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# Perceived Healthiness and its Hidden Dangers: How Healthiness Perception in Food Influences the Intention to Binge Eat

Prof. Ernesto Cardamone

RELATORE

Prof. Antonella Buonomo

CORRELATORE

*Corinne Marzia Inzirillo* Matr. 760301

CANDIDATO

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#### Management Summary

The way information is presented on product labels may play a big role in shaping healthiness perceptions and influencing the amount of food people will consume. This phenomenon has several implications for individuals in terms of health (obesity, metabolic dysfunction) and psychological issues (feelings of guilt after overeating). This study aimed to investigate the effects of healthiness perception on the intention to binge eat and the moderating roles of emotional eating and self-esteem. Specifically, the current study investigated whether individuals faced with the choice to consume something perceived as healthy are more likely to binge eat or spread consumption over time. To this end, we conducted an online experiment with pancakes as stimuli and manipulated the healthiness of the products using claims established by previous literature. The data were analyzed using ANCOVA and linear regression.

The results showed that intention to binge eat increased significantly when individuals were exposed to the healthy manipulation compared to the unhealthy manipulation; in other words, as we hypothesized, the healthiness perception in food leads to a high level of intention to binge eat. However, we could not test the moderating effect of self-esteem and emotional eating because the two-way interactions between the two moderators and healthiness perception were not significant. Nevertheless, additional analysis showed a positive correlation between emotional eating and the intention to binge eat, suggesting that emotional eaters may tend to binge eat food regardless of its healthfulness.

Our findings help us to make recommendations for management. In particular, we suggest that policymakers provide all products with unclear health status with additional heuristic decision support tools that consumers can use to make more informed choices. We also believe that it is important that marketers tailor the communication for emotional eaters as individuals are more likely to adopt good behavior when the message they receive is suited to their personality.

# Preface

The topic of this thesis has a special significance in my life because I have experienced the importance of the research question firsthand, as I often tend to binge eat food that I perceive to be healthy. Therefore, it was very satisfying to find confirmation both in the existing literature and in the results of the analysis. The findings of this thesis also heightened my awareness of food choices and consumption.

As this work marks the completion of my Master's program in Marketing Analytics, a journey that has helped me grow in many ways and has awakened my passion for coding and research, I would like to take a moment to thank all those who have supported me throughout this process.

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# 1. Introduction

#### 1.1. Problem Background

According to the World Health Organization (WHO), more than one billion people worldwide are obese, and this number is estimated to dramatically increase by 2025 (World Obesity Day 2022 -Accelerating action to stop obesity, 2022). Previous studies identified binge eating as a particular eating pattern that can lead to obesity (Bruce & Wilfley , 1996); Stunkard (1959) found that in an obese population, the majority of people who tried to lose weight were affected by binge eating problems; The consequences of this behavior can be relevant and extreme. It has been stated that the overconsumption of high-fat food reduces insulin sensitivity; in particular, engaging in the consumption of large quantities of food over a short timeframe leads to metabolic dysfunction and can lead to hyperglycemia (Parry et al., 2017). Previous literature has studied the phenomenon of overconsumption and provided recommendations to prevent the diffusion of obesity and other severe consequences related to it. For instance, Brown and colleagues have investigated the relationship between food insecurity, overeating, and associated risks. The phenomenon of binge eating not only leads to health problems but also raises psychological issues. The feelings of guilt, loss of control, and shame associated with binge eating may be the cause of depression, anxiety, and emotional discomfort. To this end, some streams of literature have provided recommendations about how to find a good balance between enjoying food pleasures and boosting healthy habits (Ratković et al., 2023). Drawing on the above, this study aimed to verify the consequences of healthiness perception on the intention to binge eat and the moderating roles of emotional eating and self-esteem; in particular, it will answer the following questions: are people more prone to binge eat food if it is perceived as healthy (vs unhealthy) ? are individuals low (vs high) in self-esteem (or emotional eating) more willing to binge eat healthy (vs unhealthy) food? The findings of this study will be relevant for marketing managers when it comes to making decisions on how to implement marketing food campaigns to promote healthy lifestyles; furthermore, they will provide guidelines and insight on how to tailor communication for individuals with high (vs low) in self-esteem and emotional eating.

#### **1.2. Relevance for Theory**

The current research contributes to three streams of literature, namely: literature on overconsumption, healthiness perceptions, and emotional eating.

The phenomenon of binge eating has been largely studied by the previous literature; however, prior works show opposing and controversial results. Adding to the ongoing debate, this research extended the literature on overconsumption in two main ways. First, we analyze the intention to binge eat of

individuals using a single product category (namely pancakes); in this way, we complemented the previous literature that tested the effect of overconsumption using dichotomous stimuli from different product categories. Secondly, we complement the work of Wansink And Chandon (2006), who analyzed the impact of low-fat nutrition claims on food consumption, by testing the effect of other health-related claims (low-calorie protein pancakes vs high in sugar and fat pancakes) on intention to binge eat.

A second contribution of this study is related to the literature on healthiness perceptions. Previous research in this field indicated that prior beliefs about food lead to a certain homogeneity in healthiness perceptions, revealing the presence of distinct boundaries that distinguish healthy products (such as fruits, meat, and vegetables) from unhealthy options (sweets and snacks) (Paquette, 2005). We contribute to this stream of literature by showing that the very same food category can be perceived as healthy vs unhealthy depending on the information available alongside it.

Thirdly, we contribute to the literature on emotional eating. Prior works have stated a correlation between eating behavior and emotions, considering negative emotions as an antecedent for binge eating (Nicholls et al., 2016). We complement this work by investigating the effects of being an emotional eater on food choice and consumption. In doing so, this research contributes to the existing literature on how a stable trait of personality can affect food intake.

#### **1.3. Relevance for Practics**

On the practical front, the potential link between healthiness perception and intention to binge eat represents a challenge for people striving to keep healthier eating habits; beliefs about the healthiness of foods need to be understood in the context of the perceptions.

The nutritional information presented alongside the product may mislead customers as they anchor on them using general heuristic cues to determine the healthfulness of a product. When faced with the choice to consume pancakes, people may be influenced by nutritional claims such as 'protein' or 'gluten-free' or 'reduced calorie', leading them to misinterpret the health benefits of the product and therefore potentially consume a larger amount. This is a crucial aspect that should be carefully analyzed by policymakers to enhance healthy habits in the population. For example, they can broaden nutritional information on products with ambiguous health statuses; this includes integrating information about potential health benefits and downsides associated with overconsumption, to help individuals in making more conscious choices.

Additionally, investigating the psychological effect of self-esteem and emotional eating on the intention to binge eat could provide valuable information for developing targeted interventions.

Understanding how self-esteem and emotional eating influence the impact of healthiness perception on the intention to binge eat can guide managerial strategies in catering to different consumer segments. Indeed, it was proved that tailored communication is highly successful, especially in the context of health care: individuals are more prone to adopt good behavior when the message they receive is customized to their personality (Graves & Matz, 2018). In this way, policymakers should prevent advertisers from promoting products in a healthy vs. unhealthy way, particularly not to certain groups, such as people with low self-esteem or prone to emotional eating.

#### **1.4. Problem Statement and Research Questions**

The current study is aimed at investigating how healthiness perception affects food choice and consumption; in particular, we want to explore whether individuals, who face the choice of consuming something perceived as healthy, would rather binge eat it or spread the consumption over time. Additionally, we analyze the moderating role of emotional eating and self-esteem.

Against this background, the problem statement of this study is: what is the effect of the healthiness perception in food (healthy vs unhealthy) on the intention to binge eat (binge eating vs not), and to what extent does this relationship depend on self-esteem and emotional eating?

#### To answer this problem statement, this study focuses on the following research questions:

#### Theoretical research question:

- 1) What is healthiness perception and how can we measure that?
- 2) What is the effect of the healthiness perception on the intention to binge eat?
- 3) What is self-esteem?
- 4) How is the effect of the healthiness perception on the intention to binge eat influenced by selfesteem?
- 5) What is emotional eating?
- 6) How is the effect of the healthiness perception on the intention to binge eat influenced by emotional eating?

#### Practical research questions:

- 7) To what extent does the effect of healthiness perception on the intention to binge eat depend on self-esteem?
- 8) To what extent does the effect of healthiness perception on the intention to binge eat depend on emotional eating?

9) Which initiatives can policy-makers and marketers implement to help consumers improve their eating behavior?

#### 1.5. Research Approach and Data

#### 1.5.1. Design

We conducted an online experiment using a 2 (healthy vs. unhealthy) between-subjects design with 2 continuous moderators (emotional eating and self-esteem), in which the independent variable healthiness perception was manipulated, resulting in 2 experimental conditions. Individuals were randomly assigned to one of the two conditions. Groups assigned to the healthy manipulation saw a picture of pancakes described as healthy ("low-calorie, protein, and gluten-free pancakes; rich in vitamins and fiber"). Participants in the unhealthy manipulation were exposed to a picture of pancakes with unhealthy descriptions ("high in sugar, fat, and carbohydrates"). To assess the impact of the moderators on the main effect, participants were then asked to complete a questionnaire on their emotional eating behavior and self-esteem, measured respectively with the English version of the Dutch Eating Behaviour Questionnaire and the Self-Esteem Scale.

#### 1.5.2. Manipulation and Analysis

A pre-test was conducted to check whether the manipulation of healthiness perception (healthy vs. unhealthy) works. The randomization function in Qualtrics was used to randomly assign participants to either the control or experimental block. The control and experimental blocks see a picture of pancakes described as healthy and unhealthy respectively (same description and pictures as in the main survey). Secondly, both groups were asked to rate how healthy they thought the pancakes were on a scale of one to seven. Finally, the significance level was tested using an independent sample t-test. The number of participants in the pre-test was between 30 and 50. Additionally, in the main study, we conducted a manipulation check designed in the same way as the pre-test; we used an independent t-test to analyze the results.

To test our main effect, i.e. the relationship between healthiness perception and intention to binge eat, we used an ANCOVA. The decision to use an ANCOVA instead of a simple ANOVA is based on the presence of a covariate, namely taste preferences (whether participants like eating pancakes) and healthiness importance (whether participants consider eating healthy an important dimension in food consumption). However, to test the effect of the moderators on the main effect, we decided to use PROCESS MACRO Model 1 and the Johnson-Neyman technique, as ANCOVA only works with categorical variables.

The following chapters explain how the independent variable and the two moderators are manipulated to test the hypotheses.

#### 2. Theoretical Framework

In the present chapter, we assess the theoretical framework for the current study. We will conceptualize the following variables, which will be used throughout this research: intention to binge eat, healthiness perception, emotional eating, and self-esteem. Furthermore, based on previous research findings, we will examine how these variables are interrelated and we will provide a conceptual model. Thus, the goal of this chapter is to review the prior literature to formulate research hypotheses that will be empirically tested.

#### **2.1. Intention to Binge Eat**

#### 2.1.1. Conceptualisation of the Intention to Binge Eat

A large body of literature has provided a definition of binge eating over time. Although the precise meaning is far from clear, a common depiction can be retrieved. The binge eating phenomenon is characterized by the consumption of high amounts of food coupled with loss of control and guilt. According to a previous study (Mathes et al., 2008), binge eating episodes are correlated with some of the following characteristics: 1) quick speed intake 2) lack of physical hunger 3) eating till uncomfortably full 4) feeling guilt after eating 5) eating alone because of shame. Despite this framework, researchers and doctors do not always succeed in assessing and differentiating binge eating phenomenon (Mathes et al., 2008). Therefore, we decided to define the intention to binge eat differently from the previous literature. In particular, we conceptualize it as the desire to consume a significantly larger amount of food within a specific food category compared to the individual's typical consumption in that category. Following we'll point out the downsides of the traditional definition and show how our conceptualization addresses them.

First of all, in the conventional interpretation of binge eating, it is challenging to determine the truly large portion size because it is subjective and depends on many factors related to the single individual. Some examples are: age (children, adolescents, and the elderly have different calorie and nutrient requirements), gender (men and women differ in terms of body composition and hormone levels), metabolism health conditions illness, pregnancy, and other health factors can influence a person's dietary needs). To this end, we conceptualize the intention to binge eat in a way that allows us to compare each respondent with themselves.

Furthermore, researchers, clinicians, and patients are uncertain when assessing whether a loss of control has occurred because the subjective differences in the definition make it difficult to quantify (Cooper & Fairburn, 2003)., some people may express the loss of control after consuming a tiny amount of food (e.g., one cookie), while others may only experience a sense of lack of control after eating a considerably bigger quantity of food (e.g., a box of cereal) (Mathes et al., 2008). Therefore, some individuals may fail to identify their behavior as binge eating even if they consume a huge amount of food. The way we conceptualize the variable assesses this problem as the intention to binge eat will be objectively revealed when people are willing to eat a quantity bigger than the amount they usually eat.

Moreover, our definition of intention to binge eat is "more inclusive" than the traditional one as it encompasses eating behavior that doesn't fall into the category of eating disorder but still represents a considerable problem. For instance, eating a significantly larger amount of food compared to the individual's typical consumption is not always recognized as an eating disorder but it can lead to severe consequences in terms of weight gain, heart disease, diabetes, and psychological distress.

On the other hand, our definition is not far from the conventional one for specific aspects that we consider important; in particular, we consider rapid food intake and feelings of shame as crucial elements in defining and distinguishing the intention to binge eat.

#### 2.1.2. Antecedentes of Binge Eating

The previous literature has identified many factors that contributed to the etiology of binge eating. Some of them directly influence the behavior, while others predispose the individuals to overeat (Fairburn & Brownell, 2002).

Examples of the latter are social factors (such as social interaction and peer judgment), psychological factors (people are unable to comply with food restrictions imposed and thus, they lose control over the quantity), and cognitive factors. Previous research elaborated more on the cognitive category; they showed that individuals make cognitive inferences about different types of foods constantly judging them on a scale from "safe" to "forbidden" (Guertin & Conger, 1999). These cognitive attributions affect their eating behavior: the more the food is perceived as safe the more they feel free to eat it. We believe that such cognitive factors are the antecedent for the dependent variable that we conceptualize in this study as the intention to binge eat; indeed, we assumed that people are more likely to binge eat food that they perceive to be healthy; the cause of this behavior may be related to the cognitive inferences people made about food: as it is healthy they feel entitled to binge it. In the

following sessions, we further explore such mechanisms by investigating the relationship between healthiness perception and intention to binge eat.

#### 2.2. The Impact of Healthiness Perception on the Intention to Binge Eat

According to the previous literature, the healthiness perception is defined as a set of "beliefs, attitudes, and views about healthy eating, eating for health, and healthy foods." (Paquette, 2005). We propose that the two main elements that influence healthiness perceptions are prior beliefs and information available alongside the product. Previous researchers have focused more on the former. The word "prior beliefs" refers to dietary guidelines that are deeply ingrained in customers' minds and substantially influence their views (Paquette, 2005). For instance, Heijden and colleagues (2021) demonstrated that individuals frequently categorized fruits and vegetables as healthy products and junk food (such as dessert, sweets, chips, candy, and cola) as unhealthy food; furthermore, these beliefs are also related to the cultural food tradition. For instance, Americans consider beef to be healthy even if it contains a high percentage of saturated fat; Another belief links healthy eating with homemade food and unhealthy eating with dining out, leading to the perception that homemade, unprocessed food is healthy, while frozen and processed meals are not (Bisogni et al., 2012). However, in the current research, we are particularly interested in how people are influenced by contextual information. The increasing complexity of nutrition research means that individuals obtain information about food from various sources, including food labels. These sources present nutritional information differently, sometimes emphasizing certain 'healthy' ingredients over others, leading to varied interpretations. Consequently, depending on how the food is presented, individuals form different perceptions of its healthiness. (Bisogni et al., 2012). In this scenario, the concept of perceptions may play a big role in food choice (Paquette, 2005).

Previous literature shows that the healthiness perception of food greatly influences eating habits: people are more likely to eat a bigger amount of the food they consider healthy vs unhealthy (Provencher et al., 2008). Many can be the reasons behind this statement; first and foremost, categorizing a product as healthy leads to an increase in the amount of food intake because it is thought to contribute to health and is less likely to lead to weight gain (Ross & Murphy, 1999); other studies suggest an association between healthy food and high level of nourishment (Carels et al., 2006). Secondly, the beliefs about healthiness can act as a norm for individuals that point to the right amount of intake: the healthier, the less harmful, the higher the amount that can be consumed (Herman & Polivy , 2005). Thirdly, uncontrolled emotions may play a role; Mohr and colleagues show that people feel less guilt when they eat food perceived as healthy vs unhealthy. Thus, it seems rational to assume that people are more prone to increase consumption when the very same food is

perceived to be healthier because it can reduce the feeling of guilt. Finally, the "Healthy = Less Filling" intuition may have a big role in the food choice (Suher et al., 2016). The authors stated the existence of an implicit and unconscious association between eating healthy food and the sense of satiation, leading people to eat more when presented with healthier options. The roots of this bias can be found back in past experiences (as unhealthy food is typically served in larger portions) (Wansink & Chandon , 2006), on the level of hunger (that is higher in people that eat healthy food) (Finkelstein & Fishbach, 2010) and on the association of the healthy product with "light" and "not dense" characteristics.

As illustrated above, a large body of literature has confirmed the importance of perception as an antecedent of food intake. The previous studies have tested their hypothesis through stimuli that fall into the category of healthy (such as salad) or unhealthy (such as snacks) products; Against this backdrop, the current research aims to expand the previous literature by highlighting how the very same food category can be perceived; In particular, we want to use products that can be perceived either as healthy or unhealthy based on the information presented alongside them. Pancakes, chocolate, and yogurt are examples of the latter. For example, previous research has shown that a yogurt label framed as a loss (e.i. yogurt 90% fat-free) was bought more frequently just because people perceived it to be healthier than the same product framed as a similar gain (e.i yogurt with only 10% fat). In this study, we are going to manipulate the healthiness perception of pancakes to verify whether people will be more prone to increased consumption when it is described as healthy vs unhealthy.

The above leads to the following hypothesis: <u>*H1*</u>: *The healthiness perception in food leads to a high level of intention to binge eat (binge eating vs not).* 

#### 2.3. The Moderating Role of Self-esteem

Having assessed the relationship between healthiness perception in products and intention to binge eat, we will now move on to discuss the moderator effect of self-esteem on the aforementioned relationship.

Self-esteem is defined as self-evaluation of one's characteristics and attributes (Elliott, 1986). A large body of literature has assessed that people attempt to protect their self-esteem by acting as consistently as possible; in particular, individuals develop a coherent understanding of themselves by organizing and integrating congruent self-perceptions. Discordant information about oneself might be difficult to process and may require "repair work"; according to dissonance theory (Festinger, 1957),

individuals tend to avoid dissonant information and interpret it in a way that confirms their beliefs and reduces their dissonance. As a result, individuals are motivated to behave consistently with their self-concept and to keep it intact even when confronted with challenging evidence. Research on "selfverification" (Swann & Read, 1981) is pertinent to this topic.

Self-verification theory supports the idea that people prefer to be perceived by others as they see themselves. According to this theory, it is reasonable to assume that people with low (vs high) self-esteem are more likely to self-verify by engaging in behaviors they perceive as "inferior" (vs "superior"); indeed, self-verifying considerations make their lives consistent and aligned with their expectations; it also helps them in relieving their social anxiety and in facilitating social relationship because the others know what to expect from them (Valentiner & Skowronski, 2011). This theory can be applied in several contexts ranging from personal and intimate relationships to shopping behavior. An example of the former is shown by Ronde and Swann (1993) who demonstrate that low-self esteem individuals choose partners who see them negatively instead of positively and that they act in ways that push away their partner's interactions (Ronde & Swann Jr., 1993). Along the same line Stuppy and colleagues (2019), stated that low self-esteem individuals are more likely to choose inferior products because it helps them make a predictable image of the self and confirm their self-view.

The current study wants to investigate the concept of self-esteem in the context of food. The previous literature has shown that acting in a way that reinforces one's self-perceptions, even if those perceptions are negative, confers important benefits to individuals. Thus, it is reasonable to assume that low self-esteem people might choose to eat a lot in one sitting to confirm their negative self-belief. This leads to the following hypothesis: <u>H2</u>: The effect of healthiness perception on the intention to binge eat is moderated by self-esteem. Specifically, individuals low in self-esteem (vs. individuals high in self-esteem) are more likely to binge eat food that is perceived as unhealthy (vs. healthy) to confirm their negative self-concept.

#### 2.4. The Moderating Role of Emotional Eating

This session aims to explore the relationship between emotions and food intake, focussing on the role of emotional eating in the development of binge eating intentions.

There is strong evidence about the relationship between food intake and emotion; according to a scientific perspective, emotion and food are strongly correlated in individuals' brains (Herwig et al., 2016). For instance, the amygdala is the brain region that is responsible for selecting food and

processing emotions (Grabenhorst et al., 2013); Furthermore, the Orbitofrontal cortex (OFC), plays an active role in the representation of emotional value and is more strongly activated when unhealthy food vs healthy food is chosen (Kringelbach, 2005). The correlation between emotions and food intake therefore appears to be confirmed. In the current study, the role of emotions in food intake will be further investigated by analyzing the contribution of emotional eating to this process.

In previous literature, emotional eating is defined as the consumption of excessive food in reaction to negative experiences beyond a certain emotion or mood (Faith et al., 1997). According to psychosomatic theory, emotional eating is seen as a reaction to adverse emotions like stress anxiety, disillusionment, and a sense of isolation (Kaplan & Kaplan, 1957). We conceptualize emotional eating as a stable personality trait, where individuals regularly use food as a means to cope with negative emotions (Eversa et al., 2018). Previous research has demonstrated the role that negative emotions play on quality (healthiness vs unhealthiness) and quantity of food intake; these results clearly show that negative emotion leads people to consume more unhealthy food. An extensive body of literature has demonstrated this relationship by considering stress as an example of negative emotion (Ulrich-Lai et al., 2015). For example, the authors have stated that people are more likely to consume higher amounts of total calories when they are experiencing stress. The idea behind this is that a greater consumption of "comfort food" helps them to diminish the level of stress and improve their mood because of the cortisol reduction. These statements were also confirmed by Dr Ulrich-Lai in an experiment tested on rats. More generally, several studies have argued that emotional eaters to cope with negative emotions consume a higher quantity of sweets (Konttinen & al, 2010) and highcalorie snacks (Wallis & Hetherington, 2009) than non-emotional eaters. This relation also appears reasonable in light of physiological mechanisms involved in food intake (Nyklíček et al., 2011). In particular, meals that contain more carbohydrates than proteins, such as snacks, potatoes, and rice, contribute to increasing the level of serotonin in the blood. At the same time, highly palatable and fatty food reduces the level of cortisol and helps individuals boost their emotional state by reducing stress. Last but not least, several studies have demonstrated the consumption of sugar or sweet food results in energy level increases and tiredness reduction (Thayer, 1987). Furthermore, psychological processes may play an active role during the eating "funnel" (Steiner, 1977). In particular, hedonistic characteristics of unhealthy food can be seen by emotional eaters as a cop-out reason to eat a large quantity of highly palatable food.

Against this background, this study is aimed at further exploring the relationship between emotional eating, healthiness perception, and intention to binge eat. In particular, it wants to test whether being an emotional eater has a moderator effect on the relationship between healthiness perception and intention to binge eat.

The above-mentioned studies lead to hypothesize that the effect of healthiness perception in food on intention to binge eat is less strong for emotional eaters than for non-emotional eaters.

When emotional eaters have to deal with food to cope with negative emotions they prefer to eat food perceived as unhealthy vs healthy both because of the overmentioned physiological and psychological mechanisms and because of some bias (such As "healthy = less taste intuition") that may occur (Raghunathan et al., 20006). Specifically, this bias leads people to view unhealthy food as more enjoyable; consequently, for emotional eaters, such food has the potential to lift their mood and support them in managing negative emotional episodes.

As a result, emotional eaters would rather cheer themselves up by binge eating food perceived as unhealthy because it is more enjoyable and hedonic.

The above leads to the following hypothesis: <u>H3</u>: The effect of healthiness perception on the intention to binge eat is moderated by emotional eating. Specifically, individuals high in emotional eating (vs. individuals low in emotional eating) are more likely to binge eat food that is perceived as unhealthy (vs. healthy).

# 2.5. Conceptual Model

The following conceptual model was set up, based on the relationships described above.



# 3. Research Methodology

After a detailed overview of the past literature, we will now focus on the research approach used to validate the developed hypotheses. This chapter will thus cover the experimental and stimulus design, the measurement of the main variables, population and sample definitions, and the analysis conducted to test our hypotheses.

#### 3.1. Study Overview

The goal of the current research is to measure the effect of healthiness perception in food (healthy vs unhealthy) on the intention to binge eat and verify the moderating role of emotional eating and selfesteem in this relationship. Therefore, the most appropriate research design was an experimental study. Experiments enable us to establish causality between the dependent variable and the independent variable as well as measure and control variables in a model (Stevens et al., 2005). In other words, it enabled us to manipulate the healthiness perception in food by assigning participants to different experimental conditions as well as determine the impact of this variable on the intention to binge eat. There are three kinds of experiments: the laboratory experiment, the field experiment, and the online experiment (Reips, 2000), we decided to use the online experiment. Despite its biggest downside in controlling the process (the same participant might take part in the experiments multiple times through different devices with different IP addresses), it offers two main advantages in terms of speed (it allows to reach a large number of people quickly) and cost (it is less expensive than laboratory or field of experiment) (Reips, 2000). When choosing an experiment, it's important to evaluate both internal and external validity. The internal validity assesses whether the manipulation of the independent variable caused changes in the dependent variable or if other factors contributed to the change. External validity refers to a study's ability to generalize its findings to other situations, contexts, or geographic areas (Stevens et al., 2005). Increasing an experiment's internal validity leads to decreased external validity, and vice versa (Sekeran & Bougie, 2016). After discussing the benefits and drawbacks, we will now move on to the type of experiment used in the current research and discuss the reason why it was chosen.

#### 3.1.1. Design of the Experiment

The type of experiment which was used for the current research was the online experiment. This design appears to be more favorable than others for the following reasons. First and foremost, reaching a large and diverse sample increases the generalizability of the result (Birnbaum, 2004); a diverse sample can provide a more accurate picture of the population (Reips, 2000), while a larger sample increases statistical power (Birnbaum, 2004). Secondly, the familiar setting for the participants increased the external validity (Reips, 2000).

The primary drawback of online experiments, such as individuals participating multiple times, is considered to be relatively minor, as the likelihood of someone engaging in the experiment repeatedly is deemed small due to the lack of excitement involved. (Reips, 2000).

To test the effectiveness of our manipulation, we run a pre-test. Qualtrics randomization feature allowed us to randomly assign participants to either the control or the experimental block. Both

groups saw two different pictures of the same food category, pancakes, respectively described as healthy and unhealthy. Successively, they were asked about rating on a scale from one to seven how healthy they perceive the pancakes to be (see Appendix I for the pre-test survey ). Finally, we run an independent sample t-test to verify the significance level of the test. Additionally, we replicated the manipulation check in the main survey and analyzed the results through an independent sample t-test.

#### **3.2. Design of the Stimulus**

As previously stated, in this study healthiness perception is the variable manipulated. In the following sessions, we will delineate the experimental stimulus design by zooming in on the product category used, the rationale of that decision, as well as how the stimulus was manipulated.

#### 3.2.1. Healthiness Perception in Food

The product category we chose was pancakes. The reason for this decision lies in the ambivalent characteristics and properties of the product, which prevent prior beliefs act as a cue to categorize them either as healthy or unhealthy. Therefore, people may classify a particular pancake as more or less healthy depending on the information presented. To manipulate healthiness we used three healthy claims established by prior literature that are "protein", "gluten-free", and "low calorie"; on the other hand, we manipulated unhealthiness using other statements that are "high level of sugar, fat, and carbohydrates";

we also decided not to use a real brand because people might hold prior beliefs about their healthiness potentially diverting the focus away from the information presented alongside the product. Furthermore, preferences for a particular brand can influence people's choices.

#### 3.2.2. Manipulation

The experiment used a 2 (healthy vs unhealthy) between-subjects design with 2 continuous moderators (emotional eating and self-esteem); The rationale of exposing participants to one treatment (between-subject design) was based on three factors. First of all, it was thought to prevent what is known as the "demand effect" which occurs when participants are exposed to multiple treatments and adjust their behavior based on the researcher's intention (Rosenthal, 1976). Secondly, this design reduces the risk of carryover effects, which arise when individuals accumulate experiences from one condition and apply them to the next (Christensen, 2007). Third, a single exposure to the experimental condition was more representative of real-life situations.

#### 3.3. Main Variables Measurement

The main variables of this study, self-esteem, and emotional eating, were measured using existing scales, while the intention to binge eat was measured using a baseline variable as a benchmark. We will now delineate the measurements used, focusing on the rationale of these choices.

#### 3.3.1. Self-esteem Measurement

To measure self-esteem, we decided to use the Self-Esteem Scale (SES); it was designed in 1965 by Rosenberg to assess global feelings related to self-acceptance and self-worth (Robinson et al., 1990). Widely utilized by researchers, this measurement stands out for its simplicity, brevity, and clarity. The scale is made of 10 items evaluated on a 4-point Likert scale (e.g. "On a scale from 1 to 4, please select the option that best suits your personality" (1) "I feel that I have a number of good qualities", (2) "All in all, I am inclined to feel that I am a failure.") This approach ensures that participants aren't overwhelmed by the questionnaire's length, fostering more sincere and honest responses. Consequently, the SES has emerged as a benchmark against which new measurements are evaluated (Robinson et al., 1990). The reliability and validity assumptions were tested in a sample of 5024 individuals from randomly selected schools in New York (Robinson et al., 1990). The high internal consistency is ensured by a high Cronbach's alpha (0.88) (Courtney, 1984); additionally, the validity is guaranteed because the scale is convergent and discriminant. For instance, Reynolds (1988) reported a correlation of 0.38 between the self-concept construct and SES, while Savin-Williams and Jaquish (1981) show a correlation of 0.27 with peer rating in the adolescent sample (Robinson et al., 1990). Conversely, a negative correlation has also been demonstrated between the scale of self-esteem scores, the grade point averages (.010), and the Scholastic aptitude test verbal (-0.06) (Robinson et al., 1990). Given what is above, the scale was used as a measurement tool for self-esteem in the current research.

#### 3.3.2. Emotional Eating Measurement

The measurement we employed to assess emotional eating is the Dutch Eating Behaviour Questionnaire (DEBQ). This questionnaire was validated in a sample of both obese and normal-weight individuals (Lluch et al., 1993); this represents a big advantage compared to the other scales of emotional eating that were tested only in clinical groups affected by eating disorders. Furthermore, despite the misleading name, the internal validation and external validity of the questionnaire were tested in different versions and languages, such as France (Lluch et al., 1993), Spain (Cebolla et all., 2014), and, our interest, English (Wardle, 1986). The DEBQ consists of 33 items and it includes a scale for restrained, emotional, and external eating that are assessed separately; for our analysis, we only used the 13-item scale related to emotional eating behavior (e.g. Do you have the desire to eat

when you are irritated? Do you have the desire to eat when you have nothing to do?). The structure of the questionnaire appears to be robust in identifying emotional eating behavior; the British version of the questionnaire shows good results in terms of internal validation; in particular, Varimx analysis demonstrated that the first factor, which accounted for 47% of the total variance, loading highly on 12 out of 13 emotional items (Wardle, 1986). Furthermore, the internal consistency and reliability through results are very high (Cronbach's alpha coefficients = 0,96 for emotional eating items).

#### 3.3.3. Intention to Binge Eat Measurement

As we previously mentioned, we defined the intention to binge eat as the desire to consume a significantly larger amount of food within a specific food category compared to the individual's typical consumption in that category.

In the survey, participants were encouraged to imagine a situation involving eating pancakes. They were then asked, how many pancakes they wanted to eat in one sitting. Their answer served as a baseline. Subsequently, the same question was asked after exposure to either the healthy or unhealthy manipulation (see Appendix II for the main study survey). Therefore, the intention to binge eat is evaluated as a difference between the two conditions (before and after the manipulation). The rationale for this measurement can be found in previous literature. For instance, Suher and colleagues (2016) measured overconsumption in their study by weighing the stimulus (in the case of the study it was a box of popcorn) before and after the experiment. Against this backdrop, the current research used a similar approach to Suher et al., adapting their measurement method to the online setting. Furthermore, to match our definition, we design the study by including the speed of food intake and feelings of shame. The former is considered by assessing whether eating occurs in one sitting, and the latter by cueing participants that they were eating alone.

#### **3.4. Sample and Population**

The sample of this study consists of European people who are older than 15 and younger than 70. The lower limit was set because it was believed that younger people do not think carefully about their eating decisions and do not have well-defined eating habits. Conversely, the upper limit was set because we assumed that people over the age of 70 stick to their eating habits and do not pay as much attention to the health status of the food they consume. To compute the sample size, we used the statistical software G\*Power (see Appendix III). With a medium effect size of f = 0.03, an error probability of alpha = 0.05, and a power of 80 %, 208 respondents - 104 people in each experimental condition - results to be the desired sample size. Furthermore, this was in line with Sawyer and Ball's (1981) recommendation that at least 30 participants are required for each experimental condition.

The data were collected through convenience sampling, by using the personal network of the researcher because it was simple and efficient (Sekeran et al., 2016). Participants received the link to take part in the experiment via WhatsApp, email, and LinkedIn.

#### 3.5. Analysis

In this study, we test whether the manipulation of healthiness perception in food influences the intention to binge eat and whether this relationship depends on emotional eating and self-esteem. Therefore, we can conceptualize the model as follows. Healthiness perception is a nominal, non-metric independent variable. It is nominal because the items are mutually exclusive and collectively exhaustive; the intention to binge eat is a metric-dependent variable, specifically its ratio because it has an absolute zero point (participants can choose not to consume pancakes). Finally, the two moderators are continuous because the intensity of the measurement is taken into account (e.g., the Likert scale). Given the above, we decide to test our main effect through an ANCOVA and the moderator effect through the process macro model 1. In the following sessions, we explain which data analysis method we used and the rationale for each decision.

#### 3.5.1.Covariates

In the analysis, we decided to use taste preferences and healthiness importance as covariates as they may affect the dependent variable separately from the treatment variable; consequently, if unaccounted for, these variables may bias the estimate of treatment effect; in particular, people may overeat pancakes because they don't consider healthiness as an important dimension in their life; thus, any differences in intention to binge eat between healthy and unhealthy pancakes may be due to the importance they placed on healthiness instead of healthiness perception; at the same time, people may choose not to consume pancakes because they do not like them and not because of perceived unhealthy. Therefore, we included taste preferences and healthiness importance to obtain an unbias estimate of the treatment effect.

#### 3.5.2. Main Effect

To test our main effect, i.e. the relationship between healthiness perception and intention to binge eat, we opted for an ANCOVA. The decision to use an ANCOVA instead of a simple ANOVA is based on the presence of a covariate. Furthermore, ANCOVA seems to be useful because it tests whether there are differences in the mean of a metric-dependent variable (intention to binge eat) at different levels of one non-metric independent variable (healthiness perception). Before running the model, the assumptions of independence, homoscedasticity, and normality were tested.

#### 3.5.3. Moderators Effect

To test the effect of the moderators, we decided to use PROCESS Macro model 1 from Andrew F. Hayes. In this case, we could not use a simple ANCOVA, as ANCOVA only works with categorical variables (Spiller et al., 2012). Thus, we opted for PROCESS Macro Model 1 because it assumes a dichotomous independent variable and continuous moderators. Finally, we wanted to use the Johnson-Neyman technique to plot our results; Johnson shows the range of moderator values where the slope of the independent variable is either significant or not significant at a given alpha level. In other words, Johnson-Neyman Naman identifies regions in the range of the moderator variable via the effect of the independent variable (healthiness perception) on the dependent variable (intention to binge eat) as statistically significant and non-significant.

# 4. Results

This chapter presents the results of the analysis. We first address the preliminary process of data inspection, which focuses on analyzing the structure of the sample, assessing the reliability of the measurement scales, checking whether the manipulation, as well as the randomization, were successful and whether the assumptions of ANCOVA were met. Finally, we highlight the results of the study by presenting the main effects and the moderating effect (see Appendix IV for Rcode).

#### 4.1. Preliminary Data Inspection

#### 4.1.1. Structure of the Sample and Data Inspection

The responses were collected over 16 days. The first check of the data set showed that all respondents met the minimum age requirement (i.e. they were older than 15 and younger than 70). These results are presented in a boxplot (see Appendix V for the Boxplot). As the population, the original sample size of 265 was reduced to 224 due to missing responses (not all participants completed the questionnaire in full). 10 of the 224 respondents indicated that they did not like pancakes. As already mentioned, the taste preferences of participants (e.g. whether they like pancakes or not) may have biased the results. Consequently, this variable was taken into account in the analysis by including it as a covariate. In addition, we consider another variable that could potentially influence the results: the healthiness importance; In other words, we want to find out to what extent people attach importance to the health-related aspects of their food intake. We therefore included it as a covariate

in our study. 149 out of 224 people consider health to be an important (rated 6 on a scale of 1 to 7) or very important (rated 7 on a scale of 1 to 7) factor influencing their food choices.

Regarding the structure of the sample, 43.75% of participants were male (n = 98), 55.36% were female (n = 124), 0.45% were non-binary (n = 1) and 0.45% preferred not to specify their gender (n = 1). Participants came from a variety of nationalities; the two most represented nationality groups were Italian (48.21%, n = 108) and Dutch (23.21%, n = 52). A possible explanation for these demographic characteristics, as all participants were of one of these two nationalities, could be that most of the individuals invited to participate in the experiment were from the researcher's network. The age of participants ranged from 16 to 38; in particular, 196 respondents were between 19 and 25 years old, 7 were younger than 19, and 21 were older than 25. The mean and standard deviation of the respondents' ages were 22.45 and 2.81 respectively (see Appendix V.a for ata inspection tables).

#### 4.1.2. Measurement Scale Reliability

Before proceeding with the analysis, we wanted to ensure that it would be appropriate to average the ratings of emotional eating and self-esteem across all items to create two separate variables. Therefore, we assessed the Cronbach's alpha for each of the measurement scales. The Cronbach's alpha for emotional eating shows excellent internal consistency ( $\alpha = 0.93$ ). When calculating the same index for self-esteem, however, we found that some items were negatively correlated with the first principal component, so we reversed these items before evaluating the alpha (this is indicated by a negative sign for the variable name). The Cronbach's alpha for self-esteem showed good internal consistency ( $\alpha = 0.87$ ). This allowed us to continue our analyses with the average of the scale items.

#### 4.1.3. Pre-test

To assess whether the manipulation produced the desired result, we conducted a pre-test. As in the main survey, participants were randomly exposed to the healthy vs unhealthy manipulation. Both groups were asked to rate how healthy they thought the pancakes were on a scale of one to seven. We collected 42 respondents but due to missing responses, the sample was reduced to 40. The results were analyzed through an independent sample t-test (see Appendix VI for Rcode). Particularly we tested whether the healthiness perception differs across the two groups (the group exposed to the healthy manipulation vs the group exposed to the unhealthy manipulation). People in the healthy condition (M = 0.6, SD = 0.5) rated the food as significantly healthier than those in the unhealthy group (M = 0.3, SD = 0.5; t(38) = -2.28, p = 0.02817). See full analysis in Appendix VI.a. Therefore, we concluded that the manipulation was successful.

#### 4.1.4. Manipulation Check

Besides the pre-test, we assessed the effectiveness of the manipulation by conducting a manipulation check on the main survey. We performed the same analysis as in the pre-test and analyzed the data through an independent sample t-test. The results remain consistent with those of the pre-test, further confirming the effectiveness of the manipulation assessment (see Appendix VII for the results).

#### 4.1.5. Randomisation

For validity and reliability purposes, we executed the so-called "balance checking" to see whether the randomization was properly executed; in particular, we analyzed whether there were large differences between the treatment and control groups on pre-treatment variables. To this end, we ran two separate ANOVAs using some demographic variables (namely age and gender) as dependent variables. The results show no significant effect for age (F(1,222) = 0.13, p > 0.05) and gender (F(1,222) = 0.77, p > 0.05). See Appendix VIII for the result. In sum, the randomization was successful.

#### 4.1.6. Checking Assumptions for ANCOVA

Before performing ANCOVA, we checked whether the three assumptions (independence of observations, equality of variance across treatment groups, and normal distribution of residuals) were met (see Appendix IX for the statistical tests). First, the observations were expected to be independent because each individual was exposed to only one treatment variable (i.e., a between-subjects design). Second, homoschedasticity was tested using the Levene test. The test showed homoschedasticity for the intention to binge eat (F(1,222) = 2.20; p > 0.05); in other words, the variance was equal across treatment groups. Therefore, the assumption was met. The third assumption we tested was the normality requirement; the Shapiro-Wilk normality test showed that the residuals were not normally distributed (p < 0.05). However, as Norman (2010) stated, this only affects the standard errors when the sample is small and there are fewer than five observations; in the case of the current study, we have a large sample with 112 observations per group.

#### 4.2. Main Analysis

To gain insight into the structure of the data, we tested whether the covariates were statistically significant. We then performed both ANOVA and ANCOVA to test our main effect (i.e., the relationship between the intention to binge eat and healthiness perception). Before proceeding with the moderation analysis, we conducted two separate linear regressions with emotional eating and self-

esteem as interaction terms to see whether there was a significant interaction effect with healthiness perception. Finally, we conducted two additional analyses.

#### 4.2.1. Significance of Covariates

After making sure that the assumptions for the ANCOVA are met, we run the model to see if the covariates (taste preferences, healthiness importance) affect the results. The model shows that the two variables don't have a significant effect on the intention to binge eat, which means that they don't affect the results (see Appendix X for ANCOVA table).

# 4.2.2. Examination of the Relationships Between Healthiness Perception and Intention to Binge Eat

First, we established whether there was a tendency to binge eat separately for people exposed to the healthy vs unhealthy manipulation; in particular, we filtered the data by condition (healthy manipulation vs unhealthy manipulation) and tested whether there were significant differences between the number of pancakes eaten from people exposed to the healthy manipulation (vs unhealthy manipulation) compared to the baseline. The results showed that this effect was statistically significant both for people exposed to the healthy manipulation (M = 5.1, SD = 2.4; F(1, 103) = 3.01, p = 0.004), and for people exposed to the unhealthy manipulation (M = 4.0, SD = 2.4; F(1, 104) = 7.40 p < 0.001). See Appendix XI for the results. Therefore, the results of the ANOVAs show that people tend to binge eat pancakes both if they are exposed to the healthy manipulation and the unhealthy manipulation.

Secondly, we wanted to assess whether the intention to binge eat was greater for people exposed to healthy manipulation vs unhealthy manipulation. To do so, we created the intention to binge eat variable by subtracting the baseline (amount of pancakes people were willing to eat before they were exposed to the manipulations) from the number of pancakes people were willing to eat after they were exposed to the healthy vs unhealthy manipulation.

Then we ran a one-way ANOVA to examine the effect of healthiness perception on the intention to binge eat, respondents' intention to binge eat is higher in the healthy condition (M = 1.94, SD = 2.49) compared to the unhealthy condition (M = 0.77, SD = 2.04; F(1, 222) = 8.47, p = 0.004). See Appendix XI.a for the results. Results remain consistent when including " the healthiness importance" and "taste preferences" as covariates (see Appendix X). Therefore, our <u>H1</u> (e.i. The healthiness perception in food leads to a high level of intention to binge eat) was met.

# 4.2.3. Examination of the Moderating Effect of Self-esteem and Emotional Eating on the Main Effect

Before running PROCESS MACRO MODEL 1, we wanted to test whether the model with the interaction between the moderators (self-esteem and emotional eating) and the independent variable (healthiness perception) was statistically significant. To this end, we conducted two separate linear regressions.

First of all, we performed regression analysis using healthiness perception, emotional eating, and their interactions as predictors and intention to binge eat as the dependent variable. The two-way interaction between emotional eating and healthiness perception was not significant ( $\beta = -0.28$ , t(220) = -0.51, p = 0.607,  $\eta 2 = 0.0012$ ); the effect of emotional eating on intention to binge eat was significant ( $\beta = 1.18$ , t(220) = 2.17, p = 0.031,  $\eta 2 = 0.02$ ; other effects were n.s. [ps > .05]). See Appendix XII.

Similar results were obtained when a linear regression with the interaction between self-esteem and healthiness perception was conducted. The two-way interaction between self-esteem and healthiness perception was not significant ( $\beta = -0.002$ , t(220) = - 0.02, p= 0.987,  $\eta 2 = 0.00$ ; other effects were n.s. [ps > 0.05]). See Appendix XII.a. Consequently, it was statistically meaningless to run PROCESS MACRO MODEL 1 to test the moderating effect of self-esteem and emotional eating.

#### 4.2.4. Additional Analysis

As we haven't found a significant interaction effect between the moderators and the healthiness perception, we decided to conduct further analysis to check whether a correlation between the moderators and the dependent variable exists. To this end, we run two separate linear regressions using emotional eating and self-esteem as independent variables. The output shows non-significant results for self-esteem, F(1, 222) = 1.265, p > 0.05, and significant results for emotional eating F(1, 222) = 4.18, p = 0.042 (see Appendix XIII). Thus, there is a positive correlation between emotional eating as a personality trait and the intention to binge eat. In other words, emotional eaters may tend to binge eat food regardless of its healthfulness. We will explore the implications of these findings in the following session.

We conducted another additional analysis to complement the work of Suher, Raghunathan, and Hoyer, 2016, by testing whether the intention to engage in binge eating varies based on the importance individuals place on the health dimension. To this end, we run a regression analysis using healthiness importance as an independent variable and intention to binge eat as the dependent variable. The effect of healthiness importance on the intention to binge eat was not significant F(1,

222) = 0.132, p > 0.05; see Appendix XIV. In other words, people are likely to binge eat food regardless of the role that healthiness importance plays in their lives.

#### 4.3. Discussion

The current study was aimed at investigating the consequences of healthiness perception on food consumption; the main question of this work was: what is the effect of the healthiness perception in food (healthy vs unhealthy) on the intention to binge eat (binge eating vs not), and to what extent does this relationship depend on self-esteem and emotional eating?

In particular, we tested whether perceiving something as healthy (vs unhealthy) will increase the willingness of people to binge eat the product. Therefore, we formulated our first hypothesis as follows: *H1*: *The healthiness perception in food leads to a high level of intention to binge eat (binge eating vs not)*. The first hypothesis worked as intended: individuals exposed to different manipulations of pancakes (healthy vs unhealthy) showed a significant difference in their intention to binge eat; in particular, the participants who saw the healthy version of pancakes were 1.17 more likely to binge eat the product compared to the one exposed to the unhealthy manipulation.

In addition, we aimed to find out if self-esteem and emotional eating will moderate the relationship between healthiness perception and intention to binge eat. More specifically we have assumed that individuals low in self-esteem (H2) and high in emotional eating (H3) were more likely to binge eat food that they perceived as unhealthy (vs healthy). However, contrary to our expectation, we could not test the second and third hypotheses because the interaction effect between the two moderators (self-esteem and emotional eating) and healthiness perception was not statistically significant. Therefore, we are not able either to reject or not reject hypotheses three and four. However, we conducted further analysis and we found a positive correlation between emotional eating and intention to binge eat suggesting that being an emotional eater may affect the tendency to binge eat food.

In the next sessions, we will speculate about the reasons why we didn't find a significant interaction between healthiness perception and the moderators (self-esteem and emotional eating); furthermore, we will discuss in the last chapter the theoretical and practical implications of the correlation found between emotional eating and the intention to binge eat.

#### 4.3.1. Self-esteem and Healthiness Perception

We initially assumed that self-esteem could moderate the relationship between healthiness perception and intention to binge eat because of self-verification theory (individuals tend to self-verify their selfperceptions by acting consistently). Specifically, we hypothesized that individuals with low selfesteem were more inclined to binge eat unhealthy food as a way to confirm their negative self-view. However, Brown and Morrison (2015) have demonstrated that the relationship between self-esteem and behavior is complex and not always straightforward. In particular, in some domains, individuals act in a way that self-verify their self-perceptions (suggesting that self-esteem has an impact on behavioral outcomes) while in other domains they may self-enhance themselves (suggesting that selfesteem does not have an impact on behavioral outcomes). In our current experiments, we didn't find a significant interaction between healthiness perception and self-esteem on the intention to binge eat, suggesting that self-esteem doesn't impact the relationship. This can be caused by the tendency of people to self-enhance (instead of self-verify) in the food-related domains; A possible explanation for this behavior is social desirability, which is the tendency of individuals to behave in a socially favorable manner (Huang, 2012). This is particularly true in the food-related context where people may feel the social pressure of being judged if they eat a significantly large amount of food.

#### 4.3.2. Emotional Eating and Healthiness Perception

In our current experiment, we didn't find a significant interaction between healthiness perception and emotional eating on the intention to binge eat, suggesting that the effect of healthiness perception on the intention to binge eat does not depend on emotional eating. At the same time, we found a positive correlation between emotional eating and the intention to binge eat, meaning that emotional eaters may tend to binge eat food. A potential explanation for the non-significant effect lies in our conceptualization of emotional eating as a stable personality trait. As emotional eating is considered a stable trait of personality, individuals may consistently turn to food as a coping mechanism for their emotions, regardless of their health perception of the food. Moreover, automatic, non-conscious processes may guide eating behavior, making the perception of the healthiness of food less influential. Therefore, emotional eaters may view food as a means to cope with their emotions perhaps regardless of their healthiness perception. In other words, food may serve as a release valve irrespective of whether it's healthy or unhealthy.

# 5. Conclusion

In this last chapter, we discuss the aim of this work and the main takeaway, focusing on their practical and theoretical implications. Finally, we analyze the limitations of this study and suggest possible extensions for future research.

#### 5.1. Aim of the Work and Main Takeaways

The main aim of this work was to show that perceptions of healthiness in products influence food consumption and dietary intake. Specifically, it was shown that people tend to binge eat pancakes when exposed to both healthy and unhealthy manipulation. However, the intention to binge eat was greater in people exposed to the healthy version of the pancakes. In particular, individuals were almost twice as likely to binge eat the healthy pancakes than the unhealthy version of the same product category.

In addition, we found a positive correlation between the intention to binge eat and emotional eating, but no significant interaction between emotional eating and healthiness perception. In other words, individuals who use food as a means of coping with emotions tend to binge eat, regardless of how healthy they perceive pancakes to be.

The last important finding of this study is that the same food category can be perceived as healthy (or unhealthy) based on the information available alongside it. In our experiment, healthiness perception differed significantly between the low-calorie protein pancakes and the version high in sugar, fat, and carbohydrates. In particular, the results show that 95% of people exposed to the unhealthy manipulation rated the pancakes as unhealthy or very unhealthy (with 1 to 4 on a scale of 1 to 7, where 1 = "very unhealthy"). Furthermore, 74% of individuals exposed to the health manipulation rated the pancakes as healthy or very healthy (with 4 to 7 on a scale of 1 to 7, where 7= "very healthy"). These results show that using claims such as "low-calorie protein" or emphasizing certain ingredients such as "fiber and vitamins" over "sugar and fat" drastically influenced individuals' healthiness perception.

The theoretical and practical implications of these takeaways are discussed in the following two paragraphs.

#### **5.2. Theoretical Implications**

The present study contributed to two streams of literature: the literature on healthiness perception and the literature on overconsumption and food choice. The following sessions will elaborate more on this topic.

#### 5.2.1. Contribution to the Literature on Healthiness Perception

First of all, this study contributed to the literature on healthiness perceptions; the healthiness perception may be mainly influenced by two elements: prior beliefs and information available

alongside products. Past researchers have focused more on the first category. The word "prior beliefs" refers to the dietary guidelines that are well established in consumers' minds and heavily influence their perception (Paquette, 2005). Over the last few years, nutritional science has evolved increasing the complexity of healthy food definition. For instance, nowadays different characteristics of food need to be taken into account to define the level of healthiness (Paquette, 2005). Against what is above, the current study contributes to the streaming literature on healthiness perceptions by demonstrating that the information presented along products may play a big role in shaping perceptions of healthiness; this is particularly evident for that kind of food that cannot easily categorized as either healthy or unhealthy, consequently, prior beliefs cannot serve as reliable cues for determining their health status. The present work demonstrated that consumers anchor on the information provided to judge the healthiness of foods. In particular, they typically have some beliefs about which ingredients are healthy (e.g. protein and fiber) and which ones are not (sugar and carbohydrates), when they then see related information use simple heuristics to categorize food. In the current experiments for example, when the pancake is presented with claims such as "lowcalorie protein pancakes, rich in fiber and vitamins" participants categorize the food as healthy; conversely, they perceived pancakes as unhealthy when unhealthy claims were used (" high level of sugar and carbohydrates"). Using decision rules and shortcuts to categorize this kind of food as either healthy or unhealthy may be misleading. For instance, describing healthy pancakes as "high in protein and fiber" doesn't necessarily mean that they are inherently healthy. In particular, we did not specify whether the fiber and/or protein in the pancakes came from natural sources or were potentially harmful artificial additives. Furthermore, the protein products are often combined with other ingredients that make them tastier and are anything but healthy (e.g. glucose syrup or flavor enhancers). To sum it up, this research has contributed to the literature on healthiness perception by showing that information available alongside products influences (and often misleads) the healthiness perception of individuals.

#### 5.2.2. Contribution to the Literature on Overconsumption

The stream of literature on overconsumption is extensive and varied and sometimes different researches have reached opposite conclusions. For example, on the one hand, Kemps and colleagues (2014) have demonstrated the tendency of people to overconsume fatty foods, while on the other hand, Ruddock and Hardman (2018) show that people tend to avoid overeating unhealthy foods. Adding to the ongoing debate of literature consumption, the results of this work show that the healthiness perception plays a role in food consumption, as people were more likely to binge eat foods that they perceived as healthy.

Furthermore, previous studies have analyzed the relationship between overeating and healthy products by using stimuli from different product categories (pizza, chips, and doughnuts for the unhealthy food category and vegetable salad and fruit for the healthy food category) (Suher et al., 2016); in contrast, we used a single food category as stimuli (namely pancakes) and showed that people tend to binge eat more when they perceive them as healthy.

Finally, we enriched earlier findings by complementing the work of Wansink and Chandon (2006). The authors focussed in particular on the impact of low-fat nutrition claims on food consumption, however, it was unknown whether their findings could be generalized to other health-related claims. Therefore, we extended this work by investigating whether other claims (e.g. fiber, vitamin, and protein-rich pancakes versus high sugar, fat, and carbohydrate) have similar effects on food consumption.

#### **5.3. Practical Implications**

This study contributed to the practical front in two ways. First of all, we demonstrated that people usually used the information presented alongside the product to make inferences about the level of healthiness; thus, we believe is important that policymakers signal the healthiness level of the product using heuristic tools such as "front-of-pack" label, nutriscore or other additional label against overconsumption.

Secondly, we demonstrated a positive correlation between being an emotional eater and the tendency to binge eat products; this finding can provide important insight to policymakers in terms of developing tailored communication strategies for emotional eaters. The following paragraphs will discuss those concepts in detail.

#### 5.3.1. Insight for Policymakers to Use Heuristic Tools

We show that the mere mention of a "low-calorie product high in proteins and fiber" can lead consumers to perceive the product to be healthy and choose to eat more. This is problematic because such claims might mislead consumers as typically they do not convey the full picture (for instance, the product can still be high in sugar, as in some protein yogurt ) (Verbeke & Hoefkens , 2013). This finding can have important implications in terms of developing obesity or health diseases in the long term.

Therefore, we believe that policymakers and marketers should take this situation into account when making decisions on product packages. The relevant problem is that consumers

typically don't pay too much attention while making a choice, attending more to claims such as "low in fat" and avoiding checking the full nutrition label. One solution could therefore be to provide all products with an unclear health status with additional heuristic decision tools that can address consumers' choices more consciously. For instance, those products that want to have a healthy claim, also need to disclose the nutriscore or additional label against overconsumption. An example of the latter is the "front-of-pack" label (Franco-Arellano et al., 2020). This labeling aims to graphically signal foods with lower (vs higher) nutritional quality. Some examples of FOPs include health star ratings (which use a score or symbol to summarise positive and negative nutrient content), traffic light labeling (which provides visual indications of the nutritional content of foods using color-coded symbols reminiscent of traffic lights), and warning labels (which indicate products with high levels of certain ingredients that may be harmful to health if consumed in large quantities). Several studies have demonstrated that FOPs are helpful because they draw people's attention from misleading health claims to nutrition information tables (Bix et al., 2015). Given the overwhelming evidence that few people pay attention to nutrition tables and over-rely on healthy claims, improving awareness through FOPs or nutriscore, is a step toward promoting conscious food choices and potentially improving overall dietary quality.

#### 5.3.2. Insight for Policymakers to Tailor Communication for Emotional Eaters

The current study shows a positive correlation between the intention to binge eat and emotional eating, suggesting that emotional eaters are more likely to binge eat. Therefore, social marketers and policymakers must recognize emotional eating as a significant problem and implement relative solutions. To this end, we believe that it is important that policymakers tailor the communication for this specific segment of consumers. Indeed, customized communication has been proven to be highly beneficial, especially in the context of health care: individuals are more likely to adopt good behavior when the message they receive is suited to their personality. Therefore, marketing campaigns can be implemented to educate emotional eaters on managing their emotions when making food choices; in particular, people can be educated on how to pay more attention to hunger and satiety signals, and how to choose foods that meet their nutritional needs rather than simply catering to their emotions.

To address emotional eating behaviors effectively, a comprehensive approach is required. This includes the implementation of social marketing programs aimed at teaching individuals emotion regulation techniques. These programs can promote activities such as meditation, yoga, socializing, and distraction to minimize 'emotional hunger' and thus reduce reliance on food as a coping

mechanism. In addition, interventions should target parents to raise awareness of adults eating in response to emotions, as research shows that parental behavior significantly influences children's eating habits (Kemp et al., 2013).

#### 5.4. Limitations

This study, like many others, has limitations that point to areas for future research. The main limitation of our work was studying an ideal and hypothetical situation of eating behavior by asking participants in the survey to imagine a situation in which they were about to eat something. However, it would have been worthwhile to study eating behavior in a real scenario (e.g. asking people to eat something). In other words, we assumed that the intention to binge eat translates into actual binge eating behavior but this relation is not always verified as the intention and behaviors are usually not perfectly aligned. Therefore we suggest that future researchers test the first hypothesis of the present study in a laboratory setting or through a field of experiment.

A second limitation is the sample. Due to time and financial constraints, the study relied on a selfadministered online questionnaire; thus, the participants who took part in the experiments were part of the researcher's network. This can be problematic as the sample is not representative of the entire population (i.e., European and non-European individuals) and may cause issues in the generability of the results; indeed, the participants had a lower average age and were more likely to be Italian or Dutch.

Lastly, the online questionnaire could have led to inaccurate data especially for the questions about self-esteem and emotional eating as they required a big span of attention and time because of the length. Although the questionnaire was well designed, we could not guarantee that consumers filled it out consciously or that other noise (such as time constraints or distraction) led them to fill it out unproperly.

#### 5.5. Possible Extensions

In this paragraph, we will suggest some possible extensions for future researchers who want to deepen their knowledge about food. The current study shows that people are more willing to binge eat healthy food but it did not investigate the reasons for this statement. One possible explanation could be that people think they would experience less guilt when they binge on healthy food. Investigating the reasons for this phenomenon may give policymakers a deeper insight and enable them to develop better communication strategies.

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Another possible extension is related to emotional eating. We have treated this dimension as a stable personality trait, but future researchers can investigate the effects of context-dependent emotions on food consumption: If a particular event (e.g. failing an exam) triggers strong emotions, are people more likely to binge eat? It could also be interesting to investigate whether behavior differs depending on the valence of emotion triggered (positive vs negative) and specific types of emotions (e.g., guilt, shame, pride).

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# Appendices

# **APPENDIX I**

**Start of Block: Default Question Block** 

#### INTRODUCTION Dear participant,

Thank you for taking part in this study. I am currently working on my master's thesis in the Marketing Analytics program at Tilburg University. Therefore, the results of this study will be used as a pre-test for my research project.

Your contribution to this process is greatly appreciated! Completing the questionnaire will take no more than TWO minutes.

The data collected will be treated confidentially and anonymously and will only be used for the current research project.

There are no right or wrong answers, so please answer openly and truthfully.

Thank you again for your time.

Kind regards, Corinne.

**End of Block: Default Question Block** 

#### Start of Block: unhealthy manipulation

You are about to see a picture of pancakes. They are made from oat flour and contain a **high** proportion of <u>sugar</u>, <u>fat</u>, and <u>carbohydrates</u>. Please take a moment to look at the pancakes and then continue to the next page.



Page Break

Q1 You saw a picture of pancakes earlier in this survey. On a scale from 1 to 7, how healthy do you think they are (1 = unhealthy, 7 = healthy)?



End of Block: unhealthy manipulation

Start of Block: healthy manipulation

You are about to see a picture of **low-calorie protein** pancakes. They are made from <u>gluten-free oat</u> flour and are **rich** in <u>fiber</u>, <u>vitamins</u>, and <u>protein</u>. Please take a moment to look at the pancakes and then continue to the next page.



Page Break

Q1 You saw a picture of pancakes earlier in this survey. On a scale from 1 to 7, how healthy do you think they are (1= unhealthy, 7 = healthy)?



End of Block: healthy manipulation

# **APPENDIX II**

**Start of Block: INTRODUCTION** 

#### Dear participant,

Thank you for taking part in this study. I am currently working on my master's thesis in the Marketing Analytics program at Tilburg University. Therefore, the results of this study will be used to structure the experiment of my research project.

Your contribution to this process is greatly appreciated!

Completing the questionnaire will take no more than five minutes. The data collected will be treated confidentially and anonymously and will only be used for the current research project. There are no right or wrong answers, so please answer openly and truthfully.

Thank you again for your time.

Kind regards, Corinne.

Page Break

End of Block: INTRODUCTION

Start of Block: BASELINE TO MEASURE INTENTION TO BINGE EAT

Q1 Imagine you are **alone** at home and have eight pancakes in the fridge that <u>a friend brought you</u> last night. In such a scenario, how many pancakes would you **normally** eat in one sitting? (You don't have to eat them all)

$\bigcirc$ None of them (1)
One (2)
○ Two (3)
O Three (4)
O Four (5)
○ Five (6)
O Six (7)
O Seven (8)
O Eight (9)

# End of Block: BASELINE TO MEASURE INTENTION TO BINGE EAT

# **Start of Block: Healthy manipulation**

You are about to see a picture of **low-calorie protein** pancakes. They are made from **gluten-free** oat flour and are **rich** in <u>fiber</u>, <u>vitamins</u>, and <u>protein</u>. Please take a moment to look at the pancakes and then continue to the next page.



Page Break

Q2 Please answer the following question about the pancakes you have just seen. How many of them would you like to eat in one sitting?

None of them (1)
One (2)
Two (3)
Three (4)
Four (5)
Five (6)
Six (7)
Seven (8)
Eight (9)

**End of Block: Healthy manipulation** 

Start of Block: unhealthy manipulation

You are about to see a picture of pancakes. They are made from oat flour and contain a **high** proportion of <u>sugar</u>, <u>fat</u>, and <u>carbohydrates</u>. Please take a moment to look at the pancakes and then continue to the next page.



page Break

Q2 Please answer the following question about the pancakes you have just seen. How many of them would you like to eat in one sitting?

None of them (1)
One (2)
Two (3)
Three (4)
Four (5)
Five (6)
Six (7)
Seven (8)
Eight (9)

End of Block: unhealthy manipulation

**Start of Block: Manipulation check** 

# Q3 You saw a picture of pancakes earlier in this survey. On a scale from 1 to 7, how healthy do you think they are (1 = unhealthy, 7 = healthy)?



**Start of Block: Covariates** 

# Q4 Do you like pancakes?

○ Yes (1)

O No (2)

Q5 On a scale of one to seven, how important is the healthiness of food to you when you eat it (1 = 'not important', 7 = 'very important')?

	1	2	3	4	5	6	7
1(	()					_	

**End of Block: Covariates** 

Start of Block: MODERATORS

In the following session, we will ask you some questions about your personality and eating habits. Remember that there are no right or wrong answers, so please answer openly and truthfully.

Page Break

	1 (1)	2 (2)	3 (3)	4 (4)
I feel that I have a number of good qualities. (1)	0	0	$\bigcirc$	0
All in all, I am inclined to feel that I am a failure. (2)	0	0	$\bigcirc$	0
I am able to do things as well as most other people. (3)	$\bigcirc$	0	0	$\bigcirc$
I feel I don't have much to be proud of. (4)	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
I take a positive attitude toward myself. (5)	0	0	$\bigcirc$	0
On the whole, I am satisfied with myself. (6)	0	0	$\bigcirc$	0
I wish I could have more respect for myself. (7)	0	0	$\bigcirc$	0
I certainly feel useless at times. (8)	0	0	$\bigcirc$	0
At times I think I am not good at all. (9)	$\bigcirc$	0	0	$\bigcirc$
I feel that I am a person of worth, at least on an equal basis with others. (10)	0	0	0	0

Q6 On a scale from 1 to 4, please select the option that best suits your personality (1 = 'strongly disagree', 2 = 'disagree', 3 = 'agree', 4 = 'strongly agree')

Q7 For each of the following questions, please choose the option that best suits your personality on a scale from 1 to 5. (1 = 'never', 2= 'seldom', 3 = 'sometimes', 4 = 'often', 5 = 'very often')

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)
Do you have the desire to eat when you are irritated? (1)	0	0	0	0	0
Do you have a desire to eat when you have nothing to do? (2)	0	0	0	0	0
Do you have a desire to eat when you are depressed or discouraged? (3)	0	0	0	0	0
Do you have a desire to eat when you are feeling lonely? (4)	0	0	0	0	0
Do you have a desire to eat when somebody lets you down? (5)	0	0	0	0	0
Do you have a desire to eat when you are cross (e.g. annoyed)? (6)	0	0	0	0	0
Do you have a desire to eat when you are approaching something unpleasant to happen? (7)	0	0	$\bigcirc$	$\bigcirc$	$\bigcirc$
Do you get the desire to eat when you are anxious, worried, or tense? (8)	0	0	0	0	0

Do you have the desire to eat when things are going against you or when things have gone wrong? (9)	0	0	0	0	0
Do you have a desire to eat when you are frightened? (10)	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$	$\bigcirc$
Do you have a desire to eat when you are disappointed? (11)	0	0	0	0	0
Do you have a desire to eat when you are emotionally upset? (12)	0	0	0	0	0
Do you have a desire to eat when you are bored? (13)	0	0	0	0	0

#### **End of Block: MODERATORS**

**Start of Block: General questions** 

Q8 This is the last session of the survey. Please answer the following questions

O What is your age? (1)\_\_\_\_\_

O What is your nationality? (2)\_\_\_\_\_\_

45

# Q9 What is your gender?

- O Male (1)
- O Female (2)
- $\bigcirc$  Non-binary/third gender (3)
- $\bigcirc$  Prefer not to say (4)

**End of Block: General questions** 

# **APPENDIX III**



#### **APPENDIX IV**

Download the data

```
{r}
dataset0 <- read.csv("Thesis_def2.csv")</pre>
```

⊙ ≚ ▸

0 = +

Download the necessary library

```
{r}
library(haven)
library(dplyr)
library(car)
library(apaTables)
data("mtcars")
library(report)
library(kableExtra )
library(kableExtra )
library(dplyr)
library(dplyr)
library(data.table)
library(broom)
tinytex::reinstall_tinytex(repository = "illinois")
```

Data cleaning

```
{r}
                                                                                                                                                                                                                                                                                                                                                                               0 × )
dataset0 <- dataset0[, -c(1:17)]</pre>
new_titles <- c("baseline", "healthy_manipulation", "unhealthy_manipulation",</pre>
"manipulation_check", "taste_preferences ", "healthiness_importance", "self-esteem"
, "self-esteem", "self-esteem
-esteem", "self-esteem", "self-esteem", "self-esteem", "emotional_eating",
"emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emotional_eating", "emoti
colnames(dataset0) <- new_titles
corrispondenze <- c("None of them" = "0", "One" = "1", "Two" = "2", "Three" = "3",
"Four" = "4", "Five" = "5", "Six"= "6", "Seven" = "7", "Eight" = "8")
for (i in 1:3) {
        for (key in names(corrispondenze)) {
                   dataset0[, i] <- gsub(key, corrispondenze[key], dataset0[, i])</pre>
        }
}
df_cleaned <- lapply(dataset0, function(x) tail(x, -2))
df_cleaned <- as.data.frame(df_cleaned)
df_cleaned$age <- as.numeric(df_cleaned$age)
dati <- df_cleaned[!is.na(df_cleaned$age), ]</pre>
```

Data inspection

Computing the following variables: dependent variable, treatment status, independent variable, emotional eating index and self-esteem index

```
{r}
                                                                               0 2 1
###Creation of treatment status###
dati$healthy_manipulation[dati$healthy_manipulation == ""] <- NA
dati$treatment_status <- ifelse(!is.na(dati$healthy_manipulation), 1, 0)</pre>
dati$healthy_manipulation <- as.numeric(dati$healthy_manipulation)
dati$unhealthy_manipulation <- as.numeric(dati$unhealthy_manipulation)
###Merging 'healthy manipulation' and 'unhealthy manipulation' in a combined
column###
dati$combined_column <- coalesce(dati$healthy_manipulation,
datiSunhealthy_manipulation)
dati <- subset(dati, select = -c(healthy_manipulation, unhealthy_manipulation))</pre>
###computing DV: intention to binge eat###
dati$combined_column <- as.numeric(dati$combined_column)</pre>
dati$baseline <- as.numeric(dati$baseline)</pre>
datiSintention_to_binge_eat <- datiScombined_column - datiSbaseline</pre>
###computing the IV: healthiness perception###
dati$healthiness_perception <- ifelse(dati$manipulation_check >= 4 &
dati$manipulation_check <= 7, 1, 0)</pre>
##Average the ratings across all items to create two single variables: self-esteem
index and emotional eating index###
emotional_dataset <- dati[, 15:27, drop = FALSE]</pre>
emotional_dataset <- as.data.frame(lapply(emotional_dataset, as.numeric))</pre>
self_esteem_dtset <- dati[, 5:14, drop = FALSE]</pre>
self_esteem_dtset <- as.data.frame(lapply(self_esteem_dtset, as.numeric))</pre>
```

Cronbach alpha and manipulation check

```
{r}
                                                                           0 1 1
##computing cronbach alpha of self esteem scale and emotional eating
alpha(emotional_dataset)
alpha(self_esteem_dtset)
## Some items were negatively correlated with the first principal component and
probably should be reversed.
##To do this, run the function again with the 'check.keys=TRUE' option
alpha(self_esteem_dtset, check.keys = TRUE)
##Some items were negatively correlated with the first principal component and were
automatically reversed.
##This is indicated by a negative sign for the variable name.
####manipulaition check###
dati$healthiness_perception <- as.numeric(dati$healthiness_perception)
t_test <- t.test(healthiness_perception ~ treatment_status, dati, var.equal = TRUE
)#####
```

summary(t\_test)

Randomization

```
{r}
##age as DV
dati$treatment_status <- as.factor(factor(dati$treatment_status))
randomis_age <- lm(age ~ treatment_status,data = dati, contrasts=list
(treatment_status=contr.sum))
dati$randomis_age <- as.numeric(factor(dati$age))
randomis_aov0 <- Anova(randomis_age, type=3)
summary(randomis_aov0)
##gender as DV
dati$gender_randomis <- as.numeric(factor(dati$gender))
randomis_gender <- lm(gender_randomis ~ treatment_status,data = dati, contrasts
=list(treatment_status=contr.sum))
randomis_aov1 <- Anova(randomis_gender, type=3)
randomis_aov1</pre>
```

Analisying the main effect

```
{r}
                                                                             0 = +
##checking the assumptions for ANCOVA pt1
setDT(dati)
dati[, treatment_status := as.factor(treatment_status)]
##homoschedasticity
homoschedasticity <- leveneTest(intention_to_binge_eat ~ treatment_status, dati,
center=mean)
dati[, .(N = .N), by=c("treatment_status")]
##ancova
dati[, taste_preferences. := as.factor(taste_preferences.)]
dati[, healthiness_perception := as.factor(healthiness_perception)]
dati[, healthiness_importance := as.factor(healthiness_importance)]
FocalTrust_lm2 <- lm(intention_to_binge_eat ~ healthiness_perception +</pre>
taste_preferences., dati, contrasts=list(healthiness_perception=contr.sum,
taste_preferences.=contr.sum))
FocalTrust_aov2 <- Anova(FocalTrust_lm2, type=3)</pre>
FocalTrust_aov2
dati[, covariates_tastiness := as.factor(healthiness_importance)]
FocalTrust_lm2 <- lm(intention_to_binge_eat ~ healthiness_perception +
healthiness_importance, dati, contrasts=list(healthiness_perception=contr.sum,
healthiness_importance=contr.sum))
FocalTrust_aov2 <- Anova(FocalTrust_lm2, type=3)</pre>
FocalTrust_aov2
##Examination of the Relationships between healthiness perception and intention to
binge eating
binge_for_unhealthy <- dati %>%
 filter(treatment_status == 0) %>%
  select(baseline, combined_column)
binge_for_unhealthy[, baseline := as.factor(baseline)]
anova_binge_unhealthy <- lm(combined_column ~ baseline,data = binge_for_unhealthy,
contrasts=list(baseline=contr.sum))
anova_binge_unhealthy <- Anova(anova_binge_unhealthy, type=3)</pre>
summary(anova_binge_unhealthy)
binge_for_healthy <- dati %>%
 filter(treatment_status == 1) %>%
 select(baseline, combined_column)
binge_for_healthy[, baseline := as.factor(baseline)]
anova_binge_healthy <- lm(combined_column ~ baseline,data = binge_for_healthy,
contrasts=list(baseline=contr.sum))####
anova_binge_healthy <- Anova(anova_binge_healthy, type=3)</pre>
anova_binge_healthy
summary(anova_binge_healthy)
```

```
dati[, healthiness_perception := as.factor(healthiness_perception)]
FocalTrust_lm0 <- lm(intention_to_binge_eat ~ healthiness_perception,data = dati,
contrasts=list(healthiness_perception=contr.sum))#####
FocalTrust_aov0 <- Anova(FocalTrust_lm0, type=3)
summary <- summary(FocalTrust_aov0)
####assumptions for ANCOVA pt 2
##NORMALITY
shapiro_test <- shapiro.test(FocalTrust_lm2$residuals)
statistic <- shapiro_test$statistic
df <- shapiro_test$parameter
df <- shapiro_test$parameter</pre>
```

Moderation analysis

p\_value <- shapiro\_test\$p.value

```
{r}
dati[, 5:14] <- lapply(dati[, 5:14], as.numeric)
datiSEmotional_eating_index <- rowMeans(dati[, 5:14])

dati[, 15:27] <- lapply(dati[, 15:27], as.numeric)
datiSSelf_esteem_index <- rowMeans(dati[, 15:27])

##emotional eating
moderation_emotional <- lm(intention_to_binge_eat ~ healthiness_perception
"Emotional_eating_index,data = dati, contrasts=list(healthiness_perception=contr
.sum))
summary(moderation_emotional)

##self-esteem
moderation_self_esteem <- lm(intention_to_binge_eat ~ healthiness_perception
"Self_esteem_index, data = dati, contrasts=list(healthiness_perception
"Self_esteem_index, data = dati, contrasts=list(healthiness_perception
"Self_esteem_index, data = dati, contrasts=list(healthiness_perception=contr.sum)))
summary(moderation_self_esteem)</pre>
```

Additional analysis

```
{r}
                                                                            0 = +
##correlation between the moderators and the dependent variable
#emotional eating
dati[, Emotional_eating_index := as.numeric(Emotional_eating_index)]
dati[, memotional := Emotional_eating_index-mean(Emotional_eating_index)]
correlation_emotion <- lm(intention_to_binge_eat ~ Emotional_eating_index, data =
dati)
tidy(correlation_emotion, conf.int = TRUE)
summary(correlation_emotion)
#self-esteem
correlation_self <- lm(intention_to_binge_eat ~Self_esteem_index, data = dati)
summary(correlation_self)
##Healthiness importance
dati$healthiness_importance <- as.numeric(dati$healthiness_importance)
dati[, mimportance := healthiness_importance-mean(healthiness_importance)]
addiotional <- lm(intention_to_binge_eat ~ healthiness_importance, data = dati)
summary(addiotional)
```

# **APPENDIX V**



# **APPENDIX V.a**

Data inspection tables

	Nationality	
Bulgarian	4	1.79%
Canadian	1	0.45%
Austrian	1	0.45%
Chinese	2	0.89%
Colombian	1	0.45%
Croatian	3	1.34%
Cypriot	1	0.45%
Cypriot-	1	0.45%
Dutch		
Dutch	52	23.21%
French	3	1.34%
French/-Italian	1	0.45%
German	10	4.46%
Greek	2	0.89%
Hungarian	1	0.45%
Indian	4	1.79%
Iranian	1	0.45%
Italian	108	48.21%
Latvian	2	0.89%
Mexican	1	0.45%
Polish	2	0.89%
Romanian	3	1.34%
Serbian	2	0.89%
Slovak	4	1.79%
Spanish	9	4.02%
Turkish	2	0.89%
Venezuelan	2	0.89%
Vietnamese	1	0.45%

	Gender	
Male	98	43.75%
Female	124	55.36%
Non-binary	1	0.45%
Prefer not to say	1	0.45%

	Age
16-18	7
19-25	196
26-34	19
35-38	2

# **APPENDIX VI**

Download the data

```
{r}
pre_test <- read.csv("pre_test2.csv")</pre>
```

Data cleaning

```
{r}
pre_test <- pre_test[, -c(1:17)]
new_titles <- c( "unhealthy_manipulation", "healthy_manipulation" )
colnames(pre_test) <- new_titles
pre_test <- lapply(pre_test, function(x) tail(x, -2))
pre_test <- as.data.frame(pre_test)
pre_test$healthy_manipulation[pre_test$healthy_manipulation == ""] <- NA</pre>
```

0 11

Computing Condition and healthiness perception variables

```
{r}
#condition
pre_test$Condition <- ifelse(!is.na(pre_test$healthy_manipulation), 1, 0)
##e convertile in numeriche
pre_test$healthy_manipulation <- as.numeric(pre_test$healthy_manipulation)
pre_test$unhealthy_manipulation <- as.numeric(pre_test$unhealthy_manipulation)
#healthiness perception
library(dplyr)
pre_test$combined_column <- coalesce(pre_test$healthy_manipulation,
pre_test$unhealthy_manipulation)
pre_test$healthiness_perception <- ifelse(pre_test$combined_column >= 4 &
pre_test$combined_column <= 7, 1, 0)</pre>
```

T-test

```
{r}
##pre-test
pre_test$healthiness_perception <- as.numeric(pre_test$healthiness_perception)
t_test <- t.test(healthiness_perception ~ Condition, pre_test, var.equal = TRUE)
summary(t_test)</pre>
```

# **APPENDIX VI.a**

	Mean	SD	t-value	df	р
Healthy manipulation	0.63	0.50	-2.28	38	0.0282
Unhealthy manipulation	0.29	0.46			

T-test results comparing healthy and unhealthy manipulation on healthiness perception

# **APPENDIX VII**

T-test results comparing healthy and unhealthy manipulation on healthiness perception

	Mean	SD	t-value	$d\!f$	р
Healthy manipulation	0.74	0.44	-8.60	222	0.00
Unhealthy manipulation	0.24	0.43			

#### **APPENDIX VIII**

Fixed-effects ANOVA results using age as the criterion

Predictor	Sum of Squares	df	Mean Square	F	р	$_{partial}\eta^2$	<sub>partial</sub> η <sup>2</sup> 90% CI [LL, UL]
(Intercept)	56116.51	1	56116.51	7084.55	.000		
Treatment status	1.00	1	1.00	0.13	.722	.00	[.00, .02]
Error	1758.46	222	7.92				

*Note.* LL and UL represent the lower limit and upper limit of the partial  $\eta^2$  confidence interval, respectively.

Predictor	Sum of Squares	df	Mean Square	F	р	$_{partial}\eta^2$	partial $\eta^2$ 90% CI [LL, UL]
(Intercept)	249.01	1	249.01	871.65	.000		
Treatment status	0.22	1	0.22	0.77	.382	.00	[.00, .03]
Error	63.42	222	0.29				

Fixed-effects ANOVA results using gender as the criterion

*Note.* LL and UL represent the lower limit and upper limit of the partial  $\eta^2$  confidence interval, respectively.

# **APPENDIX IX**

Levene's Test of Equality of Error Variances

Dependent Variable: intention to binge eat

F	df1	df2	p
2.2	1	222	0.139

Tests of normal	lity
Shapiro-wilk	-
Statistic	р
0.98	0.00

# **APPENDIX X**

Fixed-Effects ANCOVA results using intention to binge eat as the criterion

Predictor	Sum of Squares	df	Mean Square	F	р	$_{partial}\eta^2$	partial η <sup>2</sup> 90% CI [LL, UL]
(Intercept)	66.29	1	6.81	12.42	0.00		
Healthiness perception	44.43	1	44.43	8.32	.004	.04	[.01, .08]
Taste preferences	0.07	1	0.07	0.01	.909	.00	[.00, .00]
Error	1180.04	221	5.34				

*Note.* LL and UL represent the lower limit and upper limit of the partial  $\eta^2$  confidence interval, respectively.

Fixed-Effects ANCOVA results using intention to binge eat as the criterion

Predictor	Sum of Squares	df	Mean Square	F	р	partial $\eta^2$	partial η <sup>2</sup> 90% CI [LL, UL]
(Intercept)	66.80	1	0.00	12.54	0.00		
Healthiness perception	48.84	1	48.84	9.17	.003	.04	[.01, .09]
Healthiness importance	29.82	6	4.97	0.93	.472	.03	[.00, .04]
Error	1150.29	216	5.33				

*Note.* LL and UL represent the lower limit and upper limit of the partial  $\eta^2$  confidence interval, respectively.

# **APPENDIX XI**

Fixed-Effects ANOVA results using the number of pancakes eaten in the unhealthy manipulation as the criterion

Predictor	Sum of Squares	df	Mean Square	F	р	$_{partial}\eta^2$	partial η <sup>2</sup> 90% CI [LL, UL]
(Intercept)	926.67	1	5.33	226.72	.000		
baseline	211.85	7	30.26	7.40	.000	.33	[.17, .40]
Error	425.07	104	4.09				

*Note.* LL and UL represent the lower limit and upper limit of the partial  $\eta^2$  confidence interval, respectively.

I incu Effectis III	O VII I CSUUS	using num	ber oj puneu	nes cuien in inc	neutity man	phianon as in	c criterion
Predictor	Sum of Squares	df	Mean Square	F	р	$_{partial} \eta^2$	partial η <sup>2</sup> 90% CI [LL, UL]
(Intercept)	1050.62	1	39.20	205.2326	.00		
baseline	123.44	8	15.43	3.01	.004	.19	[.04, .24]
Error	527.27	103	5.12				

Fixed-Effects ANOVA results using number of pancakes eaten in the healthy manipulation as the criterion

*Note.* LL and UL represent the lower limit and upper limit of the partial  $\eta^2$  confidence interval, respectively.

Descriptive statistics re	esults using number	<i><sup>•</sup> of pancakes eaten</i>	as the criterion
	Mean	SD	Ν
Healthy	5.1	2.4	112
manipulation			
Unhealthy	4.0	2.4	112
manipulation			

# **APPENDIX XI.a**

Fixed-effects ANOVA results using intention to binge eat as the criterion

Predictor	Sum of Squares	df	Mean Square	F	р	$_{partial}\eta^2$	partial η <sup>2</sup> 90% CI [LL, UL]
(Intercept)	94.88	1	94.88	17.85	.000		
Healthiness perception	45.02	1	45.02	8.47	.004	.04	[.01, .09]
Error	1180.11	222	5.32				

*Note.* LL and UL represent the lower limit and upper limit of the partial  $\eta^2$  confidence interval, respectively.

Descriptive statistics results using intention to binge eat as the criterion

	Mean	SD	Ν
Healthy	1.94	2.50	112
manipulation			
Unhealthy	0.77	2.04	112
manipulation			

# **APPENDIX XII**

Term	b	SE	t	р	95% CI
(Intercept)	-1.74	1.44	-1.21	.228	[-4.57, 1.10]
Healthiness perception	0.28	1.44	0.20	.844	[-2.55, 3.12]
Emotional eating	1.18	0.54	2.17	.031*	[0.11, 2.25]
Healthiness perception × Emotional eating	-0.28	0.54	-0.51	.607	[-1.35, 0.79]

Linear regression results using the intention to binge eat as the criterion

# **APPENDIX XII.a**

Linear regression results using the intention to binge eat as the criterion

Term	b	SE	t	р	95% CI
(Intercept)	1.78	0.46	3.87	<.001***	[0.87, 2.69]
Healthiness perception	-0.43	0.46	-0.94	.349	[-1.34, 0.48]
Self-esteem	-0.16	0.17	-0.97	.333	[-0.49, 0.17]
Healthiness perception $\times$ Self-esteem	-0.00	0.17	-0.02	.987	[-0.33, 0.32]

# **APPENDIX XIII**

Term	b	SE	t	р	95% CI		
(Intercept)	1.85	0.47	3.96	<.001***	[0.93, 2.77]		
Self-esteem	-0.19	0.17	-1.12	.262	[-0.52, 0.14]		
<i>Note.</i> Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1							

Linear regression results using the intention to binge eat as the criterion

Residual standard error: 2.343 on 222 degrees of freedom Multiple R-squared: 0.005665, Adjusted R-squared: 0.001186 F-statistic: 1.265 on 1 and 222 DF, p-value: 0.262

-	•	•	1.	•		• •		1.				• . •
1	inoar	ragraggian	roculte	ucina	tho	intontion	to	hinaa	ont	ac ti	ho	critorion
L	лпеш	regression	resuits	using	ine	intention	uv	DINYE	eui	$u \circ u$	ue.	CILLEILOIL
_												

Term	b	SE	t	р	95% CI
(Intercept)	-1.58	1.44	-1.10	.274	[-4.43, 1.26]
Emotional eating	1.12	0.55	2.04	.042*	[0.04, 2.19]

Note. Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' '1 Residual standard error: 2.327 on 222 degrees of freedom Multiple R-squared: 0.01849, Adjusted R-squared: 0.01407 F-statistic: 4.182 on 1 and 222 DF, p-value: 0.04203

#### APPENDIX XIV

Term	b	SE	t	р	95% CI
(Intercept)	1.14	0.61	1.85	.066	[-0.07, 2.35]
healthiness_importance	0.04	0.12	0.36	.717	[-0.19, 0.28]

Residual standard error: 2.348 on 222 degrees of freedom Multiple R-squared: 0.0005929, Adjusted R-squared: -0.003909 F-statistic: 0.1317 on 1 and 222 DF, p-value: 0.717