A Thesis

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The Influence of Norms and Self-Regulatory Depletion on Eating Behavior

by

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Submitted to the Graduate Faculty as partial fulfillment of the requirements for the

Master of Arts Degree in Psychology

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An Abstract of

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Obesity is one of the largest health epidemics facing developed nations. Research suggests that obesity and overeating are influenced by a range of factors, including social psychological factors. The purpose of the present study is to examine the interplay between normative social influence and self-regulatory resource depletion on unhealthy eating. Participants were ostensibly in a study on taste preferences in college students, where they consumed an unhealthy food (cookies). Participants were randomly assigned to one cell in a 2 (Depletion or Control) X 3 (Augmentation Norm, Restriction Norm, or Control) completely between-participants design. First, participants performed a difficult task (depletion condition) or an easy task (control condition) prior to consuming the tempting food. Second, participants were led to believe that other participants had eaten a large amount of food (augmentation norm), a small amount of food (restriction norm), or they were given no norm information (control condition). The main outcome measure was the amount of food the participant ate during the session. It was hypothesized that the impact of the norm information (augmentation or restriction) would be amplified when self-regulatory resources have been depleted. Hypotheses were not supported. Possible explanations for results are discussed.
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Chapter One

Literature Review

The “obesity epidemic”, as it is often called, is a complex social issue that began in the early 1980s (Herman & Polivy, 2005). One probable reason for this trend is a drastic change in how people obtain food. Early humans were primarily hunter-gatherers whose food supply fluctuated greatly, requiring them to eat large amounts of fattening food when it was abundant to sustain them through periods of famine. Human physiology has not yet adapted to the plentiful food supply available in many modern environments. Consequently, the body tends to protect itself from weight loss rather than weight gain, resulting in widespread obesity (King, 2013). Although the experience of hunger has not changed, it does not guide eating to the extent that it once did. When food is widely available, people spend most of their time in a “zone of biological indifference” (Herman & Polivy, 2005) in which they are not particularly hungry nor completely sated. In this zone, food intake is not solely governed by biological signals of hunger and satiety. Rather, it can be affected by a host of environmental and contextual factors, including technology that allows people to be sedentary (Mitchell, Catenacci, Wyatt, & Hill, 2011), an increase in dual-income families resulting in more fast food and fewer home-cooked meals (Mitchell et al., 2011), and larger standard portion sizes (Alpert, 2012). The current research will examine the unique and interactive influence of two prominent social psychological factors on unhealthy eating behavior: normative influence and self-regulatory depletion. Developing a better understanding of the social psychological factors that influence eating behavior is necessary in order to develop targeted interventions to combat the obesity epidemic (e.g., Herman & Polivy, 2005).
1.1 Normative Influence

Humans are generally social creatures who often look to one another in times of uncertainty (Festinger, 1954; Sherif, 1936) and are motivated to fit into groups (Tajfel & Turner, 1979; Turner & Oakes, 1986). Prior research has shown that descriptive norms, which indicate how other people feel, think, or behave, are strong determinants of a variety of behaviors (Cialdini, Kallgren, & Reno, 1991; Cialdini, Reno, & Kallgren, 1990), including energy consumption (Abrahamse & Steg, 2009), littering (Cialdini, Reno, & Kallgren, 1990), blood donation (France, France, & Himawan, 2007), and alcohol abuse (Neighbors, Lee, Lewis, Fossos, & Larimer, 2007). Critically for the current research, the social environment—in which descriptive norms are salient—likewise plays a role in people’s food consumption and eating experiences.

First, research has revealed that people tend to eat more in the company of family and friends than alone or in front of strangers (Roth, Herman, Polivy, & Pliner, 2001; Bellisle, Dalix, Airinei, Hercberg, & Peneau, 2009). Relatedly, social networks in general (spouses, friends, and siblings) tend to model each other’s consumption of alcohol and snacks, which can lead to long-term weight gain and health concerns when eating norms are high for unhealthy foods. Indeed, normative influence may partially account for the tendency of obesity to run in social networks, even among genetically unrelated people (Pachucki, Jacques, & Christakis, 2011).

Second, experimental research has also revealed an impact of descriptive norms on consumption and experiences. For example, when put into a situation where their peers consumed a large amount of food (augmentation norm), participants tended to consume more than if put into a situation where their peers consumed a small amount of
food (restriction norm) or where no norm was present. That is, people’s consumption behaviors tended to assimilate to descriptive norms, relative to control conditions where no norm information was provided (Roth et al., 2001). Moreover, this type of normative social influence can even arise when the social group is not physically present (e.g., Roth et al., 2001; Pliner & Mann, 2004) and can affect hunger experiences in addition to eating behavior itself (Herman et al., 2003). Interestingly, people tend to be generally unaware of the influence of norms on their consumption behaviors, suggesting the impact of descriptive norms may be relatively unconscious (Roth et al., 2001).

In sum, the influence of descriptive norms on eating behavior is well established. However, there has been considerably less research on factors that might minimize or exacerbate the impact of norms. In the current research, we focus on the moderating role of self-regulatory resource depletion, given the link between self-regulation and eating behavior and given that prior research in another context (with the dependent variable being the completion of optional surveys to help the experimenter) has found that self-regulatory depletion increases the influence of descriptive norms (Jacobson, Mortensen, & Cialdini, 2011).

1.2 Self-Regulatory Depletion

Self-control is critical for goal pursuit and regulatory behavior. However, self-control is a finite resource. For example, when people exert effort to resist temptation, make a difficult choice, or engage in a frustrating task, self-control becomes depleted and can have a range of detrimental downstream effects, including giving up on goals. Subsequently, these resources need to be replenished before people can exert regulatory control again (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Muraven & Baumeister,
2000; Muraven, Tice, & Baumeister, 1998). In an example of one relevant study, Baumeister and colleagues (1998) found that participants who were told to only eat radishes when there was a bowl of cookies sitting in front of them gave up on unsolvable puzzles more quickly than participants who were allowed to eat the cookies. Presumably, participants had to utilize self-control resources to resist the allure of desirable cookies, which subsequently impaired the self-control resources needed to persist at the puzzle task. The examination of self-regulatory depletion in the current context—the impact of norms on food consumption—is important for several reasons.

First, self-control is critical for regulating eating behavior and resisting tempting foods. Despite being highly motivated to restrict their eating to reasonable portions of healthy foods, the goal of gaining pleasure from consuming delicious (but unhealthy) food often overrides long-term goals of weight loss or improved health when dieters are placed in a tempting environment (Papies & Hamstra, 2010). One major reason for this failure to regulate healthy eating habits is self-control and available regulatory resources (Kuijer, de Ridder, Ouwehand, Houx, & van den Bos, 2008; Hofmann, Friese, & Roefs, 2009). Indeed, according to restraint theory, attempting to control food intake eventually leads to disinhibition and overeating (Herman & Mack, 1975). Restraint theory is based on set point theory (Nisbett, 1972), which posits that everyone has a natural weight that the body fights to maintain. People who constantly try to control their eating push their bodies below their set points. Even though they may not be “underweight” by body mass index, they may feel hungry constantly and/or become preoccupied with food because the hypothalamus signals them to eat more and to gain weight. Because they do not heed their hunger cues, they may be more sensitive to external influences (Herman & Mack,
1975). Ignoring the body’s signals to eat appears to require self-regulatory resources. Empirical studies have shown that dieters’ abilities to resist tempting foods deteriorate when they have recently exercised self-control (Kahan, Polivy, & Herman, 2003).

Second, a recent series of studies showed that self-control and regulatory resource depletion impact people’s sensitivity to descriptive norms (Jacobson et al., 2011). For example, in one study, some participants performed a difficult activity (to deplete their self-regulatory resources) while others did not. All participants were then asked how many additional surveys they would be willing to take to help the experimenter. In the descriptive norm condition, participants were told that most students in past semesters decided to complete extra surveys. In a condition manipulating a different type of norm—injunctive norms, or rules and regulations for how people should behave—participants were told that most students believed that people should be willing to complete extra surveys. The authors reasoned that attending to descriptive norms requires less cognitive effort and self-regulatory resources than attending to injunctive norms (Cialdini et al., 1990; 1991). Consistent with this, participants indicated being willing to complete more surveys in the descriptive norm condition when depleted, but more surveys in the injunctive norm condition when not depleted. In sum, research has revealed that self-regulatory resources are an important moderator of the impact of descriptive norms on behavior.

1.3 Current Research

The current study examined the interplay between descriptive norms and self-regulatory depletion on consumption of an unhealthy food. This research is novel and builds on prior research in the following ways. First, this research aimed to replicate the
results of Jacobson and colleagues in a new, applied domain. Weight control is a complex, difficult public health issue that is important for many people (Mitchell et al., 2011). Dieters frequently find themselves in a state of self-regulatory depletion due to the near-constant availability of high-calorie foods in modern society that must be resisted in order to adhere to a healthy diet (King, 2013; Vohs & Heatherton, 2000). Second, this research extends prior work on norms and food consumption (e.g., Howland, Hunger, & Mann, 2012; Pliner & Mann, 2004; Roth et al., 2001), as well as prior research on self-regulatory depletion and food consumption (Evers, Stok, & de Ridder, 2010; Vohs & Heatherton, 2000) by manipulating both normative social influence and self-regulatory depletion. No study in this area has simultaneously examined the interplay between these two variables.

In the study, participants believed we were interested in students’ food preferences. Participants first completed either a difficult task intended to temporarily deplete their self-regulatory resources (Baumeister et al., 1998) or a similar but easier task (control group). Next, participants were asked to taste as many cookies as necessary to complete a taste rating form (Polivy, Herman, & McFarlane, 1994) and to help themselves to extras if they chose. During this time, some participants (augmentation norm and restriction norm groups) were also given information about prior participants’ cookie consumption in the form of a chart inadvertently left on the table in the lab (Roth et al., 2001). The main outcome measure was the number of cookies participants consumed (although secondary measures were also included).

Based on prior related research, three core hypotheses were created. First, we anticipated a main effect of self-regulatory depletion, such that participants who were
depleted should consume more food than those who were not depleted (e.g., Vohs & Heatherton, 2000). Second, we anticipated a main effect of norm condition, such that participants would consume the most in the augmentation condition, a moderate amount in the control condition, and the least in the restriction condition (e.g., Roth et al., 2001). Third, we anticipated an interaction between depletion and norms; specifically, we anticipated that descriptive norms would have their largest impact when participants’ self-regulatory resources were depleted. That is, participants in the augmentation condition would consume more food when under depletion than when not under depletion, whereas participants in the restriction norm condition would consume less food under depletion than when not (e.g., Jacobson et al., 2011).

Moreover, the effects of two individual differences, dietary restraint and self-monitoring, were also explored. According to restraint theory (Herman & Mack, 1975), restricting food can lead to overeating when dieters lose the ability to control their intake. Self-regulatory depletion may induce a loss of control and lead to overeating. However, recent evidence suggests that individual differences in ability to self-regulate, which can be developed through training, may be a better predictor of one’s ability to adhere to a healthy diet than dietary restraint would be (Johnson, Pratt, & Wardle, 2012). If restraint theory were supported, it would follow that only participants who are high in dietary restraint would show a main effect of self-regulatory depletion, such that those who were depleted would consume more food than those who were not. If restraint theory were not supported, we hypothesize that self-regulatory depletion would have a similar effect on both restrained and unrestrained participants, such that those who were depleted would consume more food than those who were not.
Second, it was anticipated that self-monitoring might influence food intake such that high self-monitors would adhere to the norm more strictly than would low self-monitors. High self-monitors pay attention to situational cues that indicate the social appropriateness of their actions (Snyder, 1974). Thus, with the descriptive norms presented in this study serving as situational cues, high self-monitors may be more likely to adhere to the normative cookie amounts than would low self-monitors, resulting in an interaction between self-monitoring and norm information. It is notable that, for both of these exploratory variables, 3-way interactions between the individual difference and our two independent variables were not anticipated.

Chapter Two

Method

2.1 Participants and Design

Participants were 131 female undergraduates from the University of Toledo subject pool. Students in this pool receive compensation in the form of credit toward their introductory psychology course or extra credit for other approved psychology courses. The median age was 18.00 ($M = 18.61$, $SD = 2.23$). Recruiting only female participants is standard practice in the dieting literature (e.g., Herman et al., 2003; Pliner & Mann, 2004; Roth et al., 2001) and some evidence suggests that males’ eating behavior is only significantly influenced by social norms when they are physically hungry (Hermans, Herman, Larsen, & Engels, 2010). Students with dietary restrictions that prevent them from eating wheat, soy, egg, milk, or nuts were not eligible to sign up for this study. Participants were randomly assigned to one cell in a 2 (Depletion vs. Control) x 3 (Augmentation Norm, Restriction Norm, Control) completely between-participants
design. The racial make-up of the sample was 66.4% White, 16.8% Black, 4.6% Asian, 3.8% mixed race, and 1.5% unknown race.

2.2 Procedure

Participants signed up individually to take part in a study regarding food preferences in college students. All sessions took place between 10am and 3pm. Participants were not given instructions to abstain from eating before the experiment. Upon arrival, participants were told that the purpose of the study, which was purportedly conducted in collaboration with the university’s nutrition department, was to understand students’ snacking preferences. They were taken to a laboratory, where they were seated at a table. First, they were asked to complete a series of visual analogue scales for mood/hunger and the letter cross-out task (all described below). Before the letter cross-out task, they were told that the plates of cookies were being prepared and that they would be completing a simple cognitive task in the meantime for preliminary testing for an unrelated study. For participants in the self-regulatory depletion condition, the room was scented with Yankee Candle Company Christmas Cookies Room Spray prior to arrival, in order to strengthen participants’ desire for cookies and amplify our depletion condition.

For the letter cross-out task (Baumeister et al., 1998), the specific instructions differed for participants in the self-regulatory depletion condition and the control condition. For both conditions, the text consisted of a page from a statistics textbook printed in 12-point font; however, the text was black for the control condition and grey for the depletion condition. Lightening the text makes it more difficult to read and increases the effectiveness of the manipulation (Baumeister et al., 1998). For the letter
cross-out task, participants in the control condition were instructed to cross out every letter “e” they saw on the page. This task can be done fairly quickly and takes little effort. Participants in the self-regulatory depletion condition were asked to cross out the letter “e” only if there was another vowel within two characters of the “e”. This additional instruction makes the task much more difficult and has been found to deplete self-regulatory resources. Participants were told to stop after 8 minutes if they had not yet completed the task. They also answered three questions intended to serve as a manipulation check (described below).

Upon completing the letter cross-out task, the research assistant set the tray of cookies on the table and provided some basic instructions about the task. Importantly, some participants (those in the augmentation norm and restriction norm conditions) saw a chart sitting on the table when they entered the room. The chart had two columns, one labeled “Participant’s First Name” and one labeled “Mini Cookies Eaten”. There were ten rows, each with a popular female name under “Participant’s First Name” and a number in the “Mini Cookies Eaten” column. For the augmentation norm condition, the number ranged from 8 to 10 ($M = 9$). For the restriction norm condition, the number ranged from 3 to 5 ($M = 4$). These norms were adapted from a similar study by Roth and colleagues (2001) and refined through pilot testing (see below for description). The sheet of paper was sitting on the table when the participant arrived, but was not mentioned by the experimenter until later in the session (Roth et al., 2001). See appendices A and B.

Following completion of the preliminary measures and the letter cross-out task, the experimenter presented the participant with 3 plates of cookies (see measures below) and a packet of questionnaires that began with 3 copies of the Taste Rating Task (Polivy
et al., 1994). Participants were asked to eat as many cookies as necessary to complete the forms accurately. They were also told that there were plenty of extra cookies, so they should feel free to eat as many additional cookies as they would like. In the augmentation norm and restriction norm conditions, the experimenter started to tell participants that “to determine how many cookies to order for next week”, she would take note of how many cookies the participant needed to eat to complete the taste test form. The experimenter would then pick up the sheet, feign a realization that the intake of 10 participants has already been recorded that week, and tell the participant that it would not be necessary to record her intake. After communicating this information to the participant, the experimenter casually placed the sheet back on the table and told the participant to enjoy the cookies. To further reinforce the norm manipulation, the experimenter either said, “people have been eating lots” (augmentation norm condition) or “people haven’t been eating that many” (restriction norm condition) after looking at the intake sheet. Participants were then left alone to eat the cookies and complete the remaining questionnaires. Finally, the experimenter debriefed participants.

2.3 Measures

2.3.1 Food Consumption. Participants sampled three varieties of cookies: Famous Amos® Chocolate Chip Cookies, Famous Amos® Chocolate Chip Pecan Cookies, and Famous Amos® Oatmeal Raisin Cookies. Each mini cookie weighs approximately 7 grams and contains 37.5 calories. Participants were presented with 3 plates, one for each flavor, each holding 6 cookies. The main outcome measure in this study was the total number of cookies consumed during the session. When participants
left, the experimenter counted the number of cookies remaining on the plates and subtracted it from 18.

**2.3.2 Visual Analogue Scales.** Participants completed four visual analogue scales (Sepple & Read, 1989) to assess their hunger, fullness, the pleasantness of their mood, and the goodness of their mood, both at the start of the experiment and after exposure to the self-regulatory depletion and eating tasks. Specifically, participants were instructed to simply draw a vertical line to indicate the point on a continuous, 100-mm line that best represented their current state. The low end of the “hunger” scale was anchored at “hungry”, while the high end was anchored at “not hungry”. The low end of the “fullness” scale was anchored at “not full”, while the high end was anchored at “full” ($\alpha = .865; M = 68.69, SD = 35.88$; Parker et al., 2004). The low ends of the two mood scales were anchored at “unpleasant” and “bad”, while the high ends were anchored at “pleasant” and “good” ($\alpha = .995; M = 61.40, SD = 56.93$). This scale was scored by using a ruler to measure the distance between the low end of the scale and the participant’s indicator mark. See Appendix C. Hunger was reverse-scored and averaged with fullness for analyses at each time point. The two mood-related visual analogue scales were also averaged to create a composite mood score for each time point.

**2.3.3 Cross-Out Task Measures.** As manipulation check items for the letter cross-out task, participants responded to the following three items: “I exerted a lot of effort in the letter cross-out task”, “I had to concentrate on the instructions while doing the letter cross-out task”, and “I felt tired after doing the letter cross-out task” (Finkel & Campbell, 2001). Items are measured on a 1-5 Likert-type scale (1 = strongly disagree; 5 = strongly agree).
2.3.4 Taste Rating Task. As part of the cover story but also acting as secondary measures, participants completed a Taste Rating Task (Polivy et al., 1994) during consumption of the cookies to get at participants’ overall evaluations. First, items 1-6 for each flavor were combined to measure participants’ attitudes about the cookies ($\alpha = .816; M = 3.01, SD = 0.52$). Sample items (measured on 1-5 Likert-type scales) included “How sweet are these cookies?” and “How good do these cookies taste?” ($\alpha = .811; M = 2.96, SD = 1.11$). Second, the final item for each flavor asked how much participants would be willing to pay for a box of the cookies (open-ended response; $\alpha = .709; M = $2.54, $SD = 1.12$). See Appendix D.

2.3.5 Post-Eating Task Questionnaire. A post-task questionnaire included the visual analogue items (described above), as well as additional questions about the participant’s experience. For instance, as a manipulation check, we asked participants to report how many cookies other people in the study had eaten. Moreover, we asked questions regarding the eating experience, such as “How guilty does eating these cookies make you feel?” (1 = not at all guilty; 5 = extremely guilty) and “How regretful do you feel after eating these cookies” (1 = Do not regret eating; 5 = Very regretful), which were combined into one overall index ($\alpha = .751; M = 2.09, SD = 1.16$). See Appendix E.

2.3.6 Exploratory Individual Differences. The study also involved two individual difference measures relevant to norm sensitivity and self-control in an eating context. First, the Revised Restraint Scale (Herman & Polivy, 1980) was used to assess the extent to which participants attempted to control their eating. This 10-question measure assesses thoughts, feelings, and behaviors related to control over food intake. Sample items include, “How conscious are you of what you’re eating?” (1 = never; 5 =
always), “Would a weight fluctuation of five pounds affect the way you live your life?”, and “Do you eat sensibly in front of others, then splurge alone?”. Women with scores of 16 or greater are considered to be restrained eaters and/or chronic dieters (Heatherton, Polivy, Herman, & Baumeister, 1993; $\alpha = .796; M = 1.26, SD = .97$).

Second, the Self-Monitoring Scale (Snyder, 1974) was included as a measure of sensitivity to social influence, such as the norm information that some participants received in this study. For 25 statements, participants circled “true” if the statement mostly applied to them and “false” if the statement did not usually apply to them. Sample items include, “When I am uncertain how to act in a social situation, I look to the behavior of others for cues”, “I rarely seek the advice of my friends to choose movies, books, or music”, and “I laugh more when I watch a comedy with others than when alone” ($\alpha = .651; M = 12.07, SD = 3.70$).

2.4 Pilot Testing

In order to refine the manipulations and procedure, four participants were run as pilot subjects (based on randomization, 2 participants were in the restriction norm condition, 1 was in the augmentation norm condition, and 1 was in the no-norm control condition). Based on observations from these pilot participants, the time allotted for the letter cross-out task was shortened to 8 minutes in order to allow participants ample time to eat as many cookies as they wished. Based on participants’ relatively low cookie consumption ($M = 5.75, SD = 2.22$), the number of cookies offered was reduced from 8 of each flavor to 6 of each flavor, for a total of 18 cookies instead of 24. Data from these initial 4 participants are not included in the final analyses.
An additional observation from the first four pilot participants was that the amount of cookies consumed was much lower than was reported from Roth and colleagues (2001). In order to establish the suitability of the provided norm information used by Roth and colleagues (augmentation norm condition = 13-15 cookies, \( M = 14 \); restriction norm condition = 3-5 cookies, \( M = 4 \)), the first 8 participants after the pilot test were assigned to the control condition (no depletion, no norm information). The purpose was to get a pure baseline for how many cookies participants in our sample will tend to eat under normal/baseline conditions. Based on the average number of cookies consumed (\( M = 6.13, SD = 1.64 \)), the norm charts were adjusted slightly from Roth and colleagues (2001) to better fit the intake of this sample. Specifically, the upper end of the restriction norm distribution was approximately one standard deviation below the mean (range = 3-5, \( M = 4 \)), whereas the lower end of the augmentation norm distribution was approximately one standard deviation above the mean (range = 8-10, \( M = 9 \)). These norms were used for all subsequent participants.

Chapter Three

Results

3.1 Manipulation Checks

3.1.1 Self-regulation. Participants answered three questions about their experience with the letter cross-out task (see above). Because the manipulation check questions had low reliability (\( \alpha = .448 \)), they were analyzed using a one-way MANOVA with self-regulatory depletion condition as the independent variable and the three manipulation check questions as the dependent variables. The MANOVA revealed no significant differences between the depletion group and the control group, \( F(3, 127) = \)
In general, participants performed poorly on the letter cross-out task, both in the depletion group (\(M\) percent correct = 52.69, \(SD = 17.81\)) and the control group (\(M\) percent correct = 65.59, \(SD = 21.23\)). The depletion group made significantly more errors than the control group, \(t(128) = -3.75, p < .001\). Taken together, this evidence suggests that the self-regulatory depletion manipulation was not effective (an issue that is returned to later).

3.1.2 Normative influence. As part of the Taste Rating Task, participants answered the question, “On average, how many of these cookies do you think other people would eat during this taste test?” for each of the three flavors. A composite score was created for each participant by averaging participants’ responses for each of the three cookies. Participants exposed to the augmentation norm believed that others ate the most cookies (\(M = 2.95, SD = 1.16\)), participants in the no-norm control condition believed that others ate a moderate amount of cookies (\(M = 2.53, SD = 0.98\)), and participants exposed to the restriction norm believed others ate the fewest cookies (\(M = 2.13, SD = 1.05\)). A one-way ANOVA revealed that these estimates were significantly different, \(F(2, 128) = 6.43, p = .002\). Post-hoc Tukey tests showed that the augmentation norm and restriction norm conditions were significantly different from one another (\(p = .001, d = .82\)). The control condition fell in between the two experimental conditions and, although not significantly different from the augmentation norm condition (\(p = .158\)) or the restriction norm condition (\(p = .193\)), the effect size differences were medium (\(ds > .39\)). In sum, the norm manipulation was generally successful.

3.2 Primary Analyses
The primary dependent variable, the number of cookies consumed, was submitted to a 2 (Depletion or Control) X 3 (Augmentation Norm, Restriction Norm, Control) between-subjects ANOVA. It was hypothesized that there would be a main effect of self-regulatory depletion such that participants who were depleted would consume more cookies than participants who retained their self-regulatory resources. A main effect of normative influence was also hypothesized such that participants who were exposed to an augmentation norm would eat the largest amount of cookies, participants exposed to a restriction norm would eat the smallest amount of cookies, and participants who were given no norm information would eat a moderate amount of cookies. Finally, it was hypothesized that there would be an interaction between self-regulatory depletion and normative influence such that participants who were exposed to both self-regulatory depletion and an augmentation norm would eat the largest amount of cookies of all six conditions. Participants exposed to both self-regulatory depletion and a restriction norm were predicted to eat the smallest amount of cookies. Results showed no main effect of self-regulatory depletion, $F(1, 129) = .034, p = .855$ and no main effect of normative influence, $F(2, 128) = 1.363, p = .260$. Lastly, results showed no significant interaction between self-regulatory depletion and normative influence, $F(2, 125) = 1.210, p = .302$. See Table 1 for means and standard deviations. Hunger at the beginning of the experiment may have influenced results. For example, participants who were physically hungry may have eaten more cookies than participants who were not physically hungry. For this reason, hunger/fullness was entered into the 2 X 3 ANOVA as a covariate, with cookie intake as the dependent variable. Hunger/fullness did significantly predict cookie consumption, $F (1, 124) = 5.031, p = .027$. However, inclusion of hunger/fullness as a
covariate did not change the overall results. Indeed, there was still no main effect of self-regulatory depletion ($F[1, 129] = .024, p = .878$), no main effect of normative influence ($F[2, 128] = 1.105, p = .334$), and no interaction ($F[2, 125] = .676, p = .510$).

3.3 Secondary Analyses

Several secondary dependent variables were also assessed, including change in mood (VAS), guilt/regret, attitudes about the cookies, and willingness to pay for the cookies. We analyzed these using a series of 2 (Depletion or Control) X 3 (Augmentation Norm, Restriction Norm, Control) between-subjects ANOVAs. First, in terms of mood change, the main effect of self-regulatory depletion ($F[1, 129] = .358, p = .551$) and interaction ($F[2, 125] = .926, p = .399$) were not significant. There was a non-significant trend for the main effect for normative influence ($F[2, 128] = 1.597, p = .207$), with participants in the augmentation condition showing improvement in mood after eating cookies ($M=2.25, SD=9.88$) and participants in the restriction condition showing a decline in mood after eating cookies ($M=-3.40, SD=18.24$), $d= .38$. Second, in terms of guilt and regret, there was no main effect of self-regulatory depletion on guilt and regret after eating ($F[1, 129] = .588, p = .445$), no main effect of normative influence on guilt and regret ($F[2, 128] = .087, p = .916$), and no interaction, $F(2, 125) = .581, p = .561$. Third, in terms of attitudes about the cookies, there was no main effect of self-regulatory depletion on attitudes about the cookies ($F[1, 129] = .914, p = .341$), and no significant interaction ($F[2, 125] = .972, p = .381$). There was, however, a significant main effect of normative influence on attitudes about the cookies, $F(2, 128) = 3.963, p = .021$. Post-hoc Tukey tests revealed a significant difference between the augmentation norm and restriction norm conditions such that participants in the augmentation norm
condition evaluated the cookies more favorably, $p = .029$, $d = .55$. Fourth, in terms of the willingness to pay for the cookies, there was no main effect of normative influence ($F[2, 128] = .751, p = .474$) and no interaction, $F(2, 125) = .400, p = .671$. There was a marginal main effect of self-regulatory depletion ($F[1, 129] = 2.742, p = .100$), where participants in the control condition were willing to pay more for a box of the cookies ($M = $2.70, $SD = $1.23) than participants in the depletion condition were willing to pay ($M = $2.38, $SD = $0.98), $d = .66$.  

3.4 Exploratory Analyses

Two individual difference variables were of interest in this study: dietary restraint and self-monitoring. Dietary restraint measures the degree to which individuals attempt to control their food intake, their concern about weight, and their current dieting behavior and dieting history. In females, a score of 16 or greater on the Revised Restraint Scale (Herman & Polivy, 1980) indicates dietary restraint (Heatherton et al., 1993). Participants who scored 16 or greater were classified as restrained eaters ($n = 47$ in the sample). Participants who scored 15 or less were classified as unrestrained eaters ($n = 84$ in the sample). We hypothesized that only restrained eaters would show a main effect of self-regulatory depletion, such that those who were depleted would consume more food than those who were not. Depletion condition, norm condition, and dietary restraint were entered into a 2 X 3 X 2 between-subjects ANOVA. Hunger/fullness at the start of the experiment was entered as a covariate. There was no main effect of self-regulatory depletion ($F[1, 129] = .231, p = .632$), no main effect of normative influence ($F[2, 128] = .764, p = .468$) and no main effect of dietary restraint ($F[1, 129] = .279, p = .598$). There was no significant interaction between self-regulatory depletion and normative influence.
(F[2, 125] = .472, p = .625), and no significant three-way interaction (F[2, 118] = .321, p = .726). There was a marginal normative influence and dietary restraint interaction (F[2, 127] = 1.788, p = .172), where restrained eaters consumed more cookies if they were not depleted, but unrestrained eaters consumed fewer cookies if they were not depleted. For participants who were depleted, dietary restraint does not appear to have strongly influenced their cookie consumption. However, most important was that the hypothesized interaction between self-regulatory depletion and dietary restraint was not found to be significant, F(1,127) = .012, p = .914.

Self-monitoring was measured because individuals who are high in self-monitoring may be particularly susceptible to normative influence. Such individuals are highly conscious of others’ behavior and tend to model their own behavior according to social influence. Although self-monitoring can be measured on a continuum, it can also be conceptualized as a discretely distributed class variable, with a fundamental difference between high self-monitors and low self-monitors (Gangestad & Snyder, 1985). Therefore, participants were classified as high or low self-monitors using a median split (median = 12). We anticipated an interaction between normative influence and self-monitoring such that high self-monitors in the augmentation norm condition would eat the most cookies and high self-monitors in the restriction norm would eat the fewest cookies. Depletion condition, norm condition, and self-monitoring were entered into a 2 X 3 X 2 between-subjects ANOVA. There was no main effect of self-regulatory depletion (F[1, 129] = .173, p = .678), no main effect of normative influence (F[2, 128] = 1.081, p = .343) and no main effect of self-monitoring (F[1, 129] = 1.661, p = .200). There was no significant interaction between self-regulatory depletion and normative
influence ($F[2, 125] = .576, p = .564$), no significant interaction between self-regulatory depletion and self-monitoring ($F[1, 127] = .455, p = .501$), and no significant three-way interaction ($F[2, 119] = 1.348, p = .264$). Most important was the fact that there was not a significant interaction between normative influence and self-monitoring, $F(2, 129) = 1.162, p = .316$.

Chapter Four

Discussion

The purpose of this study was to examine the relationship between self-regulatory depletion, normative influence, and food intake. Participants were told that they would be participating in a study on college students’ food preferences that involved tasting different types of cookies. To measure the effects of self-regulatory depletion, the experimental group engaged in a difficult task that required self-control, while the control group engaged in an easy task that did not require as much self-control. To manipulate normative influence, participants in the augmentation norm group were exposed to a chart suggesting that prior participants had eaten a large number of cookies during the experiment. Participants in the restriction norm group saw a chart suggesting that prior participants had eaten a small number of cookies, and the control group was given no information about prior participants’ consumption. Participants’ cookie consumption was surreptitiously recorded at the end of the experiment and their thoughts and feelings were recorded.

We anticipated two main effects and an interaction. First, participants whose self-regulatory resources were depleted were predicted to consume more cookies than the control group because resisting temptation requires self-regulatory resources (Baumeister

21
et al., 1998). Second, normative influence was expected to influence cookie consumption such that participants who believed that others had consumed a lot of cookies would do the same, and participants who believed that others had consumed few cookies would reduce their intake accordingly. Third, participants in the self-regulatory depletion and augmentation norm condition were predicted to eat the most cookies and participants in the self-regulatory depletion and restriction norm condition were predicted to eat the fewest (Jacobson et al., 2011). Although there was some (albeit limited) evidence the norm manipulation marginally affected some of the dependent measures (e.g., change in mood, attitudes towards the cookies), there was no evidence to support the self-regulation main effect nor the interaction effect. Likewise, other individual differences we measured (dietary restraint and self-monitoring) did not appear to influence food intake. Potential reasons for the lack of significant results in this study are outlined below.

First, in terms of the self-regulation manipulation, there were no main effects or interactions with the norm manipulation variable. It is entirely possible that self-regulatory resources play no theoretical role in the current context. However, prior research on self-regulation and food intake suggests that depletion does affect behavior, at least for dieters. Vohs and Heatherton (2000) found that dieters who were instructed to control their emotions and facial expressions during a sad movie subsequently ate more ice cream than dieters who did not exert self-control. Non-dieters did not show the same pattern. Similarly, Kahan, Polivy, and Herman (2003) found that dieters who had to repeatedly make choices ate more food than those whose self-regulatory resources were not depleted. Again, non-dieters did not show this pattern of results. It is also the case that prior research shows that the availability of self-regulatory resources interacts with
type of norm information (Jacobsen et al., 2011). Thus, a more likely explanation is that our manipulation of self-regulation was ineffective. Indeed, evidence from the manipulation check items revealed no significant differences between the depletion group and the control group. Overall, participants performed quite poorly on the letter cross-out task. This is especially true of participants in the depletion group, who were given a more difficult version of the task. When the lowest-scoring quartile was removed from analyses, there was a nearly significant interaction between self-regulatory depletion and normative influence, $F(2, 92) = 2.97, p = .056$. In the restriction norm condition, the depletion norm group ate more cookies than did the control group. In the no-norm control condition, this pattern was reversed. One possible explanation for the ineffectiveness of the manipulation is that the instructions were too difficult for the depletion group and they had little motivation to exert more effort to do the task correctly, potentially because they were told that it would be pilot data for another study and was not relevant to the current context. Indeed, participants in the depletion group did not report paying closer attention to the instructions or exerting more effort on the task than did the control group. Participants have been found to persist longer at difficult tasks if they are highly motivated to do so, even if they are depleted (Muraven & Slessareva, 2003). Also, the procedure was slightly altered from the original task in order to save time. Baumeister and colleagues (1998) instructed participants in the depletion group to complete the easy version of the task first, then switch to the difficult version. In the present study, participants in the depletion group only completed the difficult version of the task. It is possible that switching from the easy version to the difficult version is significantly more depleting than simply completing the difficult version. Another possible explanation is
that the time allotted for the letter cross-out task (8 minutes) was insufficient to produce
depletion effects. Even if participants had devoted a great deal of effort to the task, more
persistence may have been required to deplete their self-regulatory resources. In this
context, a depletion task such as suppressing emotions (Muraven et al., 1998), focusing
attention (Fischer, Greitemeyer, & Frey, 2008), or resisting food (Baumeister et al., 1998)
may have been a better choice, given the time constraints of this study. Future research
would benefit from using the letter cross-out task as it was originally designed or using a
different depletion manipulation.

Second, in terms of the norm manipulation, there was some evidence that the
norm manipulation did produce some (marginal) differences with participants in the
augmentation group compared to the restriction group (e.g., change in mood, evaluations
of cookies, and, most importantly, total cookies eaten). There was even some evidence
that this worked for our main dependent variable (consumption of cookies). Indeed, when
self-regulatory depletion conditions are collapsed and only the augmentation and
restriction norm groups are examined, participants in the augmentation norm condition
\((M = 5.49, SD = 2.13)\) ate more than did participants in the restriction norm condition
\((M = 4.74, SD = 1.72)\), \(t(85) = 1.789, p = .077, d = .38\). Participants’ default intake, as
measured by the no-norm control condition, was quite similar to the restriction condition
\((M \text{ consumed in control condition} = 5.68; M \text{ for restriction norm set to } 4; M \text{ for}
\text{augmentation norm set to 9})\). Interestingly, Roth and colleagues (2001) found a similar
pattern of food intake \((M \text{ consumed in control condition} = 6.21; M \text{ for restriction norm
set to } 4; M \text{ for augmentation norm set to 14})\). Although we are careful to not make too
much of the normative influence results since most were marginal, this general set of
findings is consistent with prior research (e.g., Howland, Hunger, & Mann, 2012; Roth et al., 2001), though not as robust. The weaker effects in our study compared to other studies could be due to some subtle methodological differences. For instance, although we used the same basic procedure as Roth and colleagues (2001), we adjusted the number of cookies prior participants had supposedly eaten to better fit the behavior of our participants, as determined by pilot testing. Specifically, we adjusted the augmentation norm downwards so that prior participants’ intake would not appear unreasonably high to our participants. Moreover, it could also be that our manipulation of normative influence was simply not strong enough and that the use of norm charts—rather than actual others—was too subtle. Finally, the experimenter’s comment in the augmentation norm condition (“looks like others have been eating lots”) could have affected participants in unintended ways. The comment, taken from Roth and colleagues (2001), was intended to draw participants’ attention to the norm. It could have been perceived as judgmental by participants and influenced them to restrict their intake in order to present themselves in a positive light to the experimenter.

4.1 Limitations and Future Directions

Beyond what was already described above, notable limitations in this study that have yet to be addressed include homogeneity of the sample, the appeal of the cookies, the artificiality of the lab environment, and the role of dietary restraint. Only female undergraduates were recruited for this study. It is standard practice in the literature to use only female participants, because females are more likely to diet and more susceptible to social influence on food consumption (e.g., Herman et al., 2003; Hermans et al., 2010; Pliner & Mann, 2004; Roth et al., 2001). However, using only females does limit the
generalizability of results. Hermans and colleagues (2010) found that males’ snack intake is influenced by social norms, but only when they are physically hungry. A follow-up study with a more diverse sample may be beneficial.

Secondly, there were multiple procedural differences that may have caused our results to differ from those of similar studies. Similar studies (e.g., Herman, Fitzgerald, & Polivy, 2003; Roth et al., 2001) used homemade cookies. Due to lab equipment limitations, we used store-bought cookies. Possible issues include participants’ preexisting familiarity with the brand (although the name was not revealed to them) and the lower appeal of store-bought cookies in general compared to fresh, homemade baked goods. Participants in this study ate relatively few cookies compared to those of comparable size used in other studies ($M = 5.19$ versus approximately 6-9 in other studies). The relatively low cookie consumption in this study could have contributed to the lack of significant differences between groups on this variable. Similarly, other studies offered participants a much larger number of cookies. Because our participants were eating relatively few cookies, we elected to reduce the number after pilot testing in order to conserve resources. It is possible that participants would have felt more comfortable eating cookies if there were a greater quantity available in the bowls. In future research, it would be ideal to offer participants a larger amount of food.

Third, results may differ in a more natural setting. Our normative influence manipulation was relatively subtle. Although it did affect participants’ estimates of how many cookies other participants ate, it does not appear to have affected their own intake. In a natural setting, people may receive more meaningful social information than they can gain from a chart listing strangers’ intake, such as observations of their family members’
and friends’ eating habits. As previously mentioned, the depletion task was short and not
directly relevant to the constructs being studied. People who experience depleting events
that are relevant to their lives, such as a difficult day at work, may be more likely to
overeat in response to depletion than participants who simply performed a lab task. Some
extant research in a naturalistic setting suggests that “comfort eating” has physiological
stress-reducing effects (Tomiyama, Dallman, & Epel, 2011). It is possible that people
who experience concurrent life stress directly related to depletion will exhibit greater
overeating. Furthermore, lab studies and real-world studies involving food intake often
differ in results, even when studying identical constructs (Tomiyama, Mann, & Comer,
2009; de Castro, 2010). A more realistic setting, such as presenting a class of students
with baked goods after they take a difficult exam to deplete their self-regulatory
resources, may produce different results. The same constructs could be studied
longitudinally in a naturalistic, applied setting using ecological momentary assessment
techniques. Participants could be given a norm manipulation (such as false information
about what other participants are eating) and a cognitive task to produce depletion prior
to meals, and they could report their food choices immediately afterwards. This
experimental design would allow for the examination of our research question over time.

Fourth, another important limitation involves the role of dietary restraint.
Although it was originally conceptualized as a secondary variable in this experiment, the
relatively low incidence of dietary restraint in this sample could have affected the self-
regulation manipulation. Only 35% of the participants in this study would be classified as
restrained eaters, meaning that they scored greater than 15 on the Revised Restraint Scale
\(M = 12.62, SD = 5.74\). Other studies have found that non-dieters’ food intake is not
influenced by self-regulatory depletion manipulations (e.g., Kahan et al., 2003; Vohs & Heatherton, 2000). A sample consisting solely of dieters may have produced stronger results in the present study. Similarly, non-dieters may be less sensitive to normative influence on food intake. If they are not self-conscious about their food intake, they may disregard others’ habits and follow their own internal cues. Therefore, the manipulations used may simply be irrelevant for the majority of this sample. The description of the study clearly stated that participants would be asked to consume cookies during the experiment. Although 91% of college women have attempted to control their weight through dieting (Shisslak, Crago, & Estes, 1995), students who have eating disorders or were actively dieting may have elected to avoid participating in this study. That is, those who would have been most tempted by the cookies, most susceptible to social influence on food intake, and therefore most affected by the experimental manipulations may have self-selected out of the study. Furthermore, restrained eaters differ from unrestrained eaters on personality factors such as neuroticism, agreeableness, and conscientiousness (MacLaren & Best, 2009) and other individual difference factors such as perfectionism and anxiety (Fitzsimmons-Craft, Bardone-Cone, Brownstone, & Harney, 2012). The personality characteristics of our sample may not be representative of female college students in general. Finally, it is possible that the experimental manipulation influenced responses to questions about dietary restraint and self-monitoring, because these measures were administered at the end of the study.

4.2 Implications and Conclusions

Overall, this study did not find the anticipated results. Despite the limitations of this study, some tentative conclusions can be drawn. Firstly, in order to see effects of
self-regulatory depletion on food intake, it may be best to use a sample of restrained eaters. For non-dieters, self-regulatory depletion may be less relevant to food intake, because non-dieters are less likely to use self-regulatory resources to resist food.

Secondly, normative influence does appear to play a role in determining food intake. However, the manipulation may need to be strengthened in order to observe the effect of this variable. Lastly, although we did not find evidence of the interaction between normative influence and self-regulatory depletion, future research may benefit from a different self-regulatory depletion manipulation. If normative influence and self-regulatory depletion were found to interact, this could have important implications for dieters trying to implement food-related goals.

The rise of obesity in Western culture is widely considered to be a major health concern. Understanding and altering key situational factors may help people live healthier lives. For instance, the restriction norm condition in this study has clear, applied value for dieters. People who are trying to make healthier choices can benefit from the influence of descriptive norms by surrounding themselves with others who make healthy choices. Furthermore, they could avoid tempting circumstances after experiencing depleting situations, such as performing a difficult task at work or making a tough decision. Ultimately, research along these lines can help us to understand the complex interplay of social, psychological, and individual difference factors that impact eating behaviors and health.
Table 1

*Descriptive Statistics for Dependent Variables (by Condition)*

<table>
<thead>
<tr>
<th>Variable</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cookies Consumed</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depleted, Augmentation Norm</td>
<td>5.55</td>
<td>2.06</td>
</tr>
<tr>
<td>Depleted, Restriction Norm</td>
<td>5.14</td>
<td>1.74</td>
</tr>
<tr>
<td>Depleted, No Norm</td>
<td>5.00</td>
<td>2.89</td>
</tr>
<tr>
<td>Not Depleted, Augmentation Norm</td>
<td>5.43</td>
<td>2.25</td>
</tr>
<tr>
<td>Not Depleted, Restriction Norm</td>
<td>4.36</td>
<td>1.65</td>
</tr>
<tr>
<td>Not Depleted, No Norm</td>
<td>5.68</td>
<td>2.14</td>
</tr>
<tr>
<td>Total</td>
<td>5.19</td>
<td>2.20</td>
</tr>
<tr>
<td><strong>Mood Change</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depleted, Augmentation Norm</td>
<td>-1.26</td>
<td>5.01</td>
</tr>
<tr>
<td>Depleted, Restriction Norm</td>
<td>3.27</td>
<td>17.02</td>
</tr>
<tr>
<td>Depleted, No Norm</td>
<td>-3.57</td>
<td>7.72</td>
</tr>
<tr>
<td>Not Depleted, Augmentation Norm</td>
<td>-3.23</td>
<td>13.15</td>
</tr>
<tr>
<td>Not Depleted, Restriction Norm</td>
<td>3.52</td>
<td>19.74</td>
</tr>
<tr>
<td>Not Depleted, No Norm</td>
<td>2.84</td>
<td>17.99</td>
</tr>
<tr>
<td>Total</td>
<td>0.24</td>
<td>14.99</td>
</tr>
<tr>
<td><strong>Attitudes Towards Cookies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depleted, Augmentation Norm</td>
<td>3.41</td>
<td>0.66</td>
</tr>
<tr>
<td>Depleted, Restriction Norm</td>
<td>2.87</td>
<td>0.51</td>
</tr>
<tr>
<td>Depleted, No Norm</td>
<td>3.37</td>
<td>0.79</td>
</tr>
<tr>
<td>Not Depleted, Augmentation Norm</td>
<td>3.19</td>
<td>0.75</td>
</tr>
<tr>
<td>Not Depleted, Restriction Norm</td>
<td>2.99</td>
<td>0.71</td>
</tr>
<tr>
<td>Not Depleted, No Norm</td>
<td>3.14</td>
<td>0.47</td>
</tr>
<tr>
<td>Total</td>
<td>3.16</td>
<td>0.68</td>
</tr>
<tr>
<td><strong>Guilt and Regret</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depleted, Augmentation Norm</td>
<td>1.87</td>
<td>0.91</td>
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<tr>
<td>Depleted, Restriction Norm</td>
<td>1.90</td>
<td>0.97</td>
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<tr>
<td>Not Depleted, Augmentation Norm</td>
<td>1.83</td>
<td>0.84</td>
</tr>
<tr>
<td>Not Depleted, Restriction Norm</td>
<td>1.95</td>
<td>1.03</td>
</tr>
<tr>
<td>Not Depleted, No Norm</td>
<td>2.04</td>
<td>1.03</td>
</tr>
<tr>
<td>Total</td>
<td>1.88</td>
<td>0.92</td>
</tr>
</tbody>
</table>
Figure 1. Expected food consumption per group (based on hypotheses).
References


**Appendix A**

**Norm information chart—Augmentation norm condition**

The following chart was placed on the table before participants in the augmentation norm condition arrive. The names and cookie counts were handwritten.

<table>
<thead>
<tr>
<th>Participant’s First Name</th>
<th>Mini Cookies Eaten</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Jessica</em></td>
<td>15</td>
</tr>
<tr>
<td><em>Ashley</em></td>
<td>14</td>
</tr>
<tr>
<td><em>Emily</em></td>
<td>14</td>
</tr>
<tr>
<td><em>Samantha</em></td>
<td>13</td>
</tr>
<tr>
<td><em>Sarah</em></td>
<td>13</td>
</tr>
<tr>
<td><em>Taylor</em></td>
<td>15</td>
</tr>
<tr>
<td><em>Amanda</em></td>
<td>14</td>
</tr>
<tr>
<td><em>Brittany</em></td>
<td>14</td>
</tr>
<tr>
<td><em>Elizabeth</em></td>
<td>15</td>
</tr>
<tr>
<td><em>Megan</em></td>
<td>13</td>
</tr>
</tbody>
</table>
Appendix B

Norm information chart—Restriction norm condition

The following chart was placed on the table before participants in the augmentation norm condition arrive. The names and cookie counts were handwritten.

<table>
<thead>
<tr>
<th>Participant’s First Name</th>
<th>Mini Cookies Eaten</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jessica</td>
<td>5</td>
</tr>
<tr>
<td>Ashley</td>
<td>4</td>
</tr>
<tr>
<td>Emily</td>
<td>4</td>
</tr>
<tr>
<td>Samantha</td>
<td>3</td>
</tr>
<tr>
<td>Sarah</td>
<td>3</td>
</tr>
<tr>
<td>Taylor</td>
<td>5</td>
</tr>
<tr>
<td>Amanda</td>
<td>4</td>
</tr>
<tr>
<td>Brittany</td>
<td>4</td>
</tr>
<tr>
<td>Elizabeth</td>
<td>5</td>
</tr>
<tr>
<td>Megan</td>
<td>3</td>
</tr>
</tbody>
</table>
Appendix C

Visual Analogue Scales

Visual Analogue Scale: Hunger

“Please draw a vertical line (straight up and down) to mark the point that best describes how hungry you are right now.”

Visual Analogue Scale: Fullness

“Please draw a vertical line (straight up and down) to mark the point that best describes how full you are right now.”

Visual Analogue Scale: Pleasant/Unpleasant

“Overall, how do you feel right now? Please mark on the line below.”

Visual Analogue Scale: Good/Bad

“Overall, how do you feel right now? Please mark on the line below.”
Appendix D

Taste Rating Task

“Please try the cookies. Have as many cookies as you need to get an accurate rating, then fill in the rating form. When you are done with the form, you may go back and help yourself to more cookies, as we have plenty.”

1. How sweet are these cookies?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all sweet</td>
<td>Somewhat sweet</td>
<td></td>
<td></td>
<td>Very sweet</td>
</tr>
</tbody>
</table>

2. How salty are these cookies?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all salty</td>
<td>Somewhat salty</td>
<td></td>
<td></td>
<td>Very salty</td>
</tr>
</tbody>
</table>

3. How good do these cookies taste?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very bad</td>
<td>Neither good nor bad</td>
<td></td>
<td></td>
<td>Very good</td>
</tr>
</tbody>
</table>

4. How much do you like these cookies?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all</td>
<td>Somewhat</td>
<td></td>
<td></td>
<td>Very much</td>
</tr>
</tbody>
</table>

5. How satisfied does eating these cookies make you feel?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all satisfied</td>
<td>Somewhat satisfied</td>
<td></td>
<td></td>
<td>Very satisfied</td>
</tr>
</tbody>
</table>

6. How interested would you be in purchasing these cookies?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all interested</td>
<td></td>
<td></td>
<td></td>
<td>Very interested</td>
</tr>
</tbody>
</table>

7. How much would you be willing to pay for a box of these cookies? (box = 24 cookies)

__________________
### Post-Eating Questionnaire

1. How guilty does eating these cookies make you feel?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not at all guilty</td>
<td>Somewhat guilty</td>
<td></td>
<td>Very guilty</td>
<td></td>
</tr>
</tbody>
</table>

2. How regretful do you feel after eating these cookies?

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Do not regret eating</td>
<td>Might regret eating</td>
<td></td>
<td>Very regretful</td>
<td></td>
</tr>
</tbody>
</table>

3. On average, how many cookies do you think other people would eat during this taste test? _________________________