

Erasmus School of Economics

**Thesis**

To obtain the academic degree of  
Master of Science in Economics & Business  
(Major in Marketing)

**Can Positive Emotions Make You Healthier?**

**Emotion Priming as a Strategy to Maximize the Impact of Public Health  
Campaigns**

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## **Abstract**

This thesis examines the possibility that positive emotions could influence the choices of food in individuals. Specifically, it studies the role that positive emotions have on the choice of food in individuals that are ego-depleted. Previous literature has found that self-control is a limited resource and as more acts of self-control are performed, this resource is depleted. Ego-depletion is a state where the self has used up the available resources and is left with less self-regulatory strength. It was hypothesized that inducing positive emotions to individuals that are ego-depleted will restore the ability for self-control and lead to choices of healthier food. To date, no systematic investigation has considered the effect that positive emotions could have on decisions where self-control is one of the main variables. This thesis aims to fill a gap in the literature by studying the possible effect that positive emotions have on the choices of food in individuals that have used up their self-control. The data was collected through a 2x2 factorial design experiment. One-Way and Two-Way ANOVA was used to analyze the results. There was an indication that when exposed to positive emotions healthier food is chosen. However, the interaction was very small and not statistically significant. It is suggested that the study is replicated in future research with more respondents and improved design.

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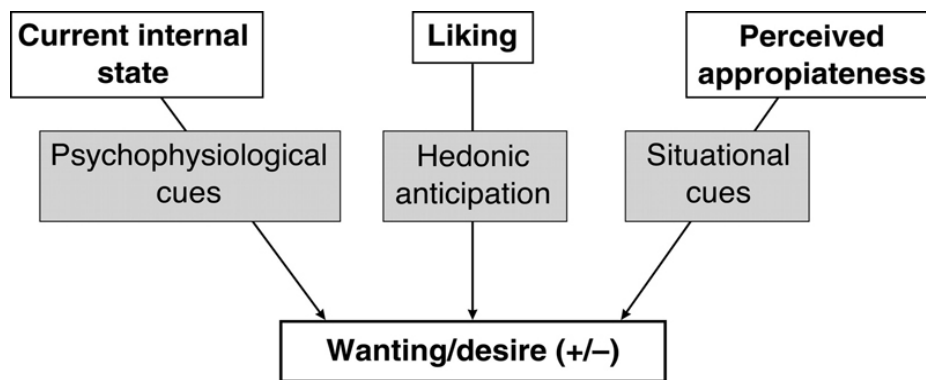
## Introduction

Eating habits have received much attention in research lately, mainly because of the increase in consumption of unhealthy food in the past years. Unhealthy food can increase the risks of health problems such as obesity, heart disease, type 2 diabetes and other health problems.

The ability of individuals to control their food choices seems to have an impact on healthier nutrition. Weight gain, obesity and other conditions that come with food intake often require some degree of control over food choices.

A large body of literature in psychology has studied self-control and its influence on decision-making. This thesis aims to add to the literature in psychology and also to public health and marketing literature by studying the determinants of consumers "food choices" and proposing a way in which consumers can be directed towards healthier nutrition.

Mela (1999) studied the factors that influence the food choice and intake. In this study it was concluded that the human food choice is influenced by external factors, such as availability and cultural rules for cuisine. Also a lot of internal factors that influence food choice and intake were identified. Individuals will generally choose certain foods based on perceptions that have been acquired with previous experience. Mela (1999) argued that most of the factors influencing food choices are internal and uniquely human. In a later review, Mela introduced a few more internal influences that could influence the choices of food. He quoted that liking is a very important determinant of food choices and food liking is mainly formed by perceptions acquired with previous experiences and the cultural context (Mela, 2001). However liking is only one of the internal influences. In a subsequent article he summarized the main internal influences of food choices (Mela, 2001). The most important internal determinants that influence the desire to eat certain foods are: (1) Momentary psychological and physical state, (2) The pleasure derived from food and (3) the context in which the food is eaten. The following diagram can give a visual representation of the above mentioned.



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Prior literature has discussed ways in which the desire and control can be further improved in order to increase the consumption of healthy food.

As previously mentioned, food decisions are mostly influenced by internal factors. It is therefore important to see how the internal processes can be altered in order to direct consumers towards healthier nutrition and eliminate problems that come with food intake. This thesis studies the opportunity to nudge individuals to choose healthier food through more effective public health campaigns, which are achieved by altering psychological processes.

Prior research has recommended many ways in which healthier food choices can be promoted. Downs et al. (2009) performed two studies for this purpose. They found that the convenience of healthy food could be an important driver of healthier food choices and also that providing calorie information can have an impact at least for some populations. Hurlé et al. (2010) studied the link between the nutrition labels and food choices of consumers. They found that the information labels influenced the choices of consumers but the choices of health aware consumers or dieters were more influenced by the labels than those of price sensitive consumers. Having said that, it is important to study other influencers of food choice such as self-control.

Overeating or eating unhealthy food usually happens because of self-control problems. Baumeister (2002) proposed that self-control is the capacity to resist temptations, especially those that will be regretted later on. Muraven et al. (1998) indicated that

self-control is a limited resource. Tice et al. (2007) have been able to prove that positive emotion can improve self-regulation. From this it would follow logically that since positive emotions improve self-regulation, they would also influence the choice of healthier food (since it is a process that requires self-regulation). However, to date there has been no study on the influence of positive emotions on the choice of healthier food in individuals with low self-control. This thesis aims to contribute to the existing literature by filling this gap.

## **1.1. Problem Statement & Research Questions**

Even though the benefits of eating healthy are highly promoted and readily known by most people, consumption of healthy food is not optimal. Most people are well aware that an unhealthy meal or snack is not good for their health but they still choose to eat it. Hoch and Loewenstein (1991) have shown that making decisions requires going through the battle between desire and self-control. When people choose the unhealthy option, the desire has won over self-control.

Self-control is defined as one's ability to alter his own states or responses. Thus one's pattern of responses is replaced with another through self-control (Baumeister, 2002). Previous research has proposed that people have a limited capacity of self-control (Muraven et al., 1998). Making several decisions that require self-control uses up the available psychological resources and leaves individuals at a state of ego-depletion. The decisions made at this state are certainly not optimal, because they do not maximize the long-term interests of individuals.

People tend to choose unhealthy food over healthy food after a long day with several decisions that have "consumed" their self-control (Ariely, 2012). When ego depleted, the individuals fail to control and cannot live up to their goal of being healthy or in a good shape. But is there any way to influence the choices of ego-depleted consumers towards a healthy food choice? Previous research has found that positive emotions can restore the ability to control oneself (Tice et al., 2007; Ren et al., 2010).

The aim of this thesis is to identify whether inducing positive emotions to ego-depleted consumers can direct them towards healthier food choices. The findings

contribute to the existing literature by proposing a way in which the food consumption decisions of consumers can be altered.

It is proposed that the positive emotions will direct ego-depleted consumers towards healthier food choices. Since most people who decide to go on a diet or change their lifestyle to a healthier one have to go through several consumption decisions that require self-control, it is important to investigate ways in which the consumers can continue making healthier choices regardless of self-control being a limited resource.

The findings of this thesis could be helpful to companies producing healthy food. The companies could improve their bottom line by making their marketing communication more positive. Governments or public health programs and marketers that aim to promote healthy eating could also make use of these findings. Since self-control is used in many other contexts such as trying to quit smoking, one may think that the results of this study may also apply there. Previous research has found a link between “dieters” and “smokers” in a negative information provision setting. Downs et al. (2009) stated that: “smokers tend to overestimate health risk in which case providing risk information could undermine their motivation to quit” (Downs et al. 2009, p.159). The same would also apply to dieters or people who want to change their lifestyle to a healthier one. Providing more information about the possible health risks of eating unhealthy food or overeating has not proven efficiency.

However, it has not been tested whether nudging positive emotions can increase efficiency in both contexts mentioned above. This thesis will only study the possible effect that positive emotions might have on food choices.

The research question is constructed as follows:

***RQ: To what extent do positive emotions influence the choice of healthy food in ego depleted individuals?***

The following sub-questions will be addressed in order to answer the main research question:

1. What is self-control?
2. Why is self-control important in the context of food choices?

3. What is ego-depletion?
4. How does ego depletion influence decision-making?
5. How can positive emotions alter psychological processes?
6. How can public health marketers prime positive emotions in consumers?

## **1.2 Structure of the Thesis**

In this section the structure of this thesis is briefly discussed. The second chapter is about the main theories used in this thesis. First, self-control is introduced as a concept and several theories about self-control discussed in previous research are presented. Second, the self-control theory of willpower or strength, which is the building block of this thesis, is explained in more detail. Furthermore several decision-making processes that require self-control are presented and briefly discussed in order to get a better understanding of its importance in such processes. Moreover self-control is presented in the context of food choices in order to further elaborate on the existing relationship between the two. Additionally, findings from literature in psychology are discussed in order to elaborate on the idea that positive emotions alter psychological processes and consequently self-control. Finally, the main hypotheses of this research are presented in this chapter.

The third chapter is about the data collection and the methods of analysis. I used an experiment in order to collect the necessary data for this research. The experimental design and the model used will be further discussed in this chapter.

The fourth chapter is dedicated to the analysis of the data and the presentation of the results.

To conclude, the last chapter presents the main findings of the research, limitations and suggestions for future research.



## **2. Theory and Hypotheses**

### **2.1. Self-control**

Self-control or self-regulation as it is mainly referred to in psychology literature, is a regulating mechanism that alters the behavior of individuals in order to maximize long-term interests (Muraven & Baumeister, 2000).

Good self-control can lead to desirable outcomes and maximization of long-term interests. Exerting self-control can lead to better health and well-being, better finances, better task performance and consequently more success (Baumeister et al., 1994; Shefrin & Thaler, 1981; Tangney & Baumeister 2004; Baumeister et al., 2007)

Research has identified four main ingredients that affect the self-regulation process: (1) Standards, (2) Monitoring, (3) The capacity to change, (4) Motivation (Baumeister & Vohs, 2007).

The first ingredient is standards. The individual must have well-defined standards in order to practice self-regulation. Self-regulation is the change in behavior that brings the individuals closer to this standard. The second ingredient is monitoring. Individuals continuously monitor their actions and evaluate their performance by comparing the self to the standard. In case the self is not performing at its highest, self-regulation is put into place. The third ingredient is the capacity to change. The individuals must have the initial capacity or strength to change. The fourth and last ingredient is motivation. Individuals must truly care about the goals or standards in order to exert self-control.

All the four ingredients just reviewed are to some extent necessary for effective self-regulation but it is worth mentioning that they can complement or substitute each other (Baumeister et al., 1994; Baumeister & Vohs, 2007). This thesis focuses mainly on the capacity to change ingredient. The other ingredients even though essential for self-control processes are out of the scope of this thesis.

Several theories have been proposed in order to elaborate more on the capacity to change ingredient. Baumeister et al. (1994) have proposed three main types of theories: (1) the theory of *willpower* or strength, (2) the *cognitive theory* and (3) the theory of *self-control as a skill*. The theory of willpower or strength suggests that after people have gone through several decisions they have used up their self-control and end up making sub-optimal decisions. It is suggested that self-regulation involves a kind of strength that is similar to the concept of willpower. The cognitive theory is somehow contradicting the strength model. This theory predicts that as more self-control acts are performed, people are able to make more optimal decisions because the self is already in a self-regulating mode. The theory of self-control as a skill assumes that self-control is a skill that remains constant and individual acts of self-control do not differ significantly.

The theory of willpower or strength has received much attention in literature. This theory is particularly interesting in the context of healthier nutrition because such decisions require great amounts of self-control. In this theory, self-control is considered as a scarce resource. In accordance with the willpower or strength model as more acts that require self-control are performed, the self will use up the available resources and arrive at a state of ego-depletion. As Baumeister et al. (2000) stated, “in this state, the self is less able to function effectively, such as by regulating itself and exerting volition” (Baumeister et al., 2000, P.130). Many studies have found support for this theory and proved that people tend to have less ability for self-control after they have performed subsequent tasks that required it. Baumeister et al. (2007) reviewed the existing literature and noted that the model was supported “in the domains of eating, drinking, spending, sexuality, intelligent thought, making choices and interpersonal behavior” (Baumeister et al., 2007, p.351). This thesis also aims to reinforce previous findings on the domain of eating.

## 2.2. Ego-depletion

As previously explained, ego-depletion is the state where the self has used up the available cognitive resources and is left with less self-regulatory strength than normally. At this state, in accordance with the willpower or strength model, the ability to exert self-control is at a very low level. It has been studied in many previous papers that performing subsequent self-control tasks will leave the individuals at the state of ego-depletion. Various different self-control tasks have been administered to respondents in different studies. It is interesting to note that even though the self-control exerting tasks differed, most studies found evidence for the existence of the strength model.

Muraven et al. (1998) ran three experiments where they presented subsequent tasks of self-control to the treatment group, and only one task of self-control to the control group. They found evidence for the existence of the strength model because the subjects in the treatment groups performed worse than the subjects in the control groups in the second self-control task. The self-control tasks in each experiment differed and from here it can be concluded that no matter what type of task, as long as self-regulation is used to perform this task it will deplete the available resource and leave the individual at an impaired state. As Muraven et al. (1998) noted “to use it is to lose it, at least temporarily” (Muraven et al., 1998, p.787).

In today’s fast-paced world people are constantly going through decisions that require self-control. Being that there are so many decisions in everyday life that require self-regulation and that subsequent decisions made in a day use up this limited resource and leave the individuals at a state of ego-depletion, it is important to look for ways to improve the performance in self-regulation and optimize the decision making process, at least for some spheres of action. This thesis will try to find a way in which the decision process for healthier food, which is regarded as a decision process that requires a lot of self-control, can be eased.

The following section will elaborate more on some day to day decisions that require self-regulation and why impaired self-control can lead to sub-optimal decision making.

### **2.3. Decision Making Under Ego-Depletion**

As previously mentioned, self-control is important because many decisions made by individuals require this mental resource. People aim to reach some goals and they tend to use self-control in the process of making decisions about future actions. That does not necessarily mean that the forethought goals are always achieved, but they serve to some extent as regulators of present behavior (Bandura, 1991). If behavior were not regulated, life would become a series of unconstrained impulsive actions as a function of immediate urges, desires and emotions (Hagger et al., 2010).

Decisions regarding health, well-being, finances, food and many other things depend on the ability to exert self-control. Failure to exert self-control can result in undesirable outcomes in bodily, financial and social welfare. While the ability to exert self-control has been empirically proven to produce a broad range of positive outcomes in life (Tagney et al., 2004).

#### *Financial Setting*

The use of self-control in financial decision-making has been studied thoroughly in literature. It is actually a very good example to explain the role that self-control has in decisions for the future. In the context of financial decision-making, people have to use self-control in order to resist the desire for instant gratification, resist overspending and maximize the financial well being in the long term.

The savings decisions highly depend on one's ability for self-control. There is a large body of literature that studies the role of self-control on savings. Research suggests that decisions that involve intertemporal trade-offs always involve some degree of self-control.

Shefrin & Thaler (1977) assume that individuals behave as if they had two separate sets of preferences. An individual has two aspects of personality, which are called the planner and the doer. The short-term satisfaction should be weighed against long-term results. In this process self-control is usually used in order to prevent the doer to act in line with myopic preferences. But exerting self-control is regarded as costly. That is

one of the main reasons why there are various external devices such as pension plans and rules of thumb in order to help the doer resist the desire for instant gratification without the cost of exerting self-control.

### *Health & Well-being*

Well-being has been positively associated with the ability for self-control in previous research. High levels of self-control have been generally associated with a happier and healthier life. People exert self-control when they keep a diet, keep calm on stressful situations, stop smoking or drinking etc. These restraints will generally lead to a healthier life and well-being. Bowlin & Baer (2012) have demonstrated that higher self-control is positively associated with well-being and good psychological health. Tagney et al. (2004) have been also able to test that high self-control is linked to more desirable outcomes. People that scored high on the self-control scale were generally less impulsive in the context of binge eating and alcohol abuse. They also showed better psychological health, higher self-acceptance and better interpersonal relationships.

All of the above mentioned are benefits that emerge with more self-control throughout the decision processes. However since individuals may differ in their ability to exert self-control and since the latter is regarded as a resource that can be depleted, it is important to further investigate into the possibility of replenishing this resource.

## **2.4. Self-control: How it Influences Food Choices**

The theory of willpower or strength is a building block for this thesis because it is proposed that ego-depleted individuals tend to make more unhealthy food choices. People usually respond favorably to a desirable meal, but when they are trying to change their lifestyle to a healthier one they have to go through several internal processes in order to restrain themselves from eating the desirable meal and in turn changing it to a healthier meal (Muraven & Baumeister, 2000). The process requires a lot of self-control. As stated in the willpower model, this resource is depleted after several choices are made and individuals may end up not living up to their promises and choosing what is not healthy for them.

This can be explained with a very simple example. Someone might wake up in the morning and decide to eat only healthy meals. But, after a long day when several decisions that require self-control have been made this person might not live up to his promise and go for the unhealthy option. This will usually happen because the unhealthy option is tempting, and at the state of ego-depletion individuals are not good at resisting temptation. Shiv & Fedorikhin (1999) ran two experiments and they found that when processing resources were limited people would make choices based on the affective dimension. This simply tells us that if people have an affective association with unhealthy food, they will tend to choose it when their cognitive resources are depleted.

Vartanian et. Al (2008) have been able to verify that external influences can affect food intake. In their studies they found that external environmental factors influence food intake. This thesis will investigate the possibility that inducing positive emotions “externally” can help these individuals move on to a healthier lifestyle, by making choices that are closer to their standards.

## **2.5. Positive Emotions and Self-Control**

There are various ways in which the ability for self-control can be restored to its natural level after it has been depleted. Positive emotions can be seen as an external influence that affects the choices of consumers. In line with prior research showing that mood may have an impact on people’s self-control (Tice et al.,2007; Ren et al.,2010), I argue in this thesis that positive emotions can boost self-control. Specifically, I argue that positive emotions can be seen as an external influence for consumers to make healthier choices. This is so because external influences have been proved to have an effect on goal pursuit, self-regulation and food intake of individuals (Vartanian et al., 2008). These external factors influence the food intake even without the awareness or acknowledgement of the individuals. Therefore, positive emotions can be seen as an external influence the sense that they are expected to have an effect in restoring self-regulation and regulating food intake.

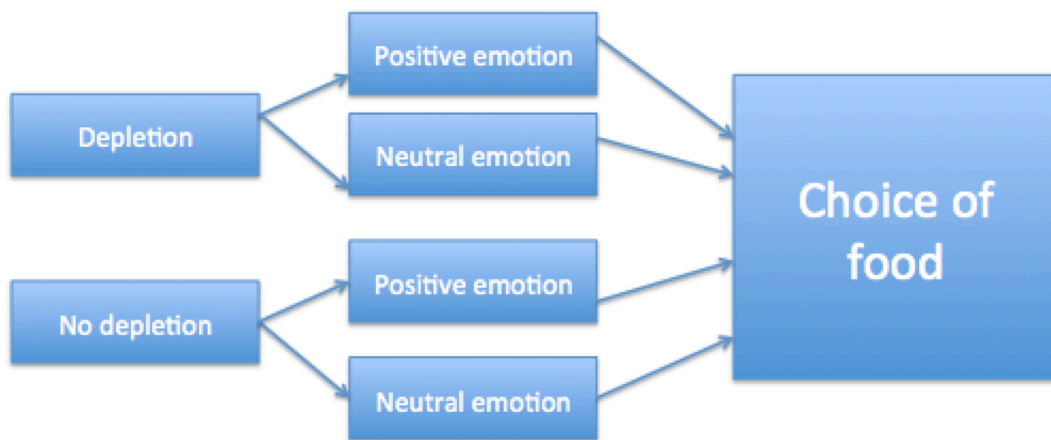
For the aim of this research, it is important to see if the positive emotions can promote better self-control in ego-depleted individuals and lead to choices of healthier food. Inducing positive emotions was easy to administer to the sample respondents in this thesis.

Kuiper, MacDonald & Derry (1983) have been able to prove that mood states can affect how one's performance is self-monitored and cognitively processed. It has been shown by several studies that positive emotions (implicit or explicit) can influence cognitive processes and behavior.

Isen & Reeve (2005) have proposed that positive emotions can facilitate flexible thinking and problem solving and enhance performance. As self-control is very sensitive to cognitive processes and behavior, it follows that positive emotions could also influence self-control. Several past studies have shown that positive emotions can restore the ability for self-control in ego-depleted individuals. Tice & al. (2007) have suggested that brief experiences of positive emotion can help to replenish self-control.

This thesis aims at proving that positive emotions induced to ego-depleted individuals would lead to healthier *food choices*. This is achieved by proving once again that positive emotions can help replenish self-control and testing the possibly existing relationship between the "replenished" self and the choice of healthy food over unhealthy.

## 2.6. Conceptual Framework & Hypothesis



Since making choices about food requires self-control and it has been shown that positive emotions can improve it, the following hypotheses are formulated in order to see if positive emotions can direct individuals towards healthier food choices.

*H1: Inducing positive emotions in ego-depleted consumers will lead them to make healthier food choices*

*H2: Ego-depleted consumers exposed to neutral emotions will tend to choose unhealthier food than non-depleted consumers exposed to neutral emotions*

*H3: Inducing positive emotions only alters the choices of ego depleted consumers*



## **3. Research Methodology**

### **3.1. Experimental Design**

The data for this thesis was collected through a 2x2 between-subjects factorial design online experiment. The experiment varied in (1) whether the participants had to perform a depleting task; and (2) whether the participants saw a video that induced positive emotions or neutral emotions.

The subjects were asked to participate in the experiment through social media platforms and personal contact. The subjects did not receive any participation fee and were kindly asked to help for this investigation with their response. The experiment lasted between ten and fifteen minutes depending on the treatment. At the beginning of the experiment some demographics of each subject were collected. Secondly, I administered a 13-item scale proposed by Tugney et al. (2004) to measure self-control.

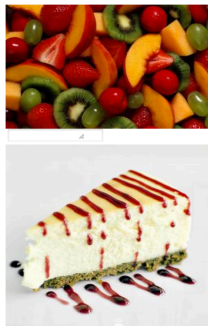
Furthermore, the participants in the experiment were randomly assigned to one of the four treatment conditions so there is no selection bias. Depending on the treatment, the subjects were first asked to perform a task that manipulated ego-depletion (or not). Baumeister et al. (1998) used a similar task in their experiment. Because their experiment was not conducted online, they asked the respondents in the treatment group to first cross out every letter “e” in an A4 paper of text and then perform the same task with some restrictions in the second paper of text. Shea et al. (2014) have also used a similar task in their online experiment. They asked the respondents to re-write a piece of text and remove all letters “e” and also not press the space bar. I used a combination of the tasks used in both papers mentioned above. The respondents first performed a basic task where they were asked to re-write a text and remove all letters “e” when rewriting. This was followed by another task in which they would rewrite the text removing all letters “e” except in the cases when it was adjacent to another vowel or was the second letter of a word (see Appendix B). The first task is administered so the participants develop a habit of crossing out every “e”. The second task ensures that the participants refrain themselves from the temptation to cross out every “e” and consequently exert self-control. It is assumed that the participants

would prefer to move on and do something else and had to exert self-control in order to continue performing the task (Baumeister et al., 1998).

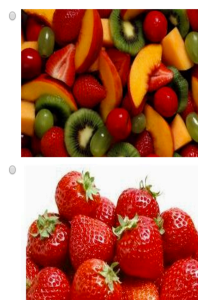
After this task, the participants were again randomly assigned to two groups. The participants in group A were exposed to positive content while the participants in group B were exposed to neutral content. The positive content consisted of a video that is believed to induce positive emotions, whereas neutral content consisted of a video, which is not believed to induce emotions of any kind (see Appendix B).

At the end of the experiment the participants in both groups were asked to make a choice between snacks. They were presented with series of pairwise choices of snacks and asked to choose their preferred snack between two snacks. One of the snacks could be seen as healthier than the other. I chose the snack or meal options based on the approximate calories that each snack or meal has. The unhealthy choice had at least 10 calories more than the healthy choice. Below is an example of the choices that the respondents faced. The rest of the choices are presented in Appendix B. I tried to make sure that each of the choices had a relatively equal amount of nutritional values. The approximate calorie intake of each of the options the respondents faced was calculated through the website [caloriecount.com](http://caloriecount.com) and the calorie intake of the unhealthy option was always higher than that of the healthy option. For instance, in the choices presented below 100 grams of strawberries contained approximately 32 versus 50 calories in 100 grams of fruit salad. The cheesecake presented in the other pair of choices had approximately 190 calories versus 50 calories in the fruit salad. The calorie intake of the rest of the choices is presented in Appendix C.

Please choose your preferred meal/snack option:



Please choose your preferred meal/snack option:



Furthermore, the position of the “healthier” meal or snack was not the same. Sometimes it was the first choice and some other times the second. All respondents saw the choices in the same order. After I constructed the choices I consulted with friends in order to make sure that the images presented would not bias the choices.

### **3.2. Measurement**

#### *Measurement of self-control*

Tagney et. al (2004) have developed a scale that is intended to measure self-control. The first version of the Self-Control Scale consisted of 36 questions. In the same study they also developed a Brief Self-Control Scale (BSCS) that consisted of only 13 questions. They found that the BSCS was nearly perfectly correlated with the extensive version. They saw that the items were correlated in two consecutive studies. The correlation between these two scales was 0.92 and 0.93 respectively. Because the scales seem to be almost perfect substitutes I decided to choose the BSCS as a measure of prior self-control in my experiment. When Tagney et. al (2004) tested the scale they found an average score of 39 among respondents. Therefore, when the score of an individual respondent is above 39 this individual will be considered as high in self-control. If the score is lower than 39 the respondent will be considered as low in self-control. Many items in this scale were reverse coded (See Appendix B for an overview of the scale and the reverse coded items).

There is much discussion about the inclusion of reverse coded items in measurement scales. Including reverse coded items in a survey corrects for agreement bias, disrupt non-substantive response behavior and improves scale validity. However, there are also negative consequences of including scales with reverse items. These scales tend to have lower reliability and complicated factor structures (Weijters & Baumgartner, 2012). The BSCS has been widely used by researchers, so there is preliminary evidence that the scale is reliable. However the factor structure of this scale was still an issue until studied by Maloney et al. (2012). In their research they identified two distinct factors within the BSCS. Namely: Restraint and impulsivity. The factors include only eight of the original thirteen items. The restraint factor included items 1,2,7 and 8

while the impulsivity factor included items 5,9,12 and 13. These factors could be useful when interpreting the results, especially because it has been studied that individuals will need higher levels of restraint when they are highly impulsive (Hoffman et al., 2009).

#### *Measurement of mood state*

After the participants watched the video they were subsequently administered the brief mood introspection scale (BMIS) as suggested by Mayer & Gaschke (1988) in order to see whether the mood of the participants that watched the positive video is significantly better than the mood of the participants that watched the neutral video (i.e., as a manipulation check). To calculate the score of each participant on the scale, first a factor analysis was conducted, to identify the items on the scale that represented positive and negative emotions. Second, the items that represented negative emotions were reverse coded. The total score represented how pleasant the participants felt (See Appendix B for an overview of the scale and the reverse coded items)

## **4.Data Analysis and Results**

This part aims to describe the data collected, the data analysis and the main results of this research. First, the data is described in more detail and some descriptive statistics of the data are presented. Second, the statistical models and tests used to analyze the data are introduced. Third, the results of the statistical analyses are presented. The data collected was analyzed through the statistical software SPSS Statistics 22.

### **4.1. Data Description**

A total of 132 observations are used in order to answer the research question of this thesis. Because the experiment was conducted online, a few observations had to be deleted from the original dataset mainly because of non-response. One observation

was deleted from the analysis because it was identified as an outlier.<sup>1</sup> The original dataset contained 192 observations but because people dropped out of the experiment at some point I had to delete a large amount of observations. Out of the remaining observations the allocation in each of the four treatments was as follows:

*Treatment 1(Depletion condition and positive emotion): 21 observations*

*Treatment 2(Depletion condition and neutral emotion): 25 observations*

*Treatment 3(No depletion and positive emotion): 36 observations*

*Treatment 4(No depletion and neutral emotion): 51 observations*

The subjects were randomly assigned to different treatments. I recognized that a lot of people dropped out when they were allocated to the depletion condition. This might have influenced the large difference in the number of subjects allocated to each treatment group. This may have also made the allocation non-random. In here we may encounter the problem of self-selection. The people who actually participated in the experiment may be very different from the ones who decided to drop out. The people who participated could have different motivations.

Table 1 below summarizes the demographics of the subjects in each of the four treatments. It should be noted here that in treatment 4 one subject preferred not to answer all demographic questions and in treatment 1 one subject preferred not to specify their age. There was no large difference in gender. The participants were almost half female and half male. All participants had education at least up to age 18. The average age of the participants was 26.

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<sup>1</sup> When looking at the boxplot of the dependent variable this observation was clearly an outlier. I checked also the choices made. This person always preferred the healthy option. This indicates that this person always cares about healthy food and the treatments have no effect.

**Table 1. Demographics of the subjects**

	Total	1	2	3	4	
Observations	132	21	25	36	50	
Gender	Male	50.8%	57.1%	36.0%	50.0%	56.0%
	Female	49.2%	42.9%	64.0%	50.0%	44.0%
Average age	25.9	25.15	27.04	25.06	26.24	
Education	No Education	0.0%	0.0%	0.0%	0.0%	0.0%
	Up to age 12	0.0%	0.0%	0.0%	0.0%	0.0%
	Up to age 14	0.0%	0.0%	0.0%	0.0%	0.0%
	Up to age18	6.8%	14.3%	8.0%	2.8%	6.0%
	Higher education	37.9%	47.6%	36.0%	38.9%	34.0%
Completed	53.3%	38.1%	56.0%	58.3%	60.0%	

The main variables used for further analysis are presented below:

*Positive emotion*- this variable took value 1 if the video with positive emotion was shown to the respondents and value 0 if the video with neutral emotion was shown.

*Depletion*- this variable took value 1 if the participants were assigned to the depletion condition and value 0 otherwise.

*Unhealthy food*- this variable was calculated based on the choices made in the end of the experiment. There were ten pairwise choices presented to the participants. The healthy choice was coded with value 1 and the unhealthy choice was coded with value 2. The values for this variable were calculated as a sum of the values for all choices.

*Choice 1*- this variable represents the first choice of food that the respondents had to make.

## **4.2. Analysis of the data**

In order to analyze the data and provide an answer to the research question I used two-way between subjects ANOVA.

I first made sure that two-way ANOVA was the right test to use in order to analyze the collected data. I checked that the data did not violate any of the six assumptions that have to be met in order to use the test. Below I demonstrate that the data to be analyzed meets these assumptions:

- (1) The dependent variable is continuous
- (2) There are two independent variables with at least two groups each
- (3) The observations are independent
- (4) There were no significant outliers in any cell of the design (one outlier was deleted)
- (5) The dependent variable was not normally distributed but in two-way ANOVA this would not be an issue since it is considered “robust” to violations in normality
- (6) The Levene’s test for homogeneity of variance showed that the variances were equal

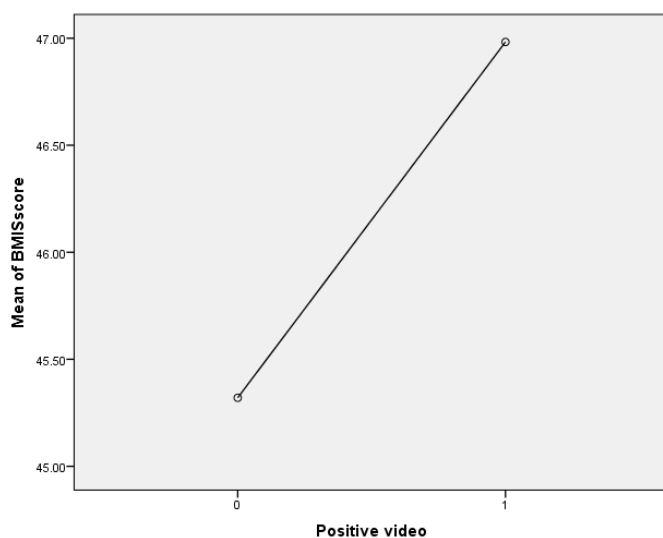
After I checked that all the assumptions applied to the data collected, I started analyzing the data. I first did the manipulation checks to see if the treatments were effective. Then, I performed the first two-way ANOVA test. The dependent variable was *Unhealthy food* and the independent variables were *Positive emotions* and *Depletion*.

Furthermore, because the subjects had to make several pairwise choices, there was a risk that the sequential elicitation of the respondents’ preferences were influenced by things such as maturation, fatigue and response strategy shifts (DeSarbo et al., 2004). Prior research has shown that within an experiment where the subjects have to go through repeated-measures or sequential measurement tasks, the choices made in the beginning phase may be essentially different from the choices made in the end of the same task. In order to correct for these problems I ran another two-way ANOVA test with *Choice 1* as the dependent variable and *Positive emotions* and *Depletion* as independent variables.

### 4.3. Results

#### Mood Manipulation check

After the participants saw the video with positive or neutral emotions, they had to complete the BMIS. I performed a one-way ANOVA test in order to see if the mood of the participants that saw the positive video was significantly better than the mood of those who saw the neutral video. Again all the assumptions for performing this test were met. The data showed that the participants who saw the positive video scored higher on the BMIS but the differences between the two groups were not statistically significant,  $F(1,130)=1.636$ ,  $p=0.203$ . The graph below shows that the mean of the participants in the positive emotion condition is higher than that of the participants in the neutral emotion condition, but the difference is small and therefore not significant.



#### Self-control Manipulation Check

Before the participants were assigned to the depletion condition or not, they were evaluated on the BSCS. I ran a one-way ANOVA to see if there were differences in self-control and whether these differences could influence the choices of food. The main effect of self-control was significant  $F(1,130)=7.193$ ,  $p=0.008$ . Meaning that people



who score high on self-control will opt for the healthier food option. This means that the level of self-control is an important factor to consider when analyzing the data. With this in mind I ran a two-way ANOVA to see if there were significant differences in the choice of food between the individuals that scored differently on the self control scale after they were administered the depleting task or not. The main effect of self-control was still significant  $F(1,128)=6.997$ ,  $p=0.009$ . However, the interaction effect between the two terms was not significant  $F(1,128)=0.326$ ,  $p=0.569$ . This would mean that there are no significant differences between the choices of food between the groups of people that scored high or low on self-control when they are exposed to the depletion condition or not.

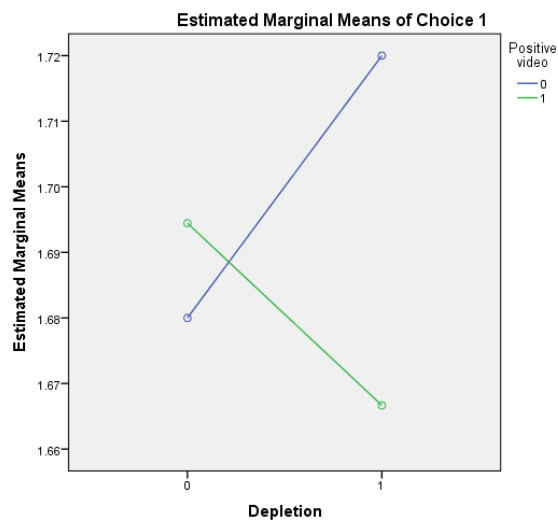
### **Choice of food**

The two-way ANOVA with *Unhealthy food* as the dependent variable showed no significant differences between the choices of the four treatment groups. The main effects and the interaction effect were not significant (See Appendix A).

To see whether the insignificant results were possibly influenced by repeated measurement error, I also ran a two-way ANOVA with *Choice 1* as the dependent variable. In this test the main effects and the interaction effect were also insignificant (See Appendix A).

However, when looking at the estimated marginal means in the graph below we get the impression that there is a difference in the choice of food between the participants that were shown the positive video and the ones that were shown the neutral video in the depletion condition. It can also be seen that the difference in choice of food was smaller when the participants were not depleted. Because the differences were very small (as also explained by the low partial eta square) and not statistically significant these results are not interpreted. The results could be insignificant due to a power issue that rises with the low number of participants (especially in the depletion condition). This problem could be solved in future research through a larger sample or a better design that would also solve the self-selection problem. I believe that the interaction below is an indication that the relationships could be existent and that

another experiment that is optimally designed could have statistically significant results.



## 5. Conclusion & Discussion

Although the results were not statistically significant, in the second test there is an indication that the positive emotions could influence the choices of food.

This thesis aimed to find an effect of positive emotions on the choices of food in ego-depleted consumers. The results showed that there were no significant differences in the choices of food in ego-depleted individuals when they were induced positive emotions or not. Therefore, the first hypothesis of this research is rejected. There were also no significant differences between the depleted and non-depleted individuals exposed to neutral emotions. As a consequence the second hypothesis is rejected. Also there were no significant differences in the choices of depleted and non-depleted respondents when exposed to positive emotions.

The data collected in this research showed no significant effects of emotions on the choices of food in ego-depleted individuals. However, as previously mentioned, prior research has suggested that emotions can restore the ability for self-control. It has also been suggested in prior research that positive emotions will make individuals choose healthier food. In line with the suggestions of previous studies, it was expected that

the results of this study would show similar findings. The findings are similar but not significant.

There could be a lot of reasons why the results of this research were not significant. First, there could be many other variables influencing the choices of individuals, which were not controlled for in this thesis. The experiment was conducted online and the behavior of the participants during the experiment was not observed. The time to complete the experiment differed among subjects. For instance, some people might have opened the experiment, left it open in their browser and continued with it at a later time. Such behavior can have a considerable effect on the results.

As previously mentioned this study may have also suffered from the problem of self-selection. The participants who decided to take part and continue with the experiment may have been very different from the ones who decided to not to take part or close the experiment without finishing. Deciding to continue with the experiment may indicate that these individuals have higher tolerance to depletion than the ones who decided to quit. Since depletion is one of the main variables in this research the results could be distorted. It is suggested that in future research on this topic this problem is accounted for. One way to solve this could be by using the two-stage Heckman correction (Heckman, 1979). Another way could be through improving the design of the experiment. If the study was conducted in a laboratory environment and appropriate incentives are provided the self-selection problem would not exist anymore.

It is suggested that this study is conducted in a laboratory with monetary incentives for participation. Also a larger number of respondents would be beneficial to the study. Additionally, since the interaction effect was only seen in the first choice it is suggested that the participants only face one choice. To make it more realistic the participants could be asked to choose a real snack at the end of the experiment. In this case the participants would not know that their choices are recorded. The snack could be presented as a reward for participating in the experiment. It would be optimal if the experimenter were not in the room where the snacks are chosen to avoid social pressure that could influence the choice.

The insignificant results could also be in accordance with previous theories in self-control. The *cognitive theory* and the theory of *self-control as a skill* do not state that self-control can be depleted. As there were no significant differences between the depletion and no depletion conditions one could say that this is in line with the theory of self-control as a skill. The theory of self-control as a skill assumes that self-control is a skill that remains constant and individual acts of self-control do not differ significantly. However, no conclusions can be drawn from this.

Even though the results of this research were not significant, I believe that this study has contributed to the literature in some way. There was an interaction effect identified, even though the design of the study was not optimal. Trying to understand why results are not significant can be very important to fully understand the behavioral and psychological processes that we aim to understand with studies like this one. If the study is replicated and significant results are found, they could be useful to public health marketers in public health campaigns. They could also be useful to companies producing healthy food for their marketing campaigns directed to dieters. Lastly dieters or individuals who want to change their lifestyle could find these insights very useful.

Another suggestion for future research could be to study if positive emotions can influence the choices of ego-depleted individuals, not only in the context of food but also in other decision-making processes that require self-control.

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## Appendix A- Results

### Test 1-Means between groups

#### 4. Depletion \* Positive video

Dependent Variable: Unhealthy food

Depletion	Positive video	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
0	0	15.080	.243	14.599	15.561
	1	15.028	.286	14.461	15.594
1	0	14.680	.344	14.000	15.360
	1	14.762	.375	14.020	15.504

### Test 2-Means between groups

#### 4. Depletion \* Positive video

Dependent Variable: Choice 1

Depletion	Positive video	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
0	0	1.680	.066	1.549	1.811
	1	1.694	.078	1.540	1.849
1	0	1.720	.094	1.534	1.906
	1	1.667	.102	1.464	1.869

### Tests of Between-Subjects effects

	F	p-value	Partial Eta Square
<b>Test 1</b>			
Main effect Positive emotion	0.007	0.963	0.000
Main effect Depletion	3.275	0.294	0.009
Interaction effect	0.133	0.832	0.000
<b>Test 2</b>			
Main effect Positive emotion	0.051	0.822	0.000
Main effect Depletion	0.005	0.944	0.000
Interaction effect	0.154	0.696	0.001



## Appendix B: Experiment

*Thank you for helping me by taking part in this study. Your open and honest responses will be crucial for me to finish my master studies at Erasmus University Rotterdam, so I value your opinion very much. Your responses are anonymous and strictly confidential. The present study is part of an investigation that tries to understand people's food choices.*

*Please read each question carefully and answer it to the best of your ability. There are no correct or incorrect responses; we are merely interested in your personal point of view.*

*The whole survey will take about 10-15 minutes of your time. Thank you very much for providing reliable data for our study!*

What is your gender?

- Male
- Female

---

What is your age?

What is your education?

- No formal Education
- Education up to age 12
- Education up to age 14
- Education up to age 18
- Higher Education (e.g., started university, other pre-university education)
- Completed university studies

Using the 1 to 5 scale below, please indicate how much each of the following statements reflects how you typically are:

	Not at all					Very Much				
I am good at resisting temptation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have a hard time breaking bad habits	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am lazy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I say inappropriate things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I do certain things that are bad for me, if they are fun	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I refuse things that are bad for me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I wish I had more self-discipline	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
People would say that I have iron self-discipline	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pleasure and fun sometimes keep me from getting work done	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have trouble concentrating	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am able to work effectively toward long-term goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sometimes I can't stop myself from doing something, even if I know it is wrong	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I often act without thinking through all the alternatives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Reverse coded items: (2, 3, 4, 5, 7, 9, 10, 12, 13)

**Control Group redirected to the next section!**

**Treatment:**

Please retype the following text in the designated area.  
When retyping please remove all letters "e".

Example:

*Pluto, to the dismay of many, fell on the wrong side of the cut -> Pluto, to th dismay of many fill on th wrong sid of th cut*

Observations from Earth suggest the surface is mostly frozen nitrogen, but there is an intriguing, ever-changing contrast between its dark and light areas. And the whole planet is tinted slightly orange, a hue thought to be the result of ultraviolet light from the sun causing some of the nitrogen to react with methane that is also present on the surface, to create a class of ruddy chemicals called tholins. All these observations should help turn the present pencil-sketch of Pluto into something resembling a proper portrait. And that, in turn, may permit researchers to engage in a bit of planetary genealogy.

Please read the following instructions, and then retype the following text in the designated area.

When retyping the text please remove all the letters "e" except if:

**1) The letter "e" is adjacent to another vowel**

*Example:*

*I like reading books-> I lik reading books*

or

The data is divided in two categories-> Th data is dividd in two catgories

**2) The letter "e" is the second letter of the word**

*I believe in this project-> I beliv in this projct*

*Note that in the examples all letters "e" are removed, except the cases when they fall in the above mentioned categories*

Three studies are reported which investigate word priming and memory in congenitally blind and sighted children. Two conditions were of particular interest, a neutral condition, where children read aloud or repeated a word, and a generate condition, where children supplied a target word to a close semantic associate given as a cue. Later, memory for those items was tested and although the two groups did not differ in overall performance a marked interaction across group and condition was noted.

## Group A-Positive

This video is a shorter version of a video from an advertisement with animated babies dancing. In general babies are believed to induce positive emotions. Before including it in this experiment I tested it with a few acquaintances. They all seemed happier during and after the video.

Link: <https://www.youtube.com/watch?v=2xfOpzSGTgU>

**Please watch the following video**



### Group B-Neutral

This was a video of an animated man walking. It is believed that this video does not induce emotions of any kind. It is assumed that the mood of the individuals who saw the video is the same before and after the video.

Link: <https://www.youtube.com/watch?v=KFidrEECaYg>

Please watch the following video



Select the response on the scale below that indicates how well each adjective or phrase describes your present mood.

	definitely do not feel	do not feel	slightly feel	definitively feel
Lively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Happy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sad	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tired	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Caring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Content	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Gloomy (melancholic)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jittery (nervous, unable to relax)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drowsy (half asleep)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grouchy (irritable)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Peppy (energetic)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervous	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Calm	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Loving	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fed up	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Active	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Reverse coded Items: 3,4,7,8,9,10,12,15

Imagine that this experiment made you hungry and you decided to grab a snack at a nearby cafeteria. You will see a series of snack choices, in each pair, please indicate which option would you prefer, i.e., which would you be more likely to choose if you had to grab a snack now.

Please choose your preferred meal/snack option:



Please choose your preferred meal/snack option:



Please choose your preferred meal/snack option:



Please choose your preferred meal/snack option:



Please choose your preferred meal/snack option:



Please choose your preferred meal/snack option:



Please choose your preferred meal/snack option:



Please choose your preferred meal/snack option:



Please choose your preferred meal/snack option:



Please choose your preferred meal/snack option:



## Please answer the following questions

Are you member of a gym club?

- Yes
- No

Have you ever visited a nutritionist?

- Yes
- No

Please rate on the following scale how important eating healthy food is to you

Unimportant



Important

Do you have any allergies that could have influenced your choices in the previous section?

- Yes (please specify)

- No

How often do you visit diet/nutrition websites or buy health magazines?

- Never
- Less than once a month
- 1-3 times a month
- Once a week
- 2-3 times a week
- 4-5 times a week



## Appendix C-Calorie Count

Choices	Calories per 100 grams
Choice 1	
Strawberries	32
Fruit Salad	50
Choice 2	
Vegetable Salad	16
Baked potatoes	75
Choice 3	
Baked Potatoes	75
French Fries	134
Choice 4	
Fruit Salad	50
Cheesecake	190
Choice 5	
Organic Soy Yogurt	88
Strawberry Yogurt	100
Choice 6	
Strawberry Yogurt	100
Ice cream	472
Choice 7	
Pasta with vegetables (50 gr Pasta, 25gr Courgette, 25 gr Peppers)	172
Regular Cheeseburger	233
Choice 8	
Fitness bar	387
Milka Bar	575
Choice 9	
Fitness bar	387
Almonds	580
Choice 10	
Steak with vegetables (50 gr Steak, 25gr Courgette, 25 gr Peppers)	103
Pasta with vegetables (50 gr Pasta, 25gr Courgette, 25 gr Peppers)	172