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The Role of Affective Forecasting and the Impact Bias in Nutritional Health Behaviors

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Abstract

Previous literature on affective forecasting has studied its role in health decisions, but there is little research investigating affective forecasting in diet choices and eating behaviors. The present study collected affective forecasts from 43 college participants before eating an indulgent snack and then observed emotions immediately after eating the snack. We predicted that emotion predictions would be significantly stronger than observed emotions, in support of previous literature on the impact bias. We also predicted that optimism would predict a stronger impact bias and that extraversion and neuroticism would have a role in forecasts and observed emotions. Contrary to our hypothesis, predicted pleasure (M=2.12) was significantly lower than observed pleasure (M=2.34), $F(1,42)=5.44$, $p=.025$. Likewise, for participants who ate M&Ms rather than cookies or chips, participants had significantly higher observed positive emotion (M=1.95) than they had predicted (1.73), $F(1,14)=5.78$, $p=.031$. Trait optimism had significant interaction effects for positive affect, for each food chosen, such that as optimism increases, predicted affect increased more rapidly than observed affect. Neuroticism and extraversion were found to significantly influence predicted and observed positive affect, but had no effect on the accuracy of the affective forecasts. The present findings did not indicate the presence of an impact bias, but support previous affective forecasting literature in other aspects. These findings indicate that many of the phenomena in affective forecasting influence food forecasts. This holds implications for future research on affective forecasting in food choice and interventions targeting forecasting errors to improve diet.

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Chapter One: Introduction

Introduction

Diet is closely tied to overall health, and poor diet choices can lead to or worsen diseases, such as type-II diabetes or chronic kidney disease. Diet changes, such as the therapeutic lifestyle changes diet, are therefore commonly recommended by doctors for patients with diet-related health problems or at risk of developing such health problems. Unfortunately, many individuals struggle to change their diets even when they know the risks associated with unhealthy eating. Consequently, the incidence of diet-related diseases continues to rise in the U.S.

Although we know the nutritional values of foods and the addictive properties of fat- and sugar-rich foods, the prediction and judgment process that occurs when an individual makes a diet choice has not been well explored. Affective forecasting, or the prediction of one's future emotional state, has been studied for a wide range of applications, but has been scarcely approached when dealing with nutritional choices. Individuals poorly predict their future emotions, due to a number of possible forecasting errors such as time discounting and impact bias. Without an understanding of the affective forecasting errors that occur while making an immediate dietary choice, nutritionists and other health professionals will struggle to keep patients adhering to dietary recommendations.

Purpose

The objective of this study is to shed light on a common affective forecasting error, the impact bias, which may occur when individuals are considering how a food might influence their mood, an important aspect of making a food choice. The impact bias is the tendency to overestimate the emotional intensity and/or duration of a future event, such as eating a snack

food. With a better understanding of forecasting errors and how to fix them, health professionals can improve patient faithfulness to dietary recommendations by addressing these errors.

Hypotheses

The primary hypotheses were based on the literature surrounding the impact bias in affective forecasting. We expect that participants will predict significantly higher positive emotions, negative emotions, and overall pleasure for cookies, chips, and candy than their actual experienced emotions. There is also literature indicating that affective forecasts can be influenced by various personal differences. People often display an optimistic bias that causes them to underestimate their own health risks (Sjöberg, 2003; Sproesser, 2015), which may be tied to overestimations of positive affect. Therefore, we expect that optimism will predict increased impact bias. In one affective forecasting study, Hoerger and Quirk (2010) found that extraversion predicted more positive baseline moods, forecasts, and actual emotional responses while neuroticism was predictive of less positive baseline moods, forecasts, and actual emotional responses. Therefore, we will also explore how extraversion and neuroticism will influence emotion prediction and the impact bias.

Significance

By intervening in the affective forecasting that occurs while making a dietary choice, this study will be the first step toward new and effective approaches to making dietary recommendations and techniques for patients to help keep their diet plans on track. Future studies could more thoroughly study personal differences that influence affective forecasts in dietary decisions, allowing for more individualized dietary interventions. Possible future intervention studies using clinical trials with medical patients rather than college students would move this research toward a viable clinical application.

Chapter Two: Review of Literature

Diet-related Diseases

Diet is closely tied to overall health, and poor diet choices can lead to or worsen many non-communicable diseases such as type-II diabetes or cardiovascular diseases (World Health Organization, 2014). Excess consumption of dietary sodium has been linked to increased risk for hypertension and cardiovascular disease and excess sodium intake was responsible for an estimated 1.7 million deaths globally from cardiovascular disease in 2010 (World Health Organization, 2014). Reducing fat intake to less than 30% of total caloric intake can help prevent unhealthy weight gain, and replacing saturated fats and trans fats with unsaturated fats can reduce the risk of non-communicable diseases (Food and Agriculture Organization, 2010). Diet and lifestyle changes are therefore commonly recommended by doctors for patients with diet-related health problems or for those at risk of developing such health problems (Garvey et al., 2016). Unfortunately, many individuals struggle to maintain healthy diets, even when knowing the risks associated with unhealthy eating behaviors (Hadžiabdić et al., 2015; Stubbs et al., 2011) and many of those who do lose weight still regain it over the long term (Greenway, 2015).

Health Information

Resources or information aimed at improving diets are commonly found where people purchase the foods that make up their diet or in a healthcare setting. Point of purchase (POP) nutrition information refers to the presentation of the health benefits or calorie content of foods on signs in a supermarket or cafeteria setting using signs next to the food to inform the purchasing decision. While these POPs have become increasingly common, recent studies assessing their effectiveness have produced mixed results. Studies using POP as part of active healthy eating campaigns in supermarket settings reported increased purchasing and

consumption of fruits and vegetables, but no drop in fats purchased (Ayala, Baquero, Laraia, Ji, & Linnan, 2013; Milliron, Woolf, & Appelhans, 2012). Other research found that POPs have no effect on nutrition intake in a university cafeteria setting (Hoefkens, Lachat, Kolsteren, Camp, & Verbeke, 2011). One study in a restaurant setting found calorie labeling of various types of menus to be ineffective at reducing the number of calories ordered by customers (Rendell & Swencionis, 2014). A study in a supermarket setting found that price discounts on fruits and vegetables, as well as price discounts paired with POP information, significantly increased fruit and vegetable purchases, but POP information alone had no significant effect (Waterlander, de Boer, Schuit, Seidell, & Steenhuis, 2013). These studies suggest that while POPs are informative, they may have limited effect on the choice to improve nutrition intake.

Nutrition information may also be provided in health care settings. In these settings, practitioners have moved from traditional lifestyle recommendations from physicians toward more interactive lifestyle and health coaching. Health coaching focuses on internal motivation and patient-driven goal setting, helping patients create a plan to implement their own goals. In a recent study, medical assistants were trained to be health coaches who then coached a group of patients for a 12-week period. While there were significant improvements in sleep quality, physical activity, and BMI, a reduction in sugary beverage intake was the only significant dietary change (Djuric et al., 2017). A study of college students used a single meeting with a health coach followed by periodic SMS updates and reminders. There was significant goal achievement and increased physical activity at follow up, but no significant improvements in diet (Sandrick et al., 2017). Thus these coaching methods are effective in improving overall health, but have less success in affecting diet choices.

Optimistic Bias

One reason POPs and health coaching may have limited effectiveness relates to individuals' optimistic biases about disease, including diet-related diseases. For example, even when people are knowledgeable or understand the risk a given health hazard poses for the general population, they tend to predict their own personal risk of developing the condition as significantly lower than the general population (Sjöberg, 2003). Much research has revealed an optimistic bias – people believing that negative events are less likely to happen to them than to similar others, or that they have a lower risk of some health problems than they actually do (Weinstein, 1980). The optimistic bias has been studied for food and nutrition issues. Sjöberg (2003) found optimistic bias to be greatest for hazards that people view as being in their control, including eating habits. In a recent study, Sproesser, Kohlbrenner, Schupp, and Renner (2015) found that people tend to believe that they eat fewer high-calorie foods and fewer calories per meal than their peers.

Emotion and Eating Behavior

Along with an optimistic bias, emotions can influence an individual's eating decisions and behavior. For example, there is a large body of literature studying the relationship between obesity and depression (Strine et al., 2008; Zhou et al., 2011; Wiltink et al., 2013) and many studies have found a significant correlation between obesity and depression. In one study of obese adult women, those who were depressed had a significantly higher daily caloric intake than those who were not depressed (Simon et al., 2008). Another recent study found that depression predicted future weight gain over a three year period, but weight change was not predictive of future depression (Singh, Jackson, Dobson, & Mishra, 2014). A similar study found that depression was significantly correlated with weight gain, but found no significant

correlation between depression and obesity (Grundy, Cotterchio, Kirsh, & Kreiger, 2014). Instead, in women who were depressed, taking antidepressants was significantly correlated with obesity (Grundy et al., 2014), suggesting that antidepressant use might account for some of the significance of the correlation between depression and weight gain.

Outside of persistent emotional states such as clinical depression, research also suggests that an individual's temporary emotional state at the time of choosing and eating food may have a significant effect on food choice and intake (Gardner, Wansink, Kim, & Park, 2014; Garg, Wansink, & Inman, 2007). In one study, Gardner et al. (2014) found that individuals in a negative mood, when presented with both healthy and indulgent foods, preferred more indulgent foods because they were focused on immediate concerns in order to improve mood. Individuals already in a positive mood, however, preferred the healthier option, as they tended to be focused on more distal, long-term concerns, such as making healthy choices for future health and well-being (Gardner et al., 2014). The degree of negative affect has been found to significantly increase the likelihood of snacking and of choosing a food with high caloric density (Elliston, Ferguson, Schüz, & Schüz, 2017). When presented with an indulgent food, those in negative moods also tend to eat a larger amount of indulgent food than people in positive moods (Garg et al., 2007). These findings suggest that mood, or affect, influences both people's food choices and how much they eat. More research in this area could open a new avenue for diet interventions.

Affective Forecasting

Just as pre-existing or current mood influences an individual's eating behaviors, their predictions of their future moods may also have an effect on their eating behaviors and dietary choices. This idea stems from a theory in social psychology referred to as affective forecasting theory (Wilson & Gilbert, 2003). Affective forecasting theory relates to the prediction of one's

emotional state at a point in the future. The theory has been studied for a wide range of applications, but has been scarcely approached when dealing with nutritional choices (Wilson & Gilbert, 2003). Affective forecasting theory suggests that people perform well when determining which emotions an event will elicit, but they poorly predict the intensity and duration of those future emotions, due to forecasting errors (Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998; Wilson & Gilbert, 2003). One prominent forecasting error is the impact bias. The impact bias is the tendency to overestimate the lasting impact that a future event will have on one's future affect, whether overestimating the intensity of the emotional response, the duration of those emotions, or both the intensity and duration (Wilson & Gilbert, 2003).

Affective forecasting and the impact bias were initially studied for life events of varying gravity, from receiving negative personality feedback to the death of a child (Gilbert et al., 1998). The impact bias has since then been applied to a wide range of events and identified in diverse populations, from university dormitory assignments to HIV test results (Wilson & Gilbert, 2003; Hoerger, Quirk, Lucas, & Carr, 2010). Affective forecasting and the impact bias can also have implications in the area of health and researchers have increasingly studied the impact bias for health events. We next review this research.

Affective Forecasting in Health

Researchers and health professionals have argued that affective forecasting errors may be a significant factor influencing the health decisions of their patients (Halpern & Arnold, 2008; Rhodes & Strain, 2008). In a recent investigation, Hoerger, Scherer, and Fagerlin (2016) researched the role of affective forecasting in patients' decisions to use breast cancer preventive medications. Participants at elevated risks for breast-cancer were provided educational information on the risks and benefits of the breast-cancer medications, then recorded

participants' forecasts of the effect of the medication on their stress levels, and measured decision-making at a 3-month follow-up. The majority of women at elevated risk of breast-cancer predicted that using a chemopreventive medication would increase their health-related stress and these participants were also significantly more likely to choose not to use the medication (Hoerger et al., 2016). These findings demonstrate the role affective forecasting plays in health decisions and the importance of addressing them in health concerns, but it does not address forecasting errors or what might be done to correct for them.

Not only does affective forecasting play a role in health choices, but errors in that forecasting have been found for some health events (Riis et al., 2005; Ubel et al., 2001; Ubel, Loewenstein, Schwarz, & Smith, 2005). In one study, healthy individuals expected that hemodialysis patients would have much more negative moods over a two-week period than those patients actually did; in fact, the moods of those on hemodialysis did not significantly differ from healthy individuals (Riis et al., 2005). A study by Gilbert et al. (1998) first found that the impact bias was due to two phenomena: (1) individuals focusing on the aspects of life that would be affected by the condition while ignoring those unaffected and (2) failing to account for how their emotions will change over time as they adapt to their new situation, called immune neglect. In applying these ideas in medicine, Rhodes and Strain (2008) argued that the impact bias has significant implications for medical decision-making, where overestimating negative consequences or possible risks are likely to lead patients to decline treatment recommendations. Halpern and Arnold (2008) used patient cases to describe the role that the impact bias can have in medical decision-making. For example, one patient refused amputation because he was focused on the aspects of his life that would be affected by the amputation, underestimating his ability to adapt to the new situation.

Ideas of affective forecasting theory and the impact bias have also been tested in nutritional choices. One study, using chocolate and apples as the sample foods, investigated the roles of explicit attitudes, implicit attitudes, and affective forecasts on food enjoyment. Explicit, or conscious, attitudes were self-reported while implicit, or subconscious, attitudes were collected in an implicit attitudes test (IAT). Both explicit and implicit attitudes toward the foods predicted the actual experience, but implicit attitudes were able to predict forecasting errors. Implicit attitudes are not cognitively available during an affective forecast, so only the explicit attitudes factor into the forecast. These implicit attitudes do influence the enjoyment of a food, so stronger implicit attitudes lead to larger forecasting errors. For example, participants in this study with stronger positive implicit attitudes toward chocolate actually underestimated their enjoyment of the chocolate (McConnell, Dunn, Austin, & Rawn, 2011). In another study, participants reported their preferred comfort food and then watched films to induce negative affect before eating. Participants who ate their preferred comfort foods had significantly improved mood, but to the same degree as those who ate noncomfort foods or no food at all (Wagner, Ahlstrom, Redden, Vickers, & Mann, 2014). Participants therefore overestimated the positive impact the more indulgent comfort food would have on their moods. These studies suggest that there may be errors in our affective forecasts of foods, especially with regard to indulgent comfort foods.

Study Overview

In this study, we examined whether there is an impact bias in food choice by measuring both the affective forecast and actual affect after eating. We also investigated how personal differences, such as in optimism and personality, influence forecasts. College student participants first completed a survey that included measures about how they expected their emotions to be

after eating each of the three study foods (Famous Amos cookies, Doritos chips, and M&Ms). They then ate the food they had selected and answered the emotion measures for that food again. This allowed us to compare the scores on the same measure before and after eating, in order to identify forecasting errors.

Chapter Three: Methodology

Participants

Forty-three college undergraduates from a large Midwestern university participated in the study in exchange for course credit. Fifty-one percent of students were male, the average age was 19 years old, and 81% of participants were Caucasian. No students reported food allergies. The average BMI for participants was 24.8, within the normal range of 18.5-25. Eighteen participants chose Famous Amos cookies, nine participants chose Doritos chips, and sixteen participants chose M&Ms.

Materials

Participants provided basic demographic information and completed two surveys. The first survey contained measures of individual differences (optimistic bias, personality, trait optimism, mindfulness, and self-esteem), as well as positive and negative emotion scales for each food, rated on an analog scale. The first survey also assessed each participant's food choice and their predicted pleasure of eating that food. The second survey, administered after eating, contained another measure of current affect, a measure of pleasure, and the repeated measures of positive and negative emotion on analog scales. All of these measures are included in the appendix. Single serving size packages of Famous Amos cookies, M&Ms, and Doritos commonly found in vending machines were used as the test foods. Each food had one serving per container. The Famous Amos cookies have 280 calories per serving, while the M&Ms and Doritos have 240 calories per serving. We chose these foods because they were high in saturated fats and/or sodium and contain little to no vitamins and dietary fiber. The cookies and M&Ms each have 25% of the recommended dietary amount of saturated fats, the cookies and chips each have 9% of the daily amount of sodium, and 50% of the chips' calories come from fat. Three

different popular snack foods were chosen in order to provide a larger proportion of participants with their preferred type of indulgent snack, whether that be chips, cookies, or candy.

Procedure

A prescreen for allergies was used to exclude individuals who might be allergic to any of our test foods. During recruitment, each participant scheduled a time to participate in the experiment through a SONA study scheduling system. The study was administered to each participant individually, with only the experimenter and one participant in the room at a time. This prevented scores from being influenced by the sight, sound, or smell of snack foods being eaten by other participants. After arriving for the study and providing informed consent, participants completed the individual difference measures, and then rated three common indulgent foods (cookies, candy, and chips) on the emotion scales. After rating their emotion predictions for each food, participants were then asked to select (by circling) which food they would eat if they could have any of the three. The food selected by the participant was then used as their experimental food. We then gave each participant their chosen food. We told them "Please eat as much of the food as you are comfortable eating in order to provide us with the most accurate data. Feel free to eat it all, as you will not be able to take any leftovers with you when you leave." Immediately after informing the experimenter that they were finished, participants reported their current affect, rated the food on the positive and negative emotion scales, and provided their demographic information. They were then provided a debriefing sheet outlining the purpose of the study and given an opportunity to ask questions before leaving. They received course credit for their participation.

Measures

The primary variables of interest to assess for the presence or absence of an impact bias are: predicted pleasure, predicted positive affect, predicted negative affect, observed pleasure, observed positive affect, and observed negative affect.

Predicted positive affect. Prior to eating their chosen snack food, participants rated the degree to which they would feel six positive emotions (happy, satisfied, joyful, excitement, calm, proud) if they ate Famous Amos cookies, Doritos chips, or M&Ms. Each emotion was rated on an analog scale ranging from "Not at all" to "Extremely" (see Appendix). To create a composite of predicted positive affect, we averaged the six emotion responses for each food (Reliability = .85 for Famous Amos cookies, .87 for Doritos chips, and .88 for M&Ms).

Predicted negative affect. Prior to eating their chosen snack food, participants rated the degree to which they would feel six negative emotions (disgusted, regretful, disappointed, sad, guilty, embarrassed) if they ate Famous Amos cookies, Doritos chips, or M&Ms. Each emotion was rated on an analog scale (see Appendix). To create a composite of predicted negative affect, we averaged the six emotion responses for each food (Reliability = .88 for Famous Amos cookies, .92 for Doritos chips, and .94 for M&Ms).

Predicted pleasure. After choosing their snack food, participants answered the question, "Overall, how pleasurable would it be to eat this snack?". They were asked to respond on an analog scale ranging from "Not pleasurable at all" to "Extremely pleasurable" (see Appendix).

Observed Positive Affect. After eating their chosen food, participants again rated the degree to which they felt the six positive emotions: happy, satisfied, joyful, excitement, calm, proud. Each emotion was rated on an analog scale (see Appendix). To create a composite of observed positive affect, we averaged the six emotion responses (Reliability = .86).

Observed Negative Affect. After eating their chosen food, participants again rated the degree to which they felt the six negative emotions: disgusted, regretful, disappointed, sad, guilty, embarrassed. Each emotion was rated on an analog scale (see Appendix). To create a composite of observed negative affect, we averaged the six emotion responses (Reliability = .93).

Observed Pleasure. After eating their chosen snack food, participants answered the question, "Overall, how pleasurable was eating this snack?". They were asked to respond on an analog scale ranging from "Not pleasurable at all" to "Extremely pleasurable" (see Appendix).

Analytic Strategies

Descriptive statistics of mean and standard deviation were collected for each primary variable across each food. Pearson correlation analysis was conducted for each primary variable across each food to assess for positive linear relationships within the positive variables (predicted pleasure, observed pleasure, predicted positive affect, observed positive affect) and within the negative variables (predicted negative affect and observed negative affect) and to assess for negative linear relationships between the positive and negative variables. Repeated measures analysis of variance (ANOVA) was conducted to test for significant affective forecasting errors: predicted pleasure vs. observed pleasure, predicted positive affect vs. observed positive affect, and predicted negative affect vs. observed negative affect. Analysis of variance was conducted once for pleasure, including all study foods, but conducted once for each food for both positive and negative affect to assess affective forecasting differences between the foods. Repeated measures analysis of covariance was conducted with each of our possible covariates (optimistic bias, trait optimism, neuroticism, and extraversion): for pleasure compiled across all food choices and for each food for positive and negative affect. Bivariate Pearson correlation analysis was conducted between extraversion and our primary variables and between neuroticism and our

primary interest variables to test their relationships with prediction and experience beyond forecasting errors.

Chapter Four: Results

Descriptives

The mean scores for the six primary variables are presented in Table 1. Because participants reported positive and negative affect predictions for each food before choosing one to eat, we analyzed each food separately, including only the data from participants who ate that food. The group of participants who ate chips reported the lowest mean predicted pleasure (M=1.95) and predicted positive affect (M=1.78) but the highest observed pleasure (M=2.63) and observed positive affect (M=2.03). The chips group also reported both the lowest predicted negative affect (M=.49) and observed negative affect (M=.40). The M&Ms group reported both the highest predicted negative affect (M=.62) and observed negative affect (M=.65).

Table 1: Table of Means for Primary Variables

	Cookies n=18		**Chips** n=9		**M&Ms** n=16		**Overall** n=43	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Predicted Pleasure	2.18	.63	1.95	.91	2.15	.48	2.12	.64
Observed Pleasure	2.23	.64	2.63	.94	2.31	.65	2.34	.71
Predicted Positive Affect	2.04	.52	1.78	.59	1.80	.67	1.90	.59
Observed Positive Affect	1.96	.55	2.03	.70	1.95	.73	1.97	.64
Predicted Negative Affect	.58	.58	.49	.60	.62	.71	.58	.63
Observed Negative Affect	.43	.51	.40	.59	.65	.77	.51	.62

Note: The above measures were recorded on a 0-3.5 in sliding scale, with higher numbers indicating greater affect or pleasure.

We next examined correlations among the six primary variables, which are presented in Table 2. Predicted pleasure was positively correlated with observed pleasure, such that higher predicted pleasure was associated with higher observed pleasure, significantly so for cookies and M&Ms. Both predicted and observed pleasure had generally significant positive correlations

with predicted and observed positive affect and generally negative correlations with predicted and observed negative affect. Predicted and observed positive affect were significantly correlated with one another for each food such that higher predicted positive affect was associated with higher observed positive affect. The same was true between predicted and observed negative affect for each food. Both predicted and observed negative affect had generally negative, though nonsignificant, relationships with predicted pleasure, observed pleasure, predicted positive affect, and observed positive affect.

Table 2: Correlation Tables for Primary Variables

Cookies n=18

Variable	1	2	3	4	5	6
1. Predicted Pleasure	1.00					
2. Observed Pleasure	.56*	1.00				
3. Predicted Positive Affect	.67**	.51*	1.00			
4. Observed Positive Affect	.64**	.78**	.73**	.02		
5. Predicted Negative Affect	-.45	.11	-.29	.02	1.00	
6. Observed Negative Affect	-.42	-.18	-.07	-.10	.53*	1.00

Chips n=9

Variable	1	2	3	4	5	6
1. Predicted Pleasure	1.00					
2. Observed Pleasure	.64	1.00				
3. Predicted Positive Affect	.74*	.59	1.00			
4. Observed Positive Affect	.67*	.86**	.87**	1.00		
5. Predicted Negative Affect	-.79*	-.79*	-.52	-.70*	1.00	
6. Observed Negative Affect	-.49	-.85**	-.39	-.71*	.76*	1.00

M&Ms n=16

Variable	1	2	3	4	5	6
1. Predicted Pleasure	1.00					
2. Observed Pleasure	.71**	1.00				
3. Predicted Positive Affect	.24	.35	1.00			
4. Observed Positive Affect	.45	.70**	.88**	1.00		
5. Predicted Negative Affect	-.40	-.30	-.30	-.22	1.00	
6. Observed Negative Affect	-.40	-.46	-.36	-.34	.95**	1.00

*p<.05, **p<.01

Primary Analyses

Repeated measures analysis of variance (ANOVA) was used to analyze the results. We first tested whether participants' predicted pleasure was different from their observed pleasure. We had hypothesized that participants would overestimate their pleasure from eating the snack food (i.e., their predicted pleasure would be greater than their observed pleasure). Analyses showed a significant difference, $F(1,42)=5.44$, $p=.025$. However, the difference was in the opposite direction than hypothesized. Compared to their predicted pleasure, participants observed pleasure was higher, *M*s=2.12 vs. 2.34, respectively. We had likewise hypothesized that participants would overestimate the degree of affect they would experience after eating their chosen snack food, so they would have higher predicted affect scores than observed affect scores. We again found the opposite results. For participants who ate M&Ms, analyses showed a significant difference, $F(1,14)=5.78$, $p=.031$, such that participants had significantly higher observed positive affect than they had predicted, *M*s=1.95 vs. 1.73, respectively. For those who ate chips, this finding approached significance, $F(1,8)=4.87$, $p=.058$, with observed positive affect being higher than predicted, *M*s=2.03 vs. 1.78, respectively. For those who ate cookies, observed positive affect and predicted affect did not significantly differ, $F<1$. Analyses for negative affect were not significant. Thus, across M&Ms, chips and cookies, participants' predicted negative affect did not differ from their observed negative affect.

Secondary analyses

Repeated measures ANOVAs were also conducted with covariates to test for individual differences that could moderate the above effects. Four potential moderators were examined: optimistic bias, trait optimism, neuroticism, and extraversion. When controlling for optimistic

bias, predicted and observed positive affect for M&Ms remained significantly different, $F(1,13)=6.28$, $p=.026$.

When controlling for trait optimism, there was a significant difference between predicted and observed positive affect for cookies, $F(1,16)=5.86$, $p=.028$. Additionally, there was a significant interaction effect, $F(1,16)=7.18$, $p=.016$. In exploring simple main effects, the interaction suggests that as optimism increased, there was a larger difference between predicted and observed positive affect. For chips and M&Ms, there were no significant main effects, but significant interaction effects, $F(1,7)=3.64$, $p=.026$, and $F(1,13)=6.275$, $p=.026$, respectively. These findings showed a similar pattern such that as optimism increased, there was a greater discrepancy between predicted and observed positive affect.

We next conducted analyses to test whether neuroticism and extraversion moderated results. Analyses showed that neuroticism did not interact to influence primary analyses. The same was true for extraversion. As previous research has indicated that neuroticism and extraversion may influence predicted and observed affect rather than the accuracy of forecasts, we conducted bivariate Pearson correlation analysis for all primary variables to identify if such effects were present in our study. Neuroticism had significant negative correlations with predicted positive affect, $r(18)=-.612$, $p=.007$, and with observed positive affect, $r(42)=-.506$, $p=.001$ for cookies. Extraversion had a significant positive correlation with predicted positive affect for M&Ms $r(16)=.535$, $p=.033$. Neither neuroticism nor extraversion had significant correlations with predicted or observed pleasure or predicted or observed negative affect.

Chapter Five: Discussion and Conclusions

The present study has explored affective forecasting and forecasting errors when making a food choice. Previous literature has shown that people make forecasting errors, such as the impact bias, when considering future events or making health decisions (Wilson, & Gilbert, 2003; Hoerger et al., 2010; Hoerger et al., 2016; Riis et al., 2005; Ubel et al., 2001; Ubel et al., 2005). In this study, we hypothesized that participants would overestimate their future emotions and pleasure after eating an indulgent snack, consistent with the impact bias. Contrary to the hypotheses, we found that participants significantly underestimated how pleasurable it was to eat the snack. They also underestimated the positive emotion they would experience after eating their snacks, though this was significant for only M&Ms. These findings provide partial support for the previous literature that affective forecasting errors are made during snack food choices (McConnell et al., 2011; Wagner et al., 2014). However, our study is the first to explore both positive and negative affect beyond overall enjoyment of the food. The absence of significant findings for negative affect, while significant effects were found for pleasure and positive affect, is noteworthy. The standard errors of the means for predicted negative affect were higher than for predicted positive affect for each food. Negative affect was also much more skewed, and in the positive direction, a sign that many participants reported very little negative affect while others reported negative affect well above the mean. This is likely due in part to some participants not finding one of their preferred snack foods among our choices and needing to choose a snack for which they have some distaste. This might also be influenced by participants who were dieting or abstaining from certain foods during the Christian season of Lent. These scenarios would similarly lead to much higher negative affect scores for a minority of participants. If a study could offer the preferred snack food for each participant, it would provide

a more accurate measure of negative affect in a food choice, such as the guilt or regret that may be observed but not predicted.

The significant underestimation of emotions is uncommon in affective forecasting literature, but research suggests that it may be caused by strong implicit, or subconscious, attitudes which are not accessible during a forecast (McConnell et al., 2011). For example, one study indicates that people who are dieting or trying to limit their calories, sugars, or fats, have stronger positive implicit attitudes for high-calorie foods (Houben, Roefs, & Jansen, 2010). Another study suggests that individuals who are overweight or healthy-weight may tend to have positive implicit attitudes toward high-calorie sweet foods, while individuals who are obese may tend to have positive implicit attitudes toward high-calorie non-sweet foods (Czyzewska & Graham, 2008). It could be that many of our participants had strong positive implicit attitudes toward the snack food that they chose. That implicit attitude would not influence their conscious forecast, but would be have an effect on the eating experience. That would lead them to have greater pleasure and positive emotion than their explicit attitudes had predicted.

The higher observed pleasure and positive affect could also be due to the biological responses to the snack food. For example, carbohydrate intake prompts the release of serotonin and one study found that administration of a serotonergic drug could reduce carbohydrate consumption by as much as 40% (Wurtman, 1988). Likewise, dopamine has been found to be tied to compulsive eating behaviors, as a rewarding release of dopamine occurs after ingestion of foods high in fats and sugars (Bello & Hanjal, 2010; Nirenberg & Waters, 2005). In conclusion, we did not find the expected presence of an impact bias, but found forecasting errors in the opposite direction, which suggest that implicit attitudes or neurotransmitter release may have effects on our observed scores.

Just as affective forecasts influence decision-making, there are factors that have been shown to influence the accuracy of an affective forecast. These have not been explored for dietary affective forecasts outside of the current study. Optimistic bias was a moderator of predicted and observed positive affect in the M&Ms group, such that as optimistic bias increased, predicted and observed positive affect decreased. As our optimistic bias measure was limited to health-related optimism, it is possible that participants were accurately assessing their health risks compared to their peers. Participants who enjoy and eat above average amounts of indulgent snacks might have accurately reported themselves as at above average risks for health-related diseases, which would appear as low optimistic bias, and also have higher predicted and observed positive affect for our snack foods. Likewise, those who do not enjoy or rarely indulge in such snacks could believe themselves to have lower health risks than their peers, appearing as high optimistic bias, and have lower predicted and observed pleasure for such snacks.

Trait optimism amplified the difference between predicted and observed positive affect for the cookie group, such that predicted positive affect was significantly higher than observed. There was also a significant interaction effect for all food groups. As optimism increased, predicted positive affect increased more rapidly than observed positive affect. This indicates that, for positive affect in the cookie group, trait optimism predicts a higher predicted affect than observed affect and greater difference between them, thereby predicting the degree of impact bias. This may be due in part to the nature of optimism: the higher a participant's trait optimism, the higher the degree of positive affect they predicted.

A study of the relationships between the Big Five Personality Traits and affective forecasting found that extraversion predicted more positive baseline moods, forecasts, and actual emotional responses; neuroticism was predictive of less positive baseline moods, forecasts, and

actual emotional responses (Hoerger & Quirk, 2010). While the current study did not find moderating effects of neuroticism or extraversion on affective forecasting errors, we did find some support for this previous study. Neuroticism predicted lower overall observed positive affect scores and lower predicted positive affect scores for cookies. Likewise, extraversion predicted significantly higher predicted positive affect scores for M&Ms, indicating that personality may influence both predicted and observed affect, rather than the accuracy of the forecast.

Future Directions

While not investigated in the present study, other personal differences have also been shown to influence affective forecasts and the weight they carry for individuals making decisions. A longitudinal study found that affective forecasting accuracy was predicted by emotional intelligence, or the ability to identify and manage one's emotions and the emotions of others; female participants scored significantly higher in emotional intelligence and therefore exhibited more accurate forecasts (Dunn, Brackett, Ashton-James, Schneiderman, & Salovey, 2007). The observation facet of mindfulness, which is attention to one's emotions and sensations, has been found to have a significant inverse correlation with the impact bias (Emanuel, Updegraff, Kalmbach, & Ciesla, 2010). People of East Asian cultural background are less likely than people of Euro-Canadian background to choose an activity with greater predicted enjoyment over an activity of greater academic usefulness, giving less weight to their affective forecasts in decision-making (Falk, Dunn, & Norenzayan, 2010). East Asians also make more modest affective forecasts and are less likely to rely heavily on a single piece of information when making a forecast, making them less prone to the impact bias than Euro-Canadians (Lam, Buehler, McFarland, Ross, & Cheung, 2005). These studies indicate that emotional intelligence,

mindfulness, and cultural differences may lead to differences in affective forecasting. These have not yet been studied in relation to food choice and may be avenues for future research.

Previous research suggests that individuals with high neuroticism scores are more likely to consume more sweet and savory foods, by more often engaging in eating to regulate their emotions or eating in response to external cues (Keller & Siegrist, 2015). Another recent study found that individuals overestimate the positive impact that indulgent comfort foods have on their moods (Wagner et al., 2014). Our present study also found that individuals with high neuroticism scores have significantly lower predicted and observed positive affect for eating sweet and savory snacks, meaning that they derive significantly less enjoyment from snacks than their peers do. These previous studies and findings from the present study could serve as the basis for an intervention which targets the desire to regulate mood by eating, using informational presentations on the ineffectiveness and harm of such mood-regulatory eating.

Likewise in the present study, extraversion was correlated with higher predicted positive affect scores, but not to observed affect scores, so extraversion could suggest overestimations of positive food experiences. The findings on neuroticism and extraversion in the present study could serve as the basis for a health coaching intervention. The coaches would add a discussion of participants' personalities, how they might influence their health plan, and some strategies to overcome individual challenges, tailored to their personality.

A substantial body of research links stress to changes in food choice and food intake (Emond et al., 2016; Groesz et al., 2012; Jääskeläinen et al., 2014). Stress exposure is related to a lack of control over one's eating and higher intake of non-nutritious food, called stress-eating (Groesz et al., 2012). Such stress-eating behaviors have been found in adolescents and can be caused by academic stressors (Emond et al., 2016; Jääskeläinen et al., 2014), suggesting that

stress-eating might be prevalent in a college student population, such as was collected in the present study. A future study could build on the present findings by investigating the effect of stress on affective forecasts of foods. Stress could be measured and participants could be collected at high-stress and low-stress times of the school year (such as before spring break vs. before midterm exams) to assess if affective forecasts fluctuate with stress levels.

Previous research suggests that interventions aimed at retraining implicit evaluations of food could reduce unhealthy eating practices in participants (Haynes, Kemps, & Moffitt, 2015). Such an intervention could be paired with information on the tendency of optimistic people to overestimate their enjoyment of indulgent foods in a study to attempt to reduce the degree of affective forecasting errors in a food choice.

Study Limitations

This study has some limitations to consider. Participants were mostly white 18-22 year olds and from a single Midwest American university that, while not representative of the older populations that are more likely to require diet intervention, is still an important population to study for food choice. With their increasing autonomy, college students are more likely to engage in risky health behaviors which can have negative long-term health implications (Steptoe et al., 2002). College students typically have a stable amount of physical activity (Centers for Disease Control, 2001), but a significant decrease in healthy eating and an increase in unhealthy snacking (Steptoe et al., 2002; Zizza, Siega-Riz, & Popkin, 2001). A study by Poobalan et al. (2014) found that a third of college age participants ate more than six unhealthy snacks a day. A study of college students by Spencer (2002) found that over half of participants consumed a diet high in saturated fats and 33% percent consumed less than two servings of fiber daily. Insights

into this group's food choices are valuable, but these results will be limited if extrapolated to the broader population or to other demographics.

The data was collected between 9:00AM and 1:30PM, but a previous study suggests that people may have more positive evaluations of food later in the day (Haynes, Kemps, & Moffitt, 2016). Therefore, the early time of day may have reduced the participants' initial interest in the snacks, reducing their predicted scores. Famous Amos cookies were only referred to as "chocolate chip cookies" in the surveys, while M&Ms and Doritos were both referred to by name. The cookies were also the only food to exhibit higher predicted positive affect than observed positive affect. It is possible that some participants expected a different type of cookie and were slightly disappointed with what they received, which could lead to lower observed positive affect scores. This was also a small study sample, particularly when participants were separated by their food choices. Future studies may collect larger samples to improve power. Future studies may also explore affective forecasting errors in fruits and vegetables in comparison to the current study on fat- and sodium-rich snack foods, to investigate the role of affective forecasting in choosing indulgent snack foods over more nutrient-rich snacks.

Conclusions

The rise of diet-related disease makes maintaining healthy, balanced diets imperative for personal and public health, yet there is little research on the role of emotion in making diet decisions. This study did not find the presence of the impact bias in food choice as was hypothesized, but the underestimation of pleasure that was found support the idea that positive implicit attitudes could increase observed pleasure. Trait optimism and optimistic bias both had significant moderating effects, though for a minority of variables, warranting future investigation. Extraversion and neuroticism were correlated with predicted and observed positive affect, as had been found in previous research. The present study introduced new reliable positive and negative affect scales for food choice and may in the future provide the basis for more thorough research on affective forecasting in diet decisions. This study found that many affective forecasting phenomena also influence food forecasts, holding implications for future research and affective forecasting interventions to improve diet choice.

Appendix: Consent Form

Consent to Participate in Research

Eating behavior and decision-making

We invite you to participate in a research study conducted by Matthew Fallon, a Master's in Health Sciences Graduate Student, and Amanda Dillard, Associate Professor of Psychology at Grand Valley State University.

Purpose of Study. The purpose of the study is to learn about eating behaviors and decision-making.

Procedures. To participate in this study, you must be at least 18 years of age. You will be asked to complete survey questions, eat a snack food, and answer questions about your perceptions. You will also report demographic characteristics. Total study time is estimated to be 40-45 minutes.

Potential Risks and Discomforts. There are no risks to participating in the study. If you have any food allergies, please inform the principal investigator, as the study uses snack foods.

Potential Benefits. There are no personal benefits to you in participating in this study. However, the information we gather from this study may help in designing health behavior interventions in the future.

Compensation for Participation. In exchange for participating in this study, you will receive 1 credit (i.e., 1 hour) of study participation toward your course grade. Participation in research studies is only one way to receive this credit. See your instructor for alternative ways of getting credit.

Assurance of Confidentiality. Your name will not be associated with the information you report to us. We use numbers to identify individuals – not names. This consent form will be kept in a separate file from other questionnaires that you complete, and we will not be able to match names to data. Data and consents created by this project are the property of the university and the investigator. The data and consents will be stored on a password protected server of the investigator in the Department of Psychology.

Other information. Your participation in this study is voluntary. Your decision whether or not to participate will not affect your present or future relationship with GVSU. If you decide to participate, you are free to withdraw your consent at any time during the study, and discontinue participation. Study withdrawal prior to completion of the survey will have no effect on your course grades or further class participation.

If you have any questions about this study, or your participation in it, you may contact Matthew Fallon (Phone 616-443-4776) or Dr. Amanda Dillard in the Psychology Department in 2109 Au

Sable Hall (Phone 331-2865). This research protocol has been approved by the Human Research Review Committee at Grand Valley State University (File # 17-146-H). If you have any questions regarding the rights of research participants, you may contact the GVSU Human Research Review Committee at 616-331-3197 or hrrc@gvsu.edu (email).

You are voluntarily deciding whether or not to participate.

Participation in this study is contingent on you being 18 years of age or older. By entering your name below, you confirm that you are age 18 or older.

Please continue only if you consent to participating in this study.

Please **ENTER** your name

_____

_____ _____

Course to receive credit Instructor

Appendix: Measures

PART 1

Big Five Personality

Directions: The following statements concern your perception about yourself in a variety of situations. Your task is to indicate the strength of your agreement with each statement, utilizing a scale in which 1 denotes strong disagreement, 5 denotes strong agreement, and 2, 3, and 4 represent intermediate judgments. In the boxes after each statement, circle a number from 1 to 5 from the following scale:

1. Strongly disagree
2. Disagree
3. Neither disagree nor agree
4. Agree
5. Strongly agree

There are no "right" or "wrong" answers, so circle the number that most closely reflects you on each statement. Take your time and consider each statement carefully.

Strongly Disagree				Strongly Agree
1	2	3	4	5

I see myself as someone who...

1. ...Is talkative
2. ...Tends to find fault with others
3. ...Does a thorough job
4. ...Is depressed, blue
5. ...Is original, comes up with new ideas
6. ...Is reserved
7. ...Is helpful and unselfish with others
8. ...Can be somewhat careless
9. ...Is relaxed, handles stress well
10. ...Is curious about many different things
11. ...Is full of energy
12. ...Starts quarrels with others
13. ...Is a reliable worker
14. ...Can be tense
15. ...Is ingenious, a deep thinker
16. ...Generates a lot of enthusiasm
17. ...Has a forgiving nature
18. ...Tends to be disorganized
19. ...Worries a lot
20. ...Has an active imagination
21. ...Tends to be quiet
22. ...Is generally trusting
23. ...Tends to be lazy
24. ...Is emotionally stable, not easily upset
25. ...Is inventive

26. ...Has an assertive personality
27. ...Can be cold and aloof
28. ...Perseveres until the task is finished
29. ...Can be moody
30. ...Values artistic, aesthetic experiences
31. ...Is sometimes shy, inhibited
32. ...Is considerate and kind to almost everyone
33. ...Does things efficiently
34. ...Remains calm in tense situations
35. ...Prefers work that is routine
36. ...Is outgoing, sociable
37. ...Is sometimes rude to others
38. ...Makes plans and follows through with them
39. ...Gets nervous easily
40. ...Likes to reflect, play with ideas
41. ...Has few artistic interests
42. ...Likes to cooperate with others
43. ...Is easily distracted
44. ...Is sophisticated in art, music, or literature
45. ...Is politically liberal
46. ...Has high self-esteem

Emotion regulation

7-pt scale; (1) *strongly disagree* – (7) *strongly agree*

1. I control my emotions by changing the way I think about the situation I'm in.
2. When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm.
3. When I am feeling negative emotions (such as sadness or anger), I make sure not to express them
4. I keep my emotions to myself.

Optimism Bias adapted from (Weinstein, 1983)

Compared to other GVSU students of my sex, my chances of developing...are:

much below average		average for GVSU students			much above average	
1	2	3	4	5	6	7

Compared to other GVSU students of my sex, my chances of developing diabetes…
Compared to other GVSU students of my sex, my chances of having a heart attack…
Compared to other GVSU students of my sex, my chances of developing a drinking problem are…
Compared to other GVSU students of my sex, my chances of attempting suicide are…
Compared to other GVSU students of my sex, my chances of developing lung cancer are…
Compared to other GVSU students of my sex, my chances of developing other forms of cancer are…
Compared to other GVSU students of my sex, my chances of being mugged are…
Compared to other GVSU students of my sex, my chances of having an injury are…

Compared to other GVSU students of my sex, my chances of getting in an auto accident are…
Compared to other GVSU students of my sex, my chances of developing high blood pressure are…
Compared to other GVSU students of my sex, my chances of having tooth decay are…
Compared to other GVSU students of my sex, my chances of developing an ulcer are…

LOT-R: Trait Optimism

Please be as honest and accurate as you can throughout. Try not to let your response to one statement influence your responses to other statements. There are no "correct" or "incorrect" answers. Answer according to your own feelings, rather than how you think "most people" would answer.

A = I agree a lot
B = I agree a little
C = I neither agree nor disagree
D = I DISagree a little
E = I DISagree a lot

1. In uncertain times, I usually expect the best.
[2. It's easy for me to relax.]
3. If something can go wrong for me, it will.
4. I'm always optimistic about my future.
[5. I enjoy my friends a lot.]
[6. It's important for me to keep busy.]
7. I hardly ever expect things to go my way.
[8. I don't get upset too easily.]
9. I rarely count on good things happening to me.
10. Overall, I expect more good things to happen to me than bad.

Self Esteem

Below is a collection of statements about you. Using the 4-point scale below, indicate on each line the degree to which you agree or disagree with each statement.

Strongly Agree	Agree	Disagree	Strongly Disagree
1	2	3	4

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

MAAS: Mindfulness

Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate
how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience rather than what you think your experience should be.
1 = *almost always* 2 = *very frequently* 3 = *somewhat frequently* 4 = *somewhat infrequently* 5 = *very infrequently* 6 = *almost never*

_____1. I could be experiencing some emotion and not be conscious of it until some time later.
_____2. I break or spill things because of carelessness, not paying attention, or thinking of something else.
_____3. I find it difficult to stay focused on what's happening in the present.
_____4. I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.
_____5. I tend not to notice feelings of physical tension or discomfort until they really grab my attention.
_____6. I forget a person's name almost as soon as I've been told it for the first time.
_____7. It seems I am "running on automatic" without much awareness of what I'm doing.
_____8. I rush through activities without being really attentive to them.
_____9. I get so focused on the goal I want to achieve that I lose touch with what I am doing right now to get there.
_____10. I do jobs or tasks automatically, without being aware of what I'm doing.
_____11. I find myself listening to someone with one ear, doing something else at the same time.
_____12. I drive places on "automatic pilot" and then wonder why I went there.
_____13. I find myself preoccupied with the future or the past.
_____14. I find myself doing things without paying attention.
_____15. I snack without being aware that I'm eating.

PANAS: Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent [INSERT APPROPRIATE TIME INSTRUCTIONS HERE]. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

_____ interested
_____ distressed
_____ excited
_____ upset
_____ strong
_____ guilty
_____ scared
_____ hostile
_____ enthusiastic
_____ proud

_____ irritable
_____ alert
_____ ashamed
_____ inspired
_____ nervous
_____ determined
_____ attentive
_____ jittery
_____ active
_____ afraid

Food Expectations (Affective Forecasts)

Not at all … Very much (3.5 inch analog scale)

If you were to eat chocolate chip cookies, to what extent do you think you will feel X emotion?

Positive Emotions	Negative Emotions
Happy	Disgusted
Satisfied	Regretful
Joyful	Disappointed
Excitement	Sad
Calm	Guilty
Proud	Embarrassed

If you were to eat Doritos, to what extent do you think you will feel X emotion?

Positive Emotions	Negative Emotions
Happy	Disgusted
Satisfied	Regretful
Joyful	Disappointed
Excitement	Sad
Calm	Guilty
Proud	Embarrassed

If you were to eat M&Ms, to what extent do you think you will feel X emotion?

Positive Emotions	Negative Emotions
Happy	Disgusted
Satisfied	Regretful
Joyful	Disappointed
Excitement	Sad
Calm	Guilty
Proud	Embarrassed

You have just told us about your perceptions of chocolate chip cookies, Doritos, and M&Ms. If you could choose to eat one of these foods right now, which would it be? Please circle your answer below:

Chocolate chip cookies Doritos M&Ms

Overall, how pleasurable would it be to eat this snack? Mark your answer on the line ranging from "not pleasurable at all" to extremely pleasurable"

Not pleasurable at all Extremely pleasurable

PART 2

PANAS: Positive and Negative Affect Schedule (Watson, Clark, & Tellegen, 1988)

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent [INSERT APPROPRIATE TIME INSTRUCTIONS HERE]. Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quite a bit	extremely

_____ interested
_____ distressed
_____ excited
_____ upset
_____ strong
_____ guilty
_____ scared
_____ hostile
_____ enthusiastic
_____ proud
_____ irritable
_____ alert
_____ ashamed
_____ inspired
_____ nervous
_____ determined
_____ attentive
_____ jittery
_____ active
_____ afraid

Food Observations (Observed Affect)

Not at all … Very much (3.5 inch analog scale)
Now that you have eaten this food, to what extent do you feel X emotion?

Positive Emotions	Negative Emotions
Happy	Disgusted
Satisfied	Regretful
Joyful	Disappointed
Excitement	Sad
Calm	Guilty
Proud	Embarrassed

Overall, how pleasurable was eating this snack?

Not pleasurable at all Extremely pleasurable

_____

Demographics

Please circle or write in your information for the following questions. This information helps us get a more complete picture of our results, but you are not required to answer any questions you do not feel comfortable with.

Year in school:
- Freshman
- Sophomore
- Junior
- Senior
- Graduate

Age: _____
Approximate weight: _____
Height: _____
Race/Ethnicity: _____
Gender: _____

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