Determining the Relationship Between Weight Dissatisfaction and Attention to Calories

Eleanor Didden
University of Central Florida

Part of the Psychology Commons
Find similar works at: https://stars.library.ucf.edu/honorstheses
University of Central Florida Libraries http://library.ucf.edu

Recommended Citation
Didden, Eleanor, "Determining the Relationship Between Weight Dissatisfaction and Attention to Calories" (2019). Honors Undergraduate Theses. 663.
https://stars.library.ucf.edu/honorstheses/663
DETERMINING THE RELATIONSHIP BETWEEN WEIGHT DISSATISFACTION AND ATTENTION TO CALORIES

by

ELEANOR HOPE ALBRIGHT DIDDEN

A thesis submitted in partial fulfillment of the requirements for the Honors in the Major Program in Psychology in the College of the Sciences and in the Burnett Honors College at the University of Central Florida

Orlando, Florida

Summer Term, 2019a

Thesis Chair: Dr. Valerie Sims
ABSTRACT

Laws which require the display of calorie information on menus are becoming more prominent throughout the United States and the world, but the efficacy of this information has not yet been studied on an individual level. An Eyetracker and two menus (which were identical save for the inclusion or exclusion of caloric information) were utilized to determine how much time college-aged women spent looking at calories. We also gathered their personal measure of weight dissatisfaction using a body image scale and participants’ self-reported weight dissatisfaction. Using random assignment, 22 participants were placed in the experimental group and 25 participants were placed in the control group. Analysis of the Eyetracker data showed that calories on the menu did have an effect on both the amount of time that participants spent looking at calories, and on the number of fixations they made on the calories. There were significant negative correlations between the participants’ time spent viewing and their appetizer and entree choices on the experimental menu, indicating that participants select lower calorie menu items when they spend more time looking at calories. The data will be further explored in future analysis; the results also indicate that additional research into multiple different directions could be beneficial.
ACKNOWLEDGEMENTS

This thesis would not exist in any form if not for the incredible support of my thesis Chair, Dr. Valerie Sims. This project has been my baby since my first semester in the ACAT lab, and throughout the entire process Dr. Sims has been the kind of mentor that I hope to be, someday, if I ever manage to develop stunning reservoirs of patience and kindness and top-notch lecturing skills.

I am also deeply grateful to my committee members, Dr. Maria Cannarozzi and Dr. Doan Modianos, for their support, feedback, and for putting up with the many, many emails I have sent.

I would have abandoned this project long ago if not for the ACAT lab, in particular Melodie Speigel, Gabby Flores, and (soon to be) Dr. Paul Barclay. Without their help running participants, answering my endless statistics questions, and emotional support I would have blockaded myself in the lab long ago.

All of my love and thanks goes out to my father, sister, brother (not you, Kate Didden. You know what you did.) my roommates, and our cat Dr. Professor Lean Cuisine Marketplace Chicken Tikka Masala “babygirl” Mitski Tads Chunkus the 7th, PhD in Time Break studies “fat n’ happy”. They all helped me through the rough patches, congratulated me on my successes, and tried to make sure that I got a reasonable amount of sleep, which sometimes worked. Thanks guys.
# TABLE OF CONTENTS

INTRODUCTION .......................................................................................................................... 1

Literature Review......................................................................................................................... 2

Hypotheses................................................................................................................................. 4

METHODOLOGY ......................................................................................................................... 5

RESULTS .................................................................................................................................... 7

Descriptive Statistics.................................................................................................................. 7

Analysis of Time Spent Viewing Calories.................................................................................. 12

Analysis of Weight Dissatisfaction and Time Spent Viewing Calories ..................................... 13

Analysis of Menu Item Choice .................................................................................................. 16

Experimental Analysis of Hunger Levels................................................................................... 18

DISCUSSION ............................................................................................................................. 20

Hypotheses................................................................................................................................. 20

Additional Results.................................................................................................................... 21

Possible Explanation of Results................................................................................................ 21

Limitations and Future Directions ............................................................................................ 22

APPENDIX A: FALLON AND ROZIN SCALE .............................................................................. 25

APPENDIX B: INITIAL SURVEY QUESTIONS .......................................................................... 27

APPENDIX C: FINAL SURVEY QUESTIONS ................................................................................. 30
APPENDIX D: GAZEPOINT SOFTWARE SCREENSHOT .......................................................... 34

APPENDIX E: CALIBRATION SOFTWARE SCREENSHOT .................................................. 36

APPENDIX F: CONTROL AND EXPERIMENTAL MENUS ........................................... 38

APPENDIX G: IRB APPROVAL ......................................................................................... 41

REFERENCES .................................................................................................................. 44
LIST OF TABLES

Table 1: Descriptive Statistics of All Participants ................................................................. 7
Table 2: Descriptive Statistics of Participants by menu ............................................................ 8
Table 3: Frequencies of Delta Scores of All Participants .......................................................... 9
Table 4: Independent T-Test for Delta Score, Time Viewed, and Subjective Weight Between Menus .................................................................................................................. 11
Table 5: Independent Samples T Test of Time Spent Viewing AOIs ........................................ 13
Table 6: Experimental Menu Correlations Between Delta Score and Fixation/Percent Time Viewed ........................................................................................................................................ 14
Table 7: Independent Samples T-Test of Delta Score Groups ..................................................... 15
Table 8: Correlations Between Delta Score, Subjective Weight Dissatisfaction, and Time and Total Fixations, Control Menu ........................................................................................................ 16
Table 9: Correlations between delta score, fixations, revisits, and caloric content of menu item choice, experimental menu ......................................................................................................... 17
Table 10: Correlations between delta score and caloric content of menu item choices, control menu ........................................................................................................................................ 17
Table 11: Experimental Menu Correlations Between Hunger Level and Fixations, Revisits, and Percent Time Viewed ......................................................................................................... 18
Table 12: Experimental Menu Correlations Between Hunger Level and Caloric Content of Choices ........................................................................................................................................ 19
LIST OF FIGURES

Figure 1: Histogram of delta scores ................................................................. 9
Figure 2: Group statistics for Subjective Weight Dissatisfaction ..................... 10
Figure 3: Groups Statistics for Mean Delta Score ........................................... 10
Figure 4: Group Statistics for Time Spent Viewing Menus ............................. 11
Figure 5: Group Statistics for Independent Samples T-Test of Time Spent Viewing AOIs .... 12
Figure 6: Group Statistics for Independent Samples T-Test of Number of Fixations .......... 12
Figure 7: Group Statistics Time (percent) vs Delta Score Groups ..................... 14
Figure 8: Group Statistics Total Fixations vs Delta Score Groups ...................... 15
INTRODUCTION

According to Gallup polls, 57% of American women want to lose weight and 59% believe they are heavier than their ideal weight; however, only 25% of American adults are actively attempting to lose weight (Gallup, 2013). Calorie counting is a well-known dieting tactic, but research on the usefulness of calories on menus has not been extensively studied. The purpose of this study is to determine if women look at calories on a restaurant menu and if their relationship with their bodies affects the amount of time they spend looking at calories. This data was collected using an Eyetracker, which measured the number of fixations, time spent fixated, and the number of revisits to the areas where the calories are located on a menu. This study used the Fallon and Rozin scale, in addition to self-reported weight satisfaction, to determine if participants are satisfied with their weight. The numerical values from the Fallon and Rozin scale results were used to analyze how weight dissatisfaction affects how much time the participants spend looking at calories.

This project is significant because of the amount of caloric information on menus throughout the United States and the world (Bomkamp, 2017). Though caloric information is widespread, researchers have not definitively determined if they are an effective tool on an individual level, or if they are helpful for people who are dissatisfied with their weight. Calories do not contain all of the nutritional information about food, but the information can still be used to impact buyers’ decisions on what they would like to order. This research will provide information which may help lawmakers determine if calories should be required on all menus and if calories are a useful tool at all.
Literature Review

In 2010, the FDA required that all restaurants with more than 20 locations post accurate nutritional information, including calories. Full compliance with this rule has taken almost a full decade, but began to be enforced starting in May 2018 (Bomkamp, 2017). Some research has been done on individuals with eating disorders; it has been determined that individuals with anorexia nervosa often order lower-calories foods when presented with caloric information, and individuals with binge eating disorder often order higher-calorie foods (van der Laan, 2017). Though this research is useful, not all individuals who struggle with their weight and self-esteem fit the diagnostic criteria for any one specific disorder. Many young women on college campuses display disordered eating behaviors, but either do not seek help or do not realize that they have a problem (Booth & Phipps, 2014). It should also be noted that in a study where both calories and pricing were manipulated, it was shown that caloric information has little to no effect on actual food choice in adults and adolescents who regularly eat at fast food restaurants (Harnack, 2008).

Additional studies have shown that individuals with restrained eating behaviors spend more time looking at caloric information than non-restrained eaters (Moore, 2014). Restrained eaters were defined as people who had a consistent pattern of dieting and restricting their food intake; however, no measurements were taken on the restrained eaters’ relationship with their weight (Moore, 2014). Weight dissatisfaction has been generally defined as negative assessment of one’s own body and weight which includes a discrepancy between one’s ideal body and one’s perceived body (Stice & Shaw, 2002; Peterson, 2007). This discrepancy between the ideal and the perceived body can be measured quantitatively using multiple different scales and questionnaires, including the Fallon and Rozin scale. The scale also shows that there are
differences in the ideal vs perceived body images in men and women, and men generally have a smaller difference between their ideal body and their perceived current body (Fallon & Rozin 1985). This scale has been established as a reliable measurement of weight dissatisfaction, especially in college-aged women (Tiggemann 1992).

Because individuals who are weight-dissatisfied may or may not be restrained eaters, this will be the first study which takes an in-depth look at how weight-dissatisfied individuals interact with caloric information as measured by an eye tracker. Eye-tracking technology has developed to the point where it can accurately measure where an individual’s attention is focused, while taking into account and correcting for saccadic movements (Henderson, Weeks & Hollingworth, 1999). Gazepoint Eyetracker software allows the researcher to place “Areas of Interest” (AOIs) on images. These AOIs collect specific data about the number of fixations, revisits, and time spent fixated within their area. Eyetracker technology has been used in the past to measure how consumers read menus, and an average number of fixations and a general scan path which consumers follow have both been established (Yang, 2012). This pattern can be affected by promotional tactics like boxing or highlighting the item or putting it at the top or bottom of a list (Gallup, 1987; Hopkins, 2005).

This study was based on a pilot study completed by Dr. Valerie Sims and Eleanor Didden in 2018. The menus and hypotheses have been updated based on the results of that study, and on feedback from members of the Applied Cognition and Technology lab. In the pilot study, 67 participants were run, with 29 sorted into in the control group and 34 sorted into the experimental group. The original menus had prices visible and the caloric content was located next to the food item descriptions. The menus were based off of a real life restaurant, and did not
have specifically controlled caloric content. The pilot study found that participants spent significantly less time looking at caloric content than they did at an empty control area.

**Hypotheses**

Hypothesis 1: Participants will spend time looking at calories on the menu, compared to participants given a control menu with no calories.

Hypothesis 2: Participants who have a high weight dissatisfaction score will spend more time looking at calories on the experimental menu.

Hypothesis 3: Participants who have a high weight dissatisfaction score will choose lower calorie options on the menu.
METHODOLOGY

For this study, 61 participants were gathered, with 30 placed into the control menu and 31 placed in the experimental menu. All participants were female, and they were randomly assigned to their menu. Participants were recruited from the University of Central Florida’s SONA system and given class credit in exchange for completing the study. This study took place in the Applied Cognition and Technology lab, utilizing the lab’s Gazepoint GP3 Eyetracker and software running on a Windows 94 Operating System (Appendix D).

Participants were given consent documents which informed them of the overall time and tasks in the study, but they were not initially told the objective. Participants took two surveys: one survey before they read their menu, and one survey after they read their menu (Appendices B and C). The first survey included 12 questions. Two questions utilized the Fallon & Rozin body image scale (Appendix A): one question about where their ideal body image fell on the scale and one question about where their perceived body image falls on the scale. The survey also contained twelve questions about various food preferences and their current level of hunger.

Once participants had completed part one of the study, they switched to the Eyetracking computer. The Eyetracking computer was set up so that the calibration software was visible on the screen (Appendix E). The participants were calibrated using a nine-point calibration for the most accuracy. The participants were then shown their randomly assigned menu.

Both menus (Appendix F) were identical, save for the inclusion or exclusion of caloric information. Both menus were labeled “price fixe” and no prices were included. The menus had three sections: an appetizer section, an entree section, and a dessert section. The appetizer and entree sections contained four items each. Two items were low calorie, and two items were high
calorie. The dessert section contained two items, one high calorie, and one low calorie.

Participants were instructed to read through the menu and choose one item from each section that they would prefer to order if they were at a restaurant.

Once they had chosen their items, participants returned to the initial computer in order to take the final survey. The final survey contained twelve questions. The first two questions were repeats of the same Fallon and Rozin body image questions on the initial survey. The remaining ten questions consisted of general demographic questions and questions about the participants’ subjective body image and dieting habits. Once the participants completed the survey, they were debriefed about the true purpose of the study.
RESULTS

Data screening was used after all participants were collected. Some participants were omitted because their data was lost, and others were omitted because they were vegetarian or because they did not complete the final survey. Vegetarian participants were removed because there were limited vegetarian options on the menu, and these limitations would immediately affect their eye movement patterns and food choices before caloric content was even considered.

Descriptive Statistics

Due to random assignment of the participants, there was some variation in the means delta scores, subjective weight dissatisfaction, hunger level of each group, and total time spent viewing the menu. In order to facilitate analysis, the hunger level and subjective weight dissatisfaction were both re-coded on numeric scales.

Table 1: Descriptive Statistics of All Participants

<table>
<thead>
<tr>
<th>All participants</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunger level</td>
<td>0.7</td>
<td>0.689</td>
<td>47</td>
</tr>
<tr>
<td>Age</td>
<td>20.13</td>
<td>5.444</td>
<td>47</td>
</tr>
<tr>
<td>Subjective Weight</td>
<td>0.0426</td>
<td>0.62406</td>
<td>47</td>
</tr>
<tr>
<td>Delta Score</td>
<td>0.606</td>
<td>1.1177</td>
<td>47</td>
</tr>
<tr>
<td>Total time (seconds)</td>
<td>79.7</td>
<td>28.8</td>
<td>47</td>
</tr>
<tr>
<td></td>
<td>Menu A</td>
<td>Menu B</td>
<td>Menu A</td>
</tr>
<tr>
<td>----------------------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td></td>
<td>Mean</td>
<td>Mean</td>
<td>Std.</td>
</tr>
<tr>
<td>Hunger level</td>
<td>0.96</td>
<td>0.41</td>
<td>0.676</td>
</tr>
<tr>
<td>Age</td>
<td>19.28</td>
<td>21.09</td>
<td>1.4</td>
</tr>
<tr>
<td>Subjective Weight</td>
<td>0.12</td>
<td>-0.0455</td>
<td>0.6</td>
</tr>
<tr>
<td>Delta Score</td>
<td>0.4</td>
<td>0.841</td>
<td>1.315</td>
</tr>
<tr>
<td>Total time (seconds)</td>
<td>80.1</td>
<td>79.3</td>
<td>28.2</td>
</tr>
</tbody>
</table>

A frequency table and histogram of the delta scores for all participants were also produced. The average of the delta scores, from before and after participants viewed the menus, were used for all delta score analysis.
An independent samples T-Test was run in order to determine if there was a significant difference in total time viewed, delta score or subjective weight dissatisfaction.
Figure 3: Groups Statistics for Mean Delta Score

Figure 2: Group statistics for Subjective Weight Dissatisfaction
Table 4: Independent T-Test for Delta Score, Time Viewed, and Subjective Weight Between Menus

<table>
<thead>
<tr>
<th></th>
<th>Independent Samples Test</th>
<th>Levene's Test for Equality of Variances</th>
<th>t-test for Equality of Means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>F</td>
<td>Sig.</td>
<td>t</td>
</tr>
<tr>
<td>Delta Scores</td>
<td>Equal variances assumed</td>
<td>1.174</td>
<td>0.284</td>
</tr>
<tr>
<td>Time viewed</td>
<td>Equal variances assumed</td>
<td>0.192</td>
<td>0.663</td>
</tr>
<tr>
<td>Subjective Weight</td>
<td>Equal variances assumed</td>
<td>0.008</td>
<td>0.93</td>
</tr>
</tbody>
</table>

Figure 4: Group Statistics for Time Spent Viewing Menus
Analysis of Time Spent Viewing Calories

In order to determine if there was a significant difference between the mean percent of
time participants spent viewing and fixations on the Areas of Interest on the experimental menu
compared to the control menu, an independent samples T-test was run.

Figure 5: Group Statistics for Independent Samples T-Test of Time Spent Viewing AOIs

Figure 6: Group Statistics for Independent Samples T-Test of Number of Fixations
The T Test showed that there were significant differences in the mean fixations and mean percentage of time spent viewing AOIs.

**Analysis of Weight Dissatisfaction and Time Spent Viewing Calories**

Bivariate correlations were used in order to determine if weight dissatisfaction, measured either by delta score or by subjective reporting, was related to the amount of time participants spent looking at calories or the number of fixations on calories. There were no significant correlations between either subjective or delta score weight dissatisfaction on the experimental menu.
Participants were re-coded as “satisfied” or “dissatisfied” based on their delta scores. Participants who had a non-zero delta score were coded as “dissatisfied”, and participants with a zero delta score were coded as satisfied. An independent samples T-test was then run, with weight dissatisfaction as the grouping factor.

Table 6: Experimental Menu Correlations Between Delta Score and Fixation/Percent Time Viewed

<table>
<thead>
<tr>
<th>Delta Score (mean)</th>
<th>Pearson Correlation</th>
<th>Sig. (2 tailed)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>22</td>
</tr>
</tbody>
</table>

Weight Dissatisfaction (subjective)

<table>
<thead>
<tr>
<th>Weight Dissatisfaction (subjective) Pearson Correlation</th>
<th>Sig. (2 tailed)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.298</td>
<td>0.177</td>
<td>22</td>
</tr>
</tbody>
</table>

Figure 7: Group Statistics Time (percent) vs Delta Score Groups

Figure 7: Group Statistics Time (percent) vs Delta Score Groups

14
Additional correlations were run on the control menu, in order to determine if delta score or subjective weight had a relationship with the time spent fixated on the control AOIs. There were no significant correlations.
Table 8: Correlations Between Delta Score, Subjective Weight Dissatisfaction, and Time and Total Fixations, Control Menu

<table>
<thead>
<tr>
<th></th>
<th>Subjective Weight Dissatisfaction</th>
<th>Delta Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (percent)</td>
<td>Pearson Correlation: -0.132</td>
<td>-0.186</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed): 0.528</td>
<td>0.372</td>
</tr>
<tr>
<td></td>
<td>N: 25</td>
<td>25</td>
</tr>
<tr>
<td>Total fixations</td>
<td>Pearson Correlation: 0.216</td>
<td>-0.018</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed): 0.3</td>
<td>0.933</td>
</tr>
<tr>
<td></td>
<td>N: 25</td>
<td>25</td>
</tr>
</tbody>
</table>

Analysis of Menu Item Choice

In order to determine if there was a relationship between weight dissatisfaction and the calorie content of the participants’ food choices, a bivariate correlation was performed. There were no significant correlations between the participants’ weight dissatisfaction (measured either by their delta scores or subjective responses) and their food choices on either the control or experimental menu. On the experimental menu there were correlations between the caloric content of the participants appetizer and entree choice and their total revisits and amount of time fixated. These correlations were significant at the \( p=0.05 \) level.
An additional bivariate correlation was run on the control menu. There were no significant correlations between the delta score and the menu choices.

### Table 9: Correlations between delta score, fixations, revisits, and caloric content of menu item choice, experimental menu

<table>
<thead>
<tr>
<th></th>
<th>Calorie Content of Appetizer Choice</th>
<th>Calorie Content of Entree Choice</th>
<th>Calorie Content of Dessert Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total fixations</td>
<td>Pearson Correlation</td>
<td>-.458*</td>
<td>-.450*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.043</td>
<td>0.036</td>
</tr>
<tr>
<td>Total revisits</td>
<td>Pearson Correlation</td>
<td>-.505*</td>
<td>-.491*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.023</td>
<td>0.02</td>
</tr>
<tr>
<td>Delta Score</td>
<td>Pearson Correlation</td>
<td>0.251</td>
<td>0.265</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.286</td>
<td>0.23</td>
</tr>
</tbody>
</table>

### Table 10: Correlations between delta score and caloric content of menu item choices, control menu

<table>
<thead>
<tr>
<th></th>
<th>Calorie Content of Appetizer Choice</th>
<th>Calorie Content of Entree Choice</th>
<th>Calorie Content of Dessert Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective Weight</td>
<td>Pearson Correlation</td>
<td>-0.363</td>
<td>0.127</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.074</td>
<td>0.544</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Delta Score</td>
<td>Pearson Correlation</td>
<td>0.029</td>
<td>0.021</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.89</td>
<td>0.922</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>
Experimental Analysis of Hunger Levels

As part of the final survey, participants were asked to report their hunger level. They were able to select either “not hungry”, “somewhat hungry” or “very hungry”. These responses were coded as 0, 1, and 2. A bivariate correlation was run in order to determine if there was a relationship between hunger level and time spent viewing calories, revisits, or total fixations.

<table>
<thead>
<tr>
<th>Hunger Level (Numeric)</th>
<th>Pearson Correlation</th>
<th>Total Fixations</th>
<th>Revisits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.323</td>
<td>.476*</td>
<td>.507*</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>0.143</td>
<td>0.025</td>
<td>0.016</td>
</tr>
<tr>
<td>N</td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>

There were significant correlations between the number of fixations on caloric content and revisits to caloric content. Additional correlations were run to determine if participants’ hunger levels were related to the caloric content of their menu choices. Though there were no significant findings, some interesting negative correlations were under $p=.10$. 


### Table 12: Experimental Menu Correlations Between Hunger Level and Caloric Content of Choices

<table>
<thead>
<tr>
<th>Hunger level (numeric)</th>
<th>Calorie Content of Appetizer Choice</th>
<th>Calorie Content of Entree Choice</th>
<th>Calorie Content of Dessert Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson Correlation</td>
<td>0.361</td>
<td>0.109</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>0.098</td>
<td>0.628</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>22</td>
<td>22</td>
</tr>
</tbody>
</table>
DISCUSSION

There were multiple interesting and significant findings in this study. The experimental and control groups, though not evenly divided, spent a very similar amount of time viewing the menus. They also had similar mean ages. The weight dissatisfaction of the experimental group was somewhat higher, both as measured by their mean delta scores and by their subjective weight dissatisfaction. The difference between the time that participants spent looking at the Areas of Interest on the experimental and control menus was significant; participants did spend more time looking at the area that contained calories than at the control area. The weight dissatisfaction of the participants did not significantly affect the time they spent looking at calories, measured either objectively or subjectively. Additionally, weight dissatisfaction did not have any effect on menu choices. The number of fixations and time spent viewing calories did have a significant negative correlation with caloric content of choices, implying that the longer that participants spent viewing calories, the lower their calorie choices were. Hunger also had effects on fixations and revisits on calories, and had a relationship (though not significant) with the caloric content of the participants’ food choices.

Hypotheses

The results indicated that Hypothesis one, that participants would spend more time looking at calories on a menu than they would looking at a blank area on a control menu, was correct. Participants spent a mean of .015 percent of their time looking at calories on the experimental menu, and .0003 percent of their time looking at the blank area on the control menu. The difference in these means was significant at .000. Hypotheses two and three were not supported by the data.
Additional Results

The relationship between participants’ fixations on calories, revisits to calories and their menu choices was an interesting incidental finding. There were negative correlations between fixations, appetizer choices, and entree choices that were significant at the $p=.05$ level. This indicated that participants who spent more time fixated on calorie content, and who made more revisits to the calorie content, chose menu items which had lower caloric content.

Though not included in the initial hypotheses, the relationship between hunger and other variables was very interesting. There were multiple positive significant correlations between participants’ hunger level, their fixations on calories, and their revisits to calories. The correlations were both significant at the $p=.05$ level. This indicated that participants who were hungrier spent more time looking at caloric content.

These two results combined indicate that when participants are hungry, they spend more time looking at calories, but when they spend more time looking at calories, they choose lower calorie options.

Possible Explanation of Results

There are multiple reasons why the data indicate what they do. The significance of the amount of time that participants spent looking at calories compared to the control can be attributed to multiple factors. As the pilot study data supported the opposite results, any of the elements which were changed may be the cause. There were no prices on the menu, the caloric content was specifically controlled, and the calories themselves were moved away from the food names and descriptions. Many other factors may have influenced why the second and third hypotheses were not supported. The participants in our study had relatively little difference in
their weights, and had low weight dissatisfaction measured both subjectively and objectively. Without a more diverse range of participants, it may be difficult to determine the true relationship between weight dissatisfaction and attention to calories. However, there are other relationships which can be explored with these data.

The individual food limitations of participants may also play a part in their food choices and the time they spend looking at caloric information. This study did not ask if participants were lactose intolerant or had been diagnosed with Celiac disease, but both of those conditions could have influenced participants’ food behaviors. Age and developmental differences may have also played a role in participants’ food choices. College students often go through changes in their eating habits as they age, and the eating habits of a first year college student may be very different from the eating habits of a graduating fourth year student.

Control may play an important part in the relationship between hunger and the caloric content of choices. When participants’ hunger levels increased, they had a decreased level of control over their choices, and may have chosen whatever item appealed to them regardless of calories. However, participants who are only somewhat hungry had more control over their choices, and therefore chose lower calories options.

Limitations and Future Directions

Though this experiment was revamped in order to be as sound as possible, there are still many different limitations. First among them, it occurred in a lab setting. When people are ordering food in a restaurant, they are experiencing stimulation of multiple senses, and have presumably walked into the restaurant hungry and ready to eat. Additionally, restaurant menus are specifically designed to direct the consumer’s gaze to specific options. This experiment was
also limited by the University of Central Florida population. Our participants had all completed some college, were only women, and had a mean age of 20. Age, education, and gender all play a factor in menu choices, and our participants are not representative of the entire population of the United States, or even of the city of Orlando.

An issue that arose in both the pilot study and the follow-up study was that participants were, overall, satisfied with their weight. This was contrary to the findings in the literature review, which may be for multiple different reasons. There is a prominent “body positivity” movement spreading throughout social media, which may have a larger impact on current college students than on any other population. Additionally, body image may be related to location and circumstances, and the population of UCF in particular may have abnormally low levels of weight dissatisfaction.

Additional analysis using this data could reveal additional significant findings. The data related to menu item descriptions and the difference between “healthy” and “unhealthy” menu choices has not been fully analyzed; these insights could reveal further avenues of study and more future directions.

The results, though limited, are very interesting and have much potential for future research. The area of hunger levels is a particularly interesting avenue, and this data indicates that it has a larger role in menu choice than weight dissatisfaction. Additionally, research could be done on male weight dissatisfaction, as their body image issues may lead to different relationships between their hunger levels, caloric choices, and time spent viewing calories. In further studies, more attention could also be paid to participants’ actual weight and BMI. This data could be used in place of, and compared to, participants’ weight dissatisfaction. Menus used
in future studies could also have a larger difference in the caloric content of the menu options, which could lead to different results. Future studies could also attempt to lead participants to make different choices, using commercial tactics like boxes and colors to highlight specific menu options.
APPENDIX A: FALLON AND ROZIN SCALE
APPENDIX B: INITIAL SURVEY QUESTIONS
(using the Fallon and Rozin scale for questions 1 and 2)

1. Which of these do you feel represents your current body?

2. Which of these represents your ideal body?

3. Are you currently a vegetarian or vegan?
   a. Yes
   b. No

4. Have you been a vegetarian or vegan in the past?
   a. Yes
   b. No

5. Have you ever worked in the restaurant industry?
   a. Yes
   b. No

6. How often do you eat out?
   a. More than once daily
   b. More than once a week
   c. Monthly
   d. Occasionally

7. Do you have a specific favorite food?
   a. Yes
   b. No
   c. I have multiple

8. Do you have a specific least favorite food?
a. Yes
b. No
c. I have multiple

9. Do you prefer sweet foods or salty foods?
   a. Sweet
   b. Salty

10. Do you prefer hot foods or cold foods?
    a. Hot
    b. Cold

11. When is the last time you ate today?
    a. Within 1 hour
    b. Over 1 hour ago
    c. Over 2 hours ago
    d. Over 4 hours ago
    e. I have not eaten yet today

12. How hungry are you?
    a. Not hungry
    b. Somewhat hungry
    c. Very hungry
APPENDIX C: FINAL SURVEY QUESTIONS
(using the Fallon and Rozin scale for questions 1 and 2)

1. Which of these do you feel represents your current body?

2. Which of these represents your ideal body?

3. What is your current age?
   a. 18-21
   b. 21-25
   c. 25-29
   d. 30-35
   e. 35+

4. Please specify your ethnicity:
   a. White
   b. Hispanic or Latino
   c. Black or African American
   d. Native American or American Indian
   e. Asian / Pacific Islander
   f. Other

2. Please specify your religious affiliation:
   a. Christian
   b. Jewish
   c. Muslim
   d. Hindu
   e. Buddhist
f. Agnostic/Atheistic

g. Other

3. What is your current marital status?
  a. Single (never married)
  b. Married, or in a domestic partnership
  c. Widowed
  d. Divorced
  e. Separated

4. What level of education have you reached?
  a. High school degree or equivalent
  b. Some college, no degree
  c. Associate degree
  d. Bachelor’s degree
  e. Master’s degree
  f. Professional degree
  g. Doctorate

5. Are you a transfer student?
  a. Yes
  b. No

6. Are you a first generation college student?
  a. Yes
  b. No
10. Do you count calories?
   a. Yes
   b. No, I never have
   c. No, but I have in the past

11. How do you feel about your current weight?
   a. Positive
   b. Negative
   c. Neutral

12. How would you classify your body type?
   a. Underweight
   b. Average
   c. Overweight
   d. Obese
APPENDIX D: GAZEPOINT SOFTWARE SCREENSHOT
UCF Carnitas Canteen
Price Fixe Menu

Choice of one appetizer, entree, and drink for $24
No substitutions are accepted.

Appetizers

- Aqua-Avocado Salad
- Spicy/white fish with avocado, sunny tomatoes, jalapeños, and a spicy-cilantro dressing

Entrees

- Chile en Nogada with fried beef, green jalapenos, and red sauce
- Green Chile Ribs with roasted green chiles, salsa verde, and chipotle sauce
- Short Rib Enchiladas with slow-cooked short ribs, roasted chilies, and mole sauce
- Shrimp and Grits with grilled shrimp, roasted peppers, and cajun spiced grits
- Tacos de Carne Asada with grilled beef, pico de gallo, and cilantro

Drinks

- Red Wine
- White Wine
- Beer
- Soft Drinks
- Milk
- Water

Order from the menu or ask for a suggestion.

Enjoy your meal!
APPENDIX E: CALIBRATION SOFTWARE SCREENSHOT
APPENDIX F: CONTROL AND EXPERIMENTAL MENUS
# UCF Carnitas Canteen

**Price Fixe Menu**

Choice of one appetizer, entree, and dessert for $24

No substitutions are accepted.

<table>
<thead>
<tr>
<th>Appetizers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Jimica-Avocado Salad</td>
<td>Spiralized jimica with avocado, cherry tomatoes, jalapeños, and a lime-cilantro dressing</td>
</tr>
<tr>
<td>Chips and Queso</td>
<td>Blue corn tortilla chips with house made queso dip</td>
</tr>
<tr>
<td>Elote</td>
<td>Corn on the cob with greek yogurt, cotija cheese, and spices</td>
</tr>
<tr>
<td>Mini Beef Empanadas</td>
<td>Two deep fried mini empanadas with ground beef</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Entrees</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Enchilada Verde</td>
<td>Mesquite roasted chicken with enchilada with tomatillo cumin sauce</td>
</tr>
<tr>
<td>Fish tacos</td>
<td>Three tacos with grilled mahi-mahi, bell pepper, and pico de gallo</td>
</tr>
<tr>
<td>Classic Burrito</td>
<td>Beef burrito with refried beans, cotija cheese, and fresh salsa</td>
</tr>
<tr>
<td>Veggie Fajitas</td>
<td>Black bean fajitas with roasted seasonal vegetables</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Desserts</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini sopapillas</td>
<td>Small pastry pillows served with a caramel or chocolate drizzle sauce.</td>
</tr>
<tr>
<td>Churros</td>
<td>Classic Mexican street pastries with cinnamon sugar</td>
</tr>
</tbody>
</table>
# UCF Carnitas Canteen
## Price Fixe Menu

Choice of one appetizer, entree, and dessert for $24

No substitutions are accepted.

### Appetizers

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jimica-Avocado Salad</td>
<td>Spiralized jimica with avocado, cherry tomatoes, jalapeños, and a lime-cilantro dressing</td>
<td>180 cal</td>
</tr>
<tr>
<td>Chips and Queso</td>
<td>Blue corn tortilla chips with house made queso dip</td>
<td>230 cal</td>
</tr>
<tr>
<td>Elote</td>
<td>Corn on the cob with greek yogurt, cotija cheese, and spices</td>
<td>180 cal</td>
</tr>
<tr>
<td>Mini Beef Empanadas</td>
<td>Two deep fried mini empanadas with ground beef</td>
<td>230 cal</td>
</tr>
</tbody>
</table>

### Entrees

All entrees include a side of rice and beans.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enchilada Verde</td>
<td>Mesquite roasted chicken with enchilada with tomatillo and cumin sauce</td>
<td>370 cal</td>
</tr>
<tr>
<td>Fish tacos</td>
<td>Three tacos with grilled mahi-mahi, bell pepper, and pico de gallo</td>
<td>420 cal</td>
</tr>
<tr>
<td>Classic Burrito</td>
<td>Beef burrito with refried beans, cotija cheese, and fresh salsa</td>
<td>420 cal</td>
</tr>
<tr>
<td>Veggie Fajitas</td>
<td>Black bean fajitas with roasted seasonal vegetables</td>
<td>370 cal</td>
</tr>
</tbody>
</table>

### Desserts

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini sopapillas</td>
<td>Small pastry pillows served with a caramel or chocolate drizzle sauce.</td>
<td>200 cal</td>
</tr>
<tr>
<td>Churros</td>
<td>Classic Mexican street pastries with cinnamon sugar</td>
<td>300 cal</td>
</tr>
</tbody>
</table>
APPENDIX G: IRB APPROVAL
Approval of Human Research

From: UCF Institutional Review Board #1
FWA00000351, IRB00001138

To: Valerie K. Sims and Co-PI: Eleanor Didden

Date: December 10, 2018

Dear Researcher:

On 12/10/2018 the IRB approved the following modifications to human participant research until 06/03/2019 inclusive:

Type of Review: IRB Addendum and Modification Request Form
Expedited Review

Modification Type: Increase the number of participants from 100 to 150 participants. Add additional demographics questions, update the menu, and change total study time from 1 hour to 30 minutes. Revised Protocol, surveys, and menus have been uploaded. Revised informed consent was approved for use.

Project Title: Menus and Attention
Investigator: Valerie K. Sims
IRB Number: SBE-18-14002
Funding Agency: University of Central Florida (UCF)
Grant Title: N/A
Research ID: N/A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30 days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form cannot be used to extend the approval period of a study. All forms may be completed and submitted online at https://iris.research.ucf.edu.

If continuing review approval is not granted before the expiration date of 06/03/2019, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in IRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

All data, including signed consent forms if applicable, must be retained and secured per protocol for a minimum of five years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained and secured per protocol. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.
In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

This letter is signed by:

Kamiille Chaparro

Signature applied by Kamiille Chaparro on 12/10/2018 04:13:08 PM EST

Designated Reviewer
REFERENCES


