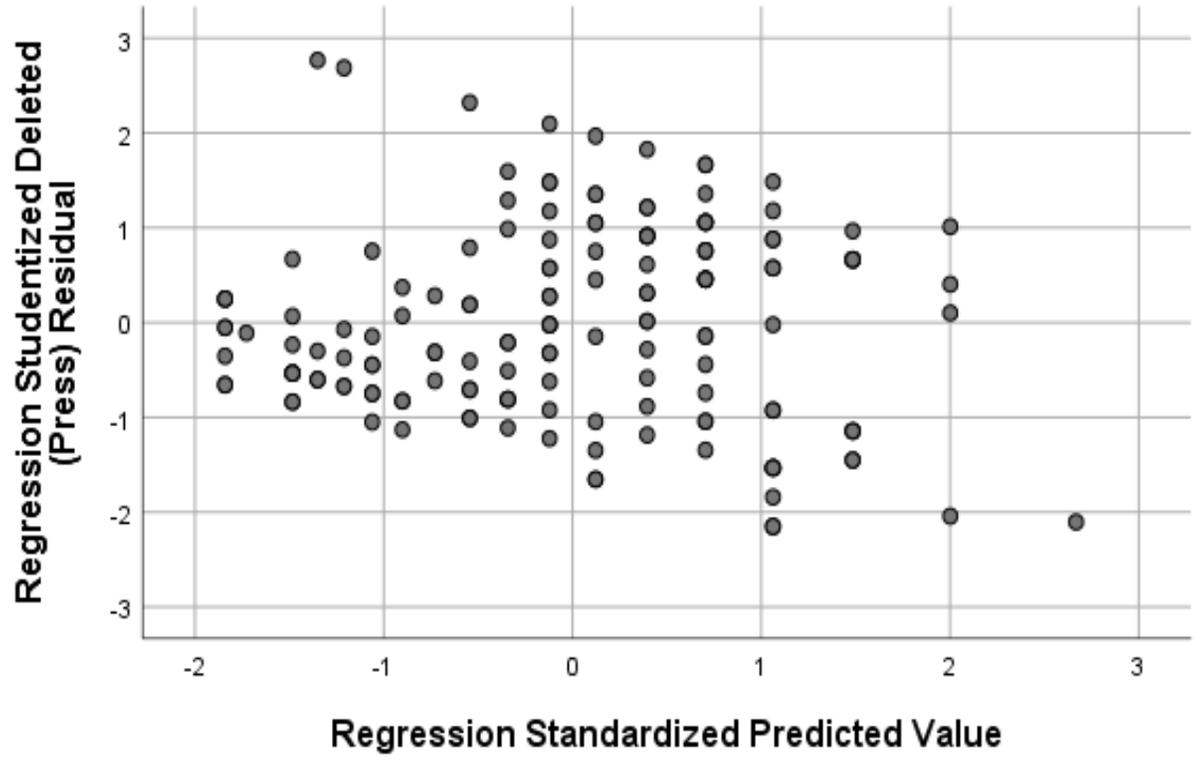
**NORMAL PROBABILITY PLOT FOR THE TWO EATING BEHAVIOR**

**MODELS**



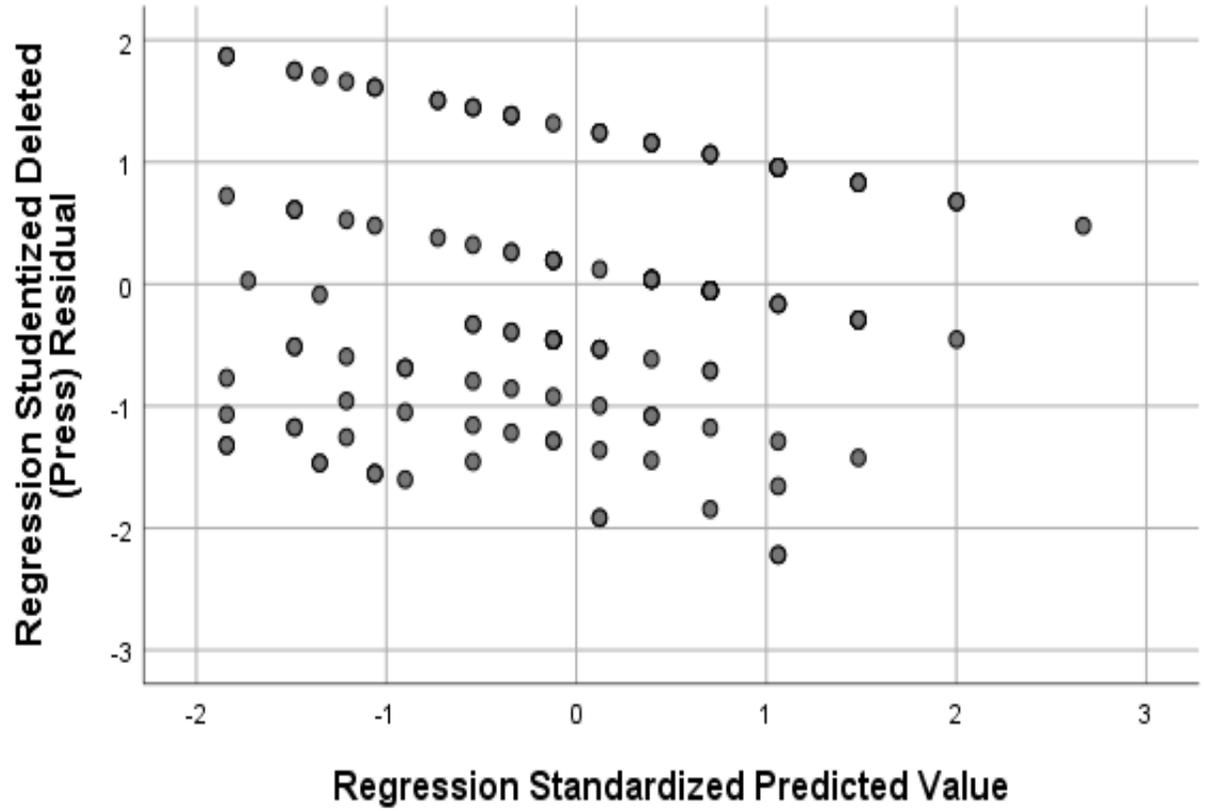
APPENDIX C

SCATTERPLOT OF EATING BEHAVIOR MODELS



APPENDIX D

SCATTER PLOT PREDICTED VALUES



**APPENDIX E**  
**BURGER VS SALAD**

Dependent Variables

Q1

Imagine you stop by a store to get lunch and you have the following two choices for lunch. Please, imagine this situation as vividly as possible and then respond to the questions below. Which of the two following two options would you choose?



1. Very Likely to Choose Burger (1)
2. Very Likely to Choose Grilled Chicken Salad (7)

## APPENDIX F

### ICE CREAM TOPPINGS

Q2: Imagine you stop by an ice cream store and get yourself a scoop of ice cream. The person at the counter asks you if you would like to add toppings to your ice cream. How many toppings would you choose?



	0	1	2	4	5	6	7	8	10	11	12
--	---	---	---	---	---	---	---	---	----	----	----

I will choose these many toppings ( )



**APPENDIX G**  
**ADDING FRIES**

Q3

Imagine you stop by a store to get lunch and you have ordered a burger. The person at the counter asks you if you would like to add a side of french fries. How likely are you to add French Fries to your order:



1. Not at All Likely (1)
2. Very Likely (7)

## APPENDIX H

### FRIES VS SALAD

Q123

Imagine you stop by a store to get lunch and purchase a burger. For your side item, you can choose between a salad and fries. Please, imagine this situation as vividly as possible and then respond to the questions below.



Which of the two options would you choose?



1 Very likely to  
choose fries

2

3

4

5

6

7 Very likely to  
choose salad

## APPENDIX I

### IMPLICIT PERSONALITY TEST

Q1

Below is a list of statements related to different experiences people have in their lives. Based on what you feel, please indicate how much do you agree with each statement. Numbers near 7 indicate strongly agree, while numbers near 1 indicate strongly disagree. Please note there are no right or wrong answers to these questions. We are merely interested in your personal opinions.

On a scale from 1-7, with 1 being strongly disagree and 7 Strongly agree, rank the following statements based on your belief.

The kind of person someone is, is something basic about them, and it can't be changed very much.

1=Strongly Disagree (1)

7=Strongly Agree (7)

---

Q2 People can do things differently, but the important parts of who they are can't really be changed

1=Strongly Disagree (1)

7=Strongly Agree (7)

---

Q3 Everyone is a certain kind of person, and there is not much that they can do to really change that

1=Strongly Disagree (1)

7=Strongly Agree (7)

## APPENDIX J

### BEHAVIORAL CONTROL TEST

Below is a list of statements related to different behaviors people have in their lives. Based on what you feel, please indicate how much do you agree with each statement. Numbers near 7 indicate strongly agree, while numbers near 1 indicate strongly disagree. Please note there are no right or wrong answers to these questions. We are merely interested in your personal opinions.

On a scale from 1-7, with **1 being strongly disagree and 7 Strongly agree**, rank the following statements based on your belief.

Avoiding unhealthy food in the future is entirely up to me.

1=Strongly Disagree (1)

7=Strongly Agree (7)

I don't think unhealthy food consumption is in my control.

1=Strongly Disagree (1)

7=Strongly Agree (7)

I think how much unhealthy food I consume is in my control.

1=Strongly Disagree (1)

7=Strongly Agree (7)

## APPENDIX K

### IMAGE

*"Increasing numbers of U.S. adults suffer from obesity that leads to other complications and chronic conditions. The number of deaths caused by obesity has increased over the past several years. Eat Healthily!"*

