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## **CAN AN UNATTRACTIVE PACKAGING LEAD TO HEALTHIER EATING BEHAVIOR?**

Carolina Pereira Lopes

Dissertation report presented as partial requirement for  
obtaining the Master's degree in Information Management

NOVA Information Management School  
Instituto Superior de Estatística e Gestão de Informação  
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# **CAN AN UNATTRACTIVE PACKAGING LEAD TO HEALTHIER EATING BEHAVIOR?**

by

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Dissertation report presented as partial requirement for obtaining the Master's degree in  
Information Management, with a specialization in Marketing Intelligence

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## **ABSTRACT**

In the last few years, although the demand for a healthier lifestyle has been increasing, the obesity rates have boomed in developed contexts. Packaging is one of the main drivers for unhealthy food decisions, having important consequences for consumers' health. In two studies, this research aims to understand the impact of healthy eating nudges like unattractive packaging on indulgent products to analyze if the consumers are more aware of their food choices. The findings suggest that pictorial warnings can increase consumers' perceived risk and that consumers would have more positive brand attitudes since they consider the brand is being sincere and have less intention to buy it, compared to verbal warnings or control (no warnings) in the indulgent products. In addition, findings suggest that construal level moderates healthy eating nudges, reducing perceived risk and increasing purchase intentions of indulgent products in abstract (vs. concrete) construal. Our research contributes by shedding light on the social and practical implications of food branding and how the companies can contribute to decreasing the obesity rate.

## **KEYWORDS**

Healthy eating nudge; Indulgent products; Risk perception; Construal level

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## 1. INTRODUCTION

In the last few decades, the demand for a healthy lifestyle and food consumption has been experiencing exponential growth, but, paradoxically, the obesity rate has nearly tripled since 1975 (World Health Organization, 2021). In 2016, more than 39% of adults were overweight and about 3.4 million people were dying each year due to obesity (FAO, 2021; World Health Organization, 2021). Calorie intake is reported as one of the biggest drivers of this (Cutler, Glaeser & Shapiro, 2003). Thus, promoting healthier eating, such as nutrition education or economic incentives, is key to having a healthier and longer-lasting population (Cadario & Chandon, 2019).

To better understand the consumer behavior related to food branding, this field has been studied for the past years. Food marketing brings together the food organization and the consumer through a chain of marketing activities (Pomeranz & Adler, 2015). There are several studies related to the impact of food marketing on the consumers' behavior, weight, calorie intake, and their perspective about healthy vs unhealthy food (Cadario & Chandon, 2019).

One way for brands to communicate in transparent ways with consumers is by using healthy eating nudges. That is, instead of focusing on their products only (e.g. hamburgers, fries, etc), brands show consumers that the excessive consumption of their products might lead to obesity or another type of disease. Nudges are defined as "any aspect of the choice architecture that alters people's behavior in a predictable way (1) without forbidding any options or (2) significantly changing their economic incentives. Putting fruit at eye level counts as a nudge; banning junk food does not" (Thaler & Sunstein, 2008, pp 6). Thus, this research focuses on healthy eating nudges to understand how brands can adapt their package with pictorial warnings for increase consumers' awareness on what they are eating.

Nowadays, the front-of-package labels have increasingly been recognized and implemented (Kanter et al., 2018). Several studies demonstrated that the use of these warnings is becoming a common strategy to prevent obesity (e.g., Hollands et al., 2011; Steenhuis et al., 2010). These types of warnings are easy for consumers to understand and quickly interpret, help them identify the type of products that they are purchasing, and tend to discourage them from purchasing unhealthy products (Taillie et al., 2020).

The studies in healthy food nudges with warning labels commonly use text warnings that say “High in calories” or related to the amount of sugar, fat, or sodium (Khandpur et al., 2019). To the best of the authors’ knowledge, there are no studies using construal level (pictorial vs. verbal representations) in healthy food labels. The use of these types of warnings has been only studied in cigarette’s packages (Kees et al., 2010). With these studies, this research aims to better understand the healthy eating nudge with a pictorial and verbal warning. The goal is to create a stimulus on indulgent products (food products with high calories, sugar, saturated fat, trans fat, and sodium that make the eater feel guilty if eaten regularly like chocolate or hamburger) with verbal or pictorial displays, focusing on negative consequences, to understand the consumers’ behavior. If they perceived a greater risk with healthy food or if they do not buy a product just because it says that can lead to obesity or have a photo of an obese person. Hollands et al (2011, p. 1) say that “there is growing evidence to suggest that communicating information about health risks using vivid, aversive images of the potential adverse health consequences of a given behavior, could be a means to motivate behavior to reduce such risks”.

To redress this gap, we adopt a construal level theoretical lens to identify its effect on healthy eating nudges and risk perceptions. Construal level theory (CLT) (Liberman & Trope,

1998) said that consumers can process objects according to concrete and abstract construals. Prior research (Lee et al., 2014) has shown the influence of construal level on visual attributes, such as colors and shapes. While in concrete construal individuals have more attention to details, under abstract construal they can see what is beyond appearance. We assess the influence of the construal level theory by applying pictorial *versus* verbal representations. With this research, we try to understand how construal level moderates healthy eating nudges.

We understand the verbal or pictorial warning as a way for brands to communicate in transparent ways with consumers and this is a type of sincere brand advertisement. A sincere brand is defined as “a brand that shows exactly what a product is in the advertisement with the number of calories or sugar, with consequences that the regular consumption of a product can make”. The brand image strongly builds the concept of a sincere brand that does not hide anything for their consumers about the product. Some studies demonstrate the importance of brand personality in consumer behavior (Aaker, 1997).

For this means, the methodology applied in this research is based on two experimental studies. The first study analyses the main effect of the healthy eating nudges in our main dependent variables (i.e., risk perception, brand attitude, and purchase intentions) with the influence of construal level theory (pictorial *versus* verbal representations). The second experiment tests an alternative moderator, scarcity, based on the construal level theory to understand the relationship between psychological distance and the extent to which people’s think when confronted with unattractive displays in unhealthy food.

The main objective of this research is to understand the effect of a healthy eating nudge on indulgent food products. Although it was already proven that hedonic



enhancements are a successful affectively-oriented nudge in healthy food (Cadario & Chandon, 2019). To the best of our knowledge, no studies are associating this topic with indulgent products and construal level theory. Thus, this research has the purpose to bring new and fresh findings in the food marketing field related to healthy eating nudges that can be applied in health marketing campaigns to increase food security, by reducing obesity.

This research is organized as follows. First, we show some literature reviews about this topic and present our hypotheses regarding healthy eating nudges and construal level theory. Further, we present our two studies that test these hypotheses. Finally, we discuss the practical and theoretical implications of our research and suggest approaches for future research.

## 2. LITERATURE REVIEW

We first conducted a literature review to understand the studies performed until the moment and their findings. Cadario and Chandon (2019) did a meta-analysis about all the healthy eating nudges that have been already studied and compared them to understand which works better. This study was the beginning. We understand the diverse types of experiments that were already done in these fields, and we understand the research that they considered imperative to do next. Healthy eating nudges are a trending topic because food advertising has grown a lot and has been influencing consumers' buying intentions. The consumers need to choose between products and brands. The choice is related to their emotions or the information that they possess.

A nudge is defined as "any aspect of the choice architecture that alters people's behavior predictably without forbidding any options or significantly changing their economic incentives. Putting fruit at eye level counts as a nudge; banning junk food does not" (Thaler & Sunstein, 2008, pp 6). They classified seven healthy eating nudges in three categories (1) cognitively oriented, (2) affectively oriented, or (3) behaviorally oriented. When they compare and present the studies made in which category, we can understand that there has not been any research done on the hedonic enhancements for unhealthy food. There are a lot of studies trying to understand the effects of food branding on healthy food but normally, they do not confirm that the contrary applies to unhealthy food (e.g., indulgent products).

One of the gaps that Cadario and Chandon suggest to study is the consumers' behavior when confronted with hedonic enhancements in indulgent products. This research wants to bring fresh conclusions about a less studied topic with lot of space to improve and contribute with valuable information.

The gap that has been found is to understand better the healthy eating nudge with an affectively oriented intervention based on “hedonic enhancements” in indulgent products. An affectively oriented intervention corresponds to “the degree to which people are aware of their emotions, perceive them as important, and actively consider their affective responses in making judgments and interacting with others” (Booth-Butterfield & Booth-Butterfield, 2009). The goal is to increase the hedonic appeal of indulgent products options by using vivid hedonic descriptions or unattractive displays, photos, or containers, focusing on negative hedonic aspects, to understand the consumers’ behavior. If they perceived a greater risk with unhealthy food or if they do not buy a product just because it says “high calorie” or have a photo of an obese person. Hollands et al (2011) say that there is growing evidence that employing vivid, unpleasant representations of the potential negative health implications of a certain behavior to communicate information about health risks could be a way to inspire behavior to lower such risks.

Some of the findings show that food branding has effects on food consumption. Koenigstorfer & Baumgartner (2015) studied the effects of fitness branding and they found that fitness branding increases consumption volumes for restrained eaters unless the food is viewed as dietary forbidden and that after consuming fitness-branded food, restrained eaters expend less energy on physical activity. There are other studies made by Koenigstorfer et al. (2013), Irmak, Vallen & Rosen Robinson (2011), Provencher, Poliv & Herman (2009), and Werle et al. (2011) showing the relation between food branding and the consumers’ behavior related to the healthy food. Most of the conclusions say that when a product presents some clue about fitness or health, the consumer tends to perceive the product as healthier and tends to consume a higher amount of calories (Koenigstorfer et al., 2013).

Hollands et al. (2011) concluded, in a study made with aversive images in energy-dense snacks foods, that when aversive visuals of potential health implications are presented with images of specific meals, implicit attitudes are influenced, having an impact on later food choice behavior. There are also studies related to the use of text or graphic warnings, sugar information labels, and health star rating labels in sugar-sweetened beverages (Billich et al., 2018) showing that when used they have the potential to reduce the probability of choosing these products and that the graphic warning label was the more effective one. Additional studies (Bollard et al., 2016; Roberto et al., 2016) also showed that graphic warning labels are effective in reducing the purchase intentions of sugar-sweetened beverages. Boncinelli et al. (2016) concluded that only the use of high-calorie warning labels has little effect on consumers' choices. Khandpur et al. (2019) concluded that "warning labels are the newest paradigm of nutrient-based, front-of-package labels that have been consistently shown to be more effective at informing consumers than other FOP labels." With all these conclusions the warning label (pictorial vs verbal) seems to be the most influential on the consumers' behavior, especially on risk perception and purchase intentions.

To address this gap, we rely on the construal level theory to investigate its effect on risk perceptions and purchase intentions. The construal level theory (CLT) (Liberman & Trope, 1998) posits that consumers process objects according to concrete and abstract construals, thus influencing people's perceptions of visual attributes such as colors and shapes (e.g., Lee, Deng, Unnava, & Fujita, 2014). That is, under abstract construal, consumers focus on broad, general features and essences of issues; under concrete construal, they focus on contextual specifics (Trope, Liberman, & Wakslak, 2007). In our studies, we used one CLT manipulation: pictorial *versus* verbal representations.

**H1:** When exposed to a pictorial (*versus* verbal) warning in a product, consumers will exhibit lower purchase intentions.

**H2:** When exposed to a pictorial (*versus* verbal) warning in a product, consumers will exhibit higher perceptions of risk.

Most of the studies about graphical warnings are related to the tobacco industry. There are only a few studies about the potential use of graphical warnings in indulgent products. For the tobacco industry, Kees et al. (2010) showed that the use of graphical warnings in the tobacco package evoked more fear in the consumers and strengthened smokers' intentions to quit smoking. The findings of another study said that "more graphic pictorial cigarette warnings positively influence smoking cessation intentions, and that evoked fear is a primary mechanism underlying this relationship" (Davis et al., 2015). The results show that pictorial warning labels can reduce the demand for cigarettes more effectively than text-only labels (Rousu and Thrasher, 2012).

We understand the verbal or pictorial warning as a way for brands to communicate in transparent ways with consumers and that this is a type of sincere brand advertisement. To analyze if the consumers consider the brand more sincere because it does not hide anything about the product, we test another hypothesis.

**H3:** When exposed to a pictorial (*versus* verbal) warning in a product, consumers will increase their brand attitude.

The main question is to understand which type of answer has the consumer when confronted with a pictorial or verbal warning on indulgent products. We want to understand if a pictorial warning in the package of a product, impacts the attitude towards the brand and how important is the package for the consumer. Most of the consumers know that fast-food products can have an impact on their health but nowadays, there are no verbal or pictorial warnings in the products, so when confronted with one the consumer may be perceived a higher risk or may intend to purchase less of the product. With two studies we will try to understand the impact of verbal and pictorial warnings to prove our hypotheses.

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Insert Figure 1 about here.

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**3. OVERVIEW OF STUDIES**

This research is based on two different experimental studies. The goal is to gather as much data as possible to discover a finding that can contribute to the future of the food marketing field and its social implications. The first study aims to understand the main effect of the independent variable (healthy eating nudges) in the dependent variables (risk perception, purchase intentions, and brand attitude) with the influence of construal level theory (pictorial *versus* verbal representations). The second study’s goal is to test an alternative moderator based on the scarcity *versus* abundance mindset to understand the extent to which people’s thinking when confronted with healthy eating nudges.

**3.1. STUDY 1: HEALTHY EATING NUDGES EFFECTS ON PURCHASE INTENTIONS, RISK PERCEPTION, AND BRAND ATTITUDE**

**3.1.1. Pretest**

To pretest the most appropriate pictorial warning to use in our studies, we conducted a questionnaire by Qualtrics with thirty-one participants (64.5% female,  $M_{age} = 28, SD = 9.12$ ) where they had seven different options with pictures related to obesity. The seven pictures had different obese adults and children. The participants had to choose the picture that they related more with the text “Fast food may cause obesity.” and the picture that they considered more related to an “unhealthy” lifestyle. The results showed that the pictorial warning number four is the one that most people related to the text “Fast food may cause obesity.” (n=13), so we selected this pictorial warning to be used in our studies.

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Insert Figure 2 about here.  
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### 3.1.2. Main Study

*Study Design.* The first study goal was to study the main effect of a healthy eating nudge on purchase intentions, perceived risk, and brand attitude. For the first study, we have conducted a randomized experiment in an online panel of adults (age > 18 years). Participants were randomized to view one of three packages: control, verbal warning, or pictorial warning for a hamburger package. The two labels, verbal warning, and pictorial warning correspond to different healthy eating nudges. For the control group, we have used a hamburger package with the image of a hamburger and the text “hamburger”. For the verbal warning, we have used the same image of the control group and have added the text “Warning: Fast Food may cause obesity”. For the pictorial warning, we have used the same image of verbal warning and have added an image of an obese child. When these types of nudges are presented in the packaging, they create different reactions in consumers. The goal is to examine consumers’ perceptions and understand if there are any changes in consumer behavior about purchase intentions, risk perception, and brand attitude.

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Insert Figure 3 about here.  
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The first study adopted a between-subjects with one-factor, three levels (control *versus* verbal *versus* pictorial representations) design. Participants completed an online survey programmed in English using Qualtrics survey questionnaire. After providing informed consent, participants were randomly assigned to view one of the three healthy eating nudges conditions in the packaging. The total numbers of participants was two hundred and fifty-four (63.6% female,  $M_{age} = 24.11$ ,  $SD = 5.65$ ).



The key dependent variables were purchase intentions, risk perceptions, and brand attitude. Participants evaluated their purchase intention (“very unlike to buy this product/very likely to buy this product”, “very unwilling to buy this product/very willing to buy this product”, “very uninclined to buy this product/very inclined to buy this product”) rated on nine-point scales (White *et al.*, 2011) (Cronbach’s alpha= 0.947). Risk perceptions were assessed with two items: “*Considering the hamburger package you just saw, how “risky” would you consider it?*”; “*Considering the hamburger package you just saw, how “harmful” would you consider it?*” also rated on nine-point scales (adapted from White *et al.*, 2016) (Cronbach’s alpha= 0.746). The brand attitude was assessed with four items: “*Considering the hamburger package you just saw, how “sincere” would you consider it?*”; “*Considering the hamburger package you just saw, how “honest” would you consider it?*”; “*Considering the hamburger package you just saw, how “real” would you consider it?*”; “*Considering the hamburger package you just saw, how “original” would you consider it?*” also rated on nine-point scales (Aaker, 1997) (Cronbach’s alpha= 0.857).

Also, we have studied other variables that are relevant for the study like package stimuli and visual engagement. Package stimuli was assessed with four items: “*Considering the hamburger package you just saw, how “graphic” would you consider it?*”; “*Considering the hamburger package you just saw, how “powerful” would you consider it?*”; “*Considering the hamburger package you just saw, how “intense” would you consider it?*” also rated on nine-point scales (Kees *et al.*, 2010) (Cronbach’s alpha= 0.690). Participants evaluated what they think about the visual engagement of the packaging (“not very aesthetically pleasing/very aesthetically pleasing”, “flawed/perfect”, “unattractive/attractive”, “unappealing/appealing”, “bad looking/good looking”) rated on nine-point scales (White *et al.*, 2016) (Cronbach’s alpha= 0.935).

*Results.* A one-way between-groups ANOVA was performed to investigate the effect of the healthy eating nudges on purchase intentions ( $F_{(2,251)} = 4.577, p < .01, \eta^2 = .035$ ). Purchase intentions for the control group were significantly higher ( $M = 4.93, SD = 1.93$ ) when compared with the verbal group ( $M = 4.54, SD = 2.08$ ) and with the pictorial group ( $M = 4, SD = 2.06$ ). The control and pictorial warning are statistically significant, which provides support for H1. When confronted with pictorial warnings the consumers tend to have a lower purchase intention.

About the risk perception ( $F_{(2,251)} = 27.826, p < .00, \eta^2 = .181$ ), the control group was significantly lower ( $M = 3.49, SD = 1.83$ ) when compared with the verbal group ( $M = 4.84, SD = 2.01$ ) and with the pictorial group ( $M = 5.52, SD = 1.63$ ). Between the groups, some differences are statistically significant, which provides support for H2. When a product has a pictorial warning the consumers tend to perceive a higher risk when comparing to a product with a verbal warning or without any warning (control group).

Regarding to the brand attitude ( $F_{(2,251)} = 25.343, p < .00, \eta^2 = .168$ ), the control group was significantly lower ( $M = 4.26, SD = 1.68$ ) when compared with the verbal group ( $M = 5.28, SD = 1.86$ ) and with the pictorial group ( $M = 6.18, SD = 1.82$ ), providing support for H3. Thus, we can conclude that the consumer has a higher attitude toward a brand that has sincere advertisements in the products.

About the package stimuli ( $F_{(2,251)} = 12.091, p < .00, \eta^2 = .088$ ), the control group was significantly lower ( $M = 4.12, SD = 3.44$ ) when compared with the verbal group ( $M = 4.68, SD = 2.89$ ) and with the pictorial group ( $M = 6.0, SD = 2.97$ ). The consumer perceived a higher stimulus when the package had a verbal or pictorial warning.

In terms of visual engagement ( $F_{(2,251)} = 9.750, p < .00, np^2 = .072$ ), the control group was significantly higher ( $M = 4.59, SD = 1.89$ ) when compared with the verbal group ( $M = 4.39, SD = 1.70$ ) and with the pictorial group ( $M = 3.46, SD = 1.73$ ). The consumer considers that without any warning the package is more visually appealing, the verbal and pictorial warnings make the product less attractive.

In the context of emotions ( $F_{(2,251)} = 9.117, p < .00, np^2 = .068$ ), the control group was significantly higher ( $M = 7.27, SD = 2.86$ ) when compared with the verbal group ( $M = 6.91, SD = 2.98$ ) and with the pictorial group ( $M = 5.45, SD = 3.03$ ). When confronted with verbal or pictorial warnings, the consumers tends to perceive their emotions as more negative than the consumers that are confronted with the control package.

Since there are three different healthy eating nudges (control *versus* verbal *versus* pictorial), we decided to analyze in more detail the results, so we did a post-hoc Sidak and Bonferroni to understand better the conclusions. We concluded that the pictorial group is stronger than the control and verbal group for the risk perception, brand attitude, and package stimuli. Regarding the purchase intentions, they are strongest in the control group against the pictorial one. And for emotions and visual engagement, the pictorial is weaker than verbal and control groups.

*Mediation.* To analyze possible explicative variables, we have tested different mediators using PROCESS Model 4 (Hayes, 2013). The two most relevant mediators are visual engagement and emotions.

*Mediation of Visual Engagement.* To determine if visual engagement mediates the effect of the healthy eating nudges on purchase intentions, we have conducted a mediation analysis using PROCESS Model 4 (Hayes, 2013). The mean indirect effect was positive ( $a \times b = -$

.23, SE=.15), with a 95% confidence interval excluding zero (-.3908 to -.0915), direct effect [c'] = 1.55, p=3.16, indicating significant partial mediation by visual engagement.

*Mediation of Emotions.* We also analyzed the mediation of emotions in the healthy eating nudges on purchase intentions, we have conducted a mediation analysis using PROCESS Model 4 (Hayes, 2013). The mean indirect effect was positive (a x b= -.07, SE=.25), with a 95% confidence interval excluding zero (-.1577 to -.0081), direct effect [c'] = 1.55, p=3.16, indicating significant partial mediation by emotions.

We believe that this happens because when confronted with different emotions the perception of the consumers tends to be different about the packaging that they see. Emotions influence on information processing can help to measure the effects of marketing stimuli and can mediate the responses to persuasive appeals (Bagozzi et al., 1999).

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Insert Figure 4 about here.  
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*Discussion.* This first study provides evidence that the consumer perceives a higher risk, has a higher attitude towards the brand and tends to purchase less products with a verbal or pictorial warning. This study proved our hypotheses H1, H2, and H3, showing that a verbal and pictorial warning has an influence on the consumers' behavior. When a brand has a sincere advertisement, the consumer tends to perceive a higher risk and purchase less. The visual engagement and emotions are mediators of the healthy eating nudges which helps to better understand the consumers' purchase intentions when related to different packaging. So,

when confronted with a verbal or pictorial healthy eating nudge consumers tend to have higher perceptions of risk and low purchase intentions.

### **3.2. STUDY 2: THE MODERATION OF SCARCITY**

*Study Design.* The goal of the second study is to understand the main effect that the moderation of scarcity has on the healthy eating nudges. The study was a three healthy eating nudges (control *versus* verbal *versus* pictorial) vs. 2 (scarcity *versus* abundance) between-subjects design. The total number of participants was two hundred and fifty-six (52% female,  $M_{age} = 46.4$ ,  $SD = 0.501$ ) US-based individuals recruited from Mturk and had a history of providing high-quality responses in past online studies (Task Completion Rate > 98%). Amazon's Mechanical Turk is a crowdsourcing website owned by Amazon that can be used to recruit remotely located individuals to do some tasks such as filling out questionnaires.

For this study, we have used the moderation of scarcity (Roux et al., 2015) where we have asked the participants to identify three episodes when they felt that the resources were scarce and for the control group, we asked the participants three things that they did during the past week. Participants were also randomized to view one of three labels: control, a verbal warning, or a pictorial warning for a hamburger package. The goal is to examine consumers' perceptions and understand if there are any changes in the consumer behavior about the purchase intention, risk perception, and brand attitude, when confronted with scarcity manipulation.

We will try to understand that if exposed to scarcity manipulation, consumers will exhibit higher purchase intentions and perceive higher calories of the product. For the participants in the scarcity condition, we expect that they evaluate the hamburger with more calories, so they will have less intentions to buy it and perceived a higher risk for their health.

The key dependent variables of this study are the same as the first study: purchase intentions, risk perceptions, and brand attitude. The evaluation of these dependent variables was evaluated with the same questions as the first study. The only change in the experiment is the introduction of scarcity manipulation.

*Results.* A one-way between-groups ANOVA was performed to investigate the effect of scarcity in the healthy eating nudges on purchase intentions. The main effect of scarcity was not statistically significant for any of the variables but our independent variable (healthy eating nudges) comproved again to be statistically significant for all the dependent variables. Thus, the interaction between scarcity and the independent variable is not statistically significant.

That being said, we think that we should not consider the scarcity mindset as a moderator. We can actually say, given the pandemic, we controlled for scarcity levels, but it did not affect the results.

*Mediation.* To analyze possible explicative variables, we tested different mediators using PROCESS Model 4 (Hayes, 2013). The most relevant mediator is risk perception.

*Mediation of Risk Perception.* We also analyzed the mediation of risk perception in the healthy eating nudges on purchase intentions. We have conducted a mediation analysis using PROCESS Model 4 (Hayes, 2013). The mean indirect effect was positive ( $a \times b = -.79$ ,  $SE = .06$ ), with a 95% confidence interval excluding zero ( $-1.3283$  to  $-.3009$ ), direct effect [ $c'$ ] = 7.5,  $p = 0.00$ , indicating significant partial mediation by risk perception.

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Insert Figure 5 about here.  
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*Discussion.* This second study provides evidence for the first study: that the consumer perceived higher risk, has a higher attitude towards the brand, and tends to purchase less products with a verbal or pictorial warning. This study proved again our hypotheses H1, H2 and H3, showing that a verbal and pictorial warning influences the consumers' behavior. When we used scarcity mindset as a moderator it did not affect our results and only comproved that scarcity is not a moderator of healthy eating nudges.

## **4. GENERAL DISCUSSION AND CONCLUSIONS**

The present research reveals how construal level theory (pictorial *versus* verbal representations) can impact the way consumers tend to perceive indulgent products. Across two experiments we have analyzed how construal level influences healthy eating nudges to decrease negative risk perceptions and increase the purchase intentions. Next, we emphasize the theoretical and practical implications of this research and indicate possible orientations to future research.

### **4.1. THEORETICAL IMPLICATIONS**

Our research findings contribute to the literature in, at least, three important fields: first, it extends the domain of healthy eating nudges in multiple ways; second, it contributes to the intersection between healthy eating nudges and construal level and third, it offers important theoretical contributions to the literature on healthy eating nudges and construal level (pictorial *versus* verbal representations).

Extensive research on healthy eating nudges has examined the food marketing processes that explain the choice of healthier products (Koenigstorfer et Baumgartner, 2015; Koenigstorfer et al., 2013; Provencher et al., 2009; Ooijen et al., 2017). However, scant research has focused on food marketing for indulgent products to reduce obesity. This research deepens the understanding of the effect of healthy eating nudges on indulgent products. We find that pictorial warnings in indulgent products have a significant effect on consumers compared to verbal or no warnings. They tend to perceive more risk for their health eating those products which lead to a decrease in the purchase intentions. These conclusions have been also proved by Kees et al. (2010) for the tobacco industry. The current research adds to the literature and provides insights on the effectiveness of pictorial and



verbal warnings on indulgent products, extending prior research that has focused more on healthy products (Candario & Chandon, 2019).

To the best of our knowledge, our study is the first to combine indulgent products and construal level theory, so our findings are the first to demonstrate the association between construal level, risk, and healthy eating nudges. By doing so, we contribute to extending earlier literature on the effects between healthy eating nudges and construal level (e.g., fTaillie et al., 2020; White & Barquera, 2020; Candario & Chandon, 2019; Reyes et al., 2019).

Specifically, this research shows that the impact of healthy eating nudges on risk perception and purchase intentions is malleable as it is influenced by construal level (pictorial *versus* verbal representations). Thus, this research sheds new light in the food marketing field related to healthy eating nudges that can be applied in health marketing campaigns to increase consumer awareness and consequently reduce the likelihood of obesity.

#### **4.2. PRACTICAL IMPLICATIONS**

The current research offers important practical implications for creating more consumer awareness for healthier eating. Our findings offer suggestions for the food retail industry and public policy makers to increase healthier eating and a way to curtail healthy eating nudges with the influence of construal level. Those implications are particularly relevant to decreasing the obesity rate in the world (FAO, 2021). This research also offers important practical implications that could contribute to the development of more effective campaigns to stimulate healthy behaviors. Our findings suggest that public policymakers and managers can increase healthy behavioral intentions by using pictorial representations in their communications.

Nowadays, one of the main concerns in the world is the obesity rate that has nearly tripled since 1975 (World Health Organization, 2021), the governments need to start to do better health marketing campaigns and as was proven in the two experiments, verbal and pictorial warnings can do a lot for that. In the products with more calories, sodium, fat, and salt can be applied to the packaging labels that show what the product really does with our health. So, the consumer can be more aware of what they are consuming and eventually, they will start to have more attention to products that they buy and take more care of their health and body. Our findings suggest that pictorial warnings are a stronger driver for incentivizing healthy behaviors.

Another conclusion is that consumers tend to perceive the brands as more sincere than the brands that do not have this type of advertising. The brands can create awareness in the consumers about what they are eating and at the same time be honest about their products which creates more confidence and loyalty in the consumers. The consumer can understand when looking at the food packaging what the product is about. If the product has some advertisement saying that it can lead to obesity, it probably is not a good product to consume every day. There are a lot of implications of these types of advertisements for the consumer which can lead to a healthier population.

On the other hand, there are a lot of implications for companies. The main goal of a company is to have maximize revenue and generate profit, so the company itself cannot promote advertisements that lead to less purchase intentions by the consumer, and that leads the consumer to perceive more risk in the products that they are selling. This needs to be carefully studied to understand a way where both companies and the consumers can gain. It

is something that is not easy, and we have the example of tobacco industry that does not approve the kind of labels they have to use on their packaging (Kees et al., 2010).

There is a need to better study a way in which both consumers and companies can benefit from this type of advertising.

#### **4.3. LIMITATIONS AND FUTURE RESEARCH**

This research presents some limitations and provides possible orientations for future research. This research tries to understand the effect of healthy eating nudges on indulgent products. One limitation of the study is that we have tested the effects on only one indulgent product - hamburgers. Future research should apply the same study with different types of indulgent products like chocolate, pizza, and so on or even extend the study on products that are not indulgent.

Another limitation is that we have only used one type of warning. Although we have done a pretest to define the best warning, it is necessary to replicate the studies with different types of advertising messages and manipulations in verbal/pictorial representations.

This study was done once so it does not mean that the consumer responses to verbal and pictorial warnings cannot be attenuated over time. It is important to perform a study that would try to prove if there are also long-term effects on the consumer.

Finally, another limitation is in the fact that the studies have been only conducted in the online environment, more studies need to be done in new and different contexts (e.g., laboratory) to prove that the conclusions are solid. Since there are a few studies on this area it is an opportunity to better understand this field and contribute in some way to advances in marketing area so that we have consumers who are more aware of the products they eat.

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6. APPENDIX

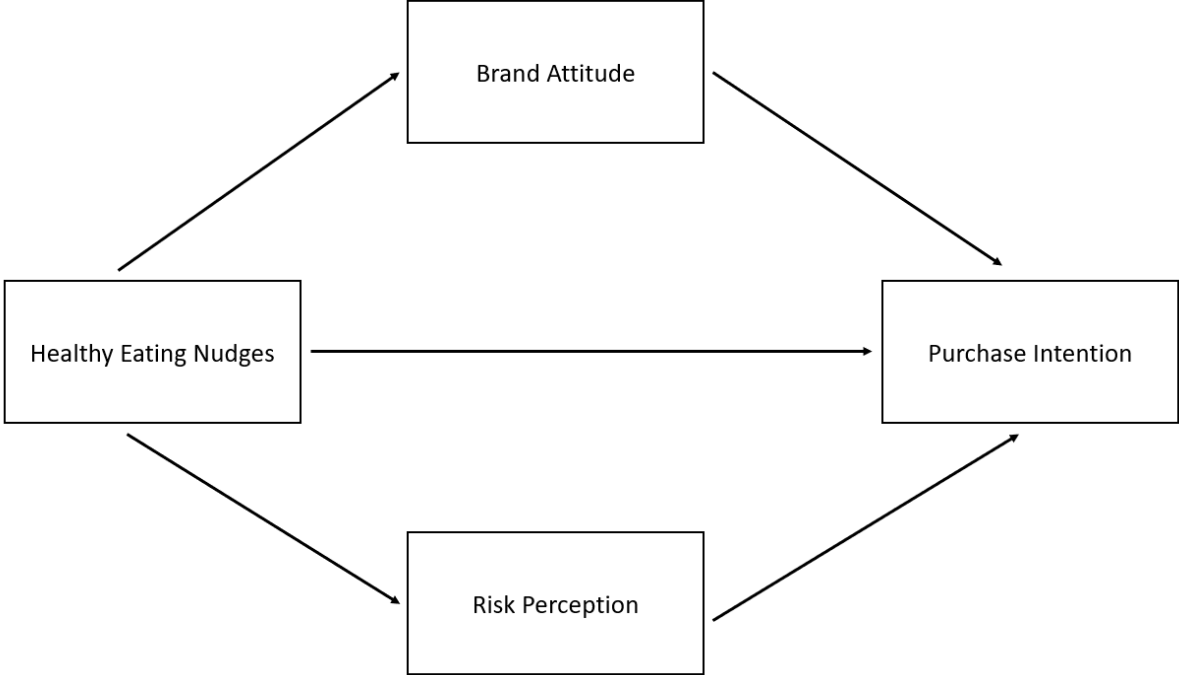


Figure 1 – Our studies’ model

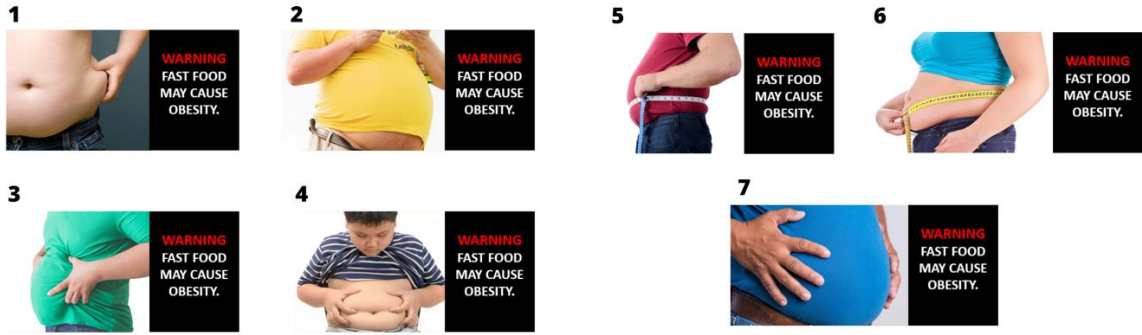
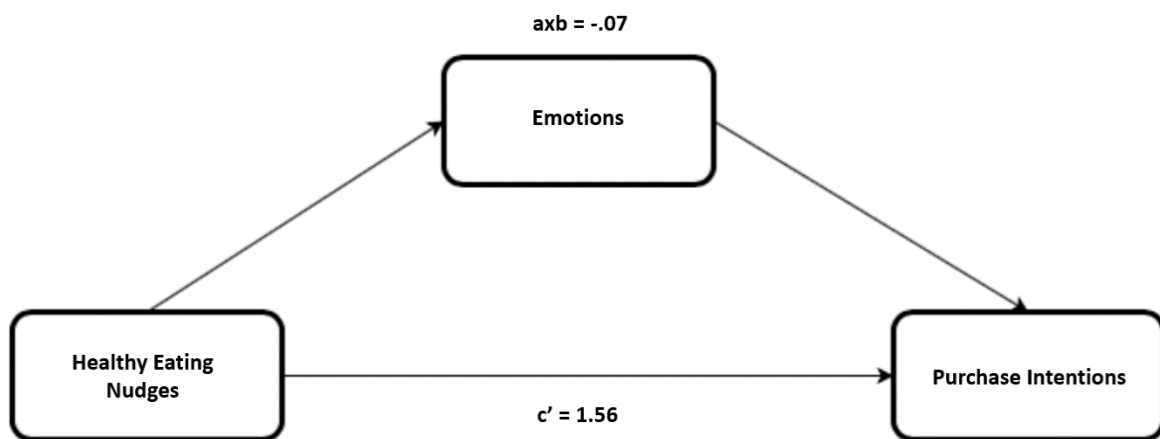
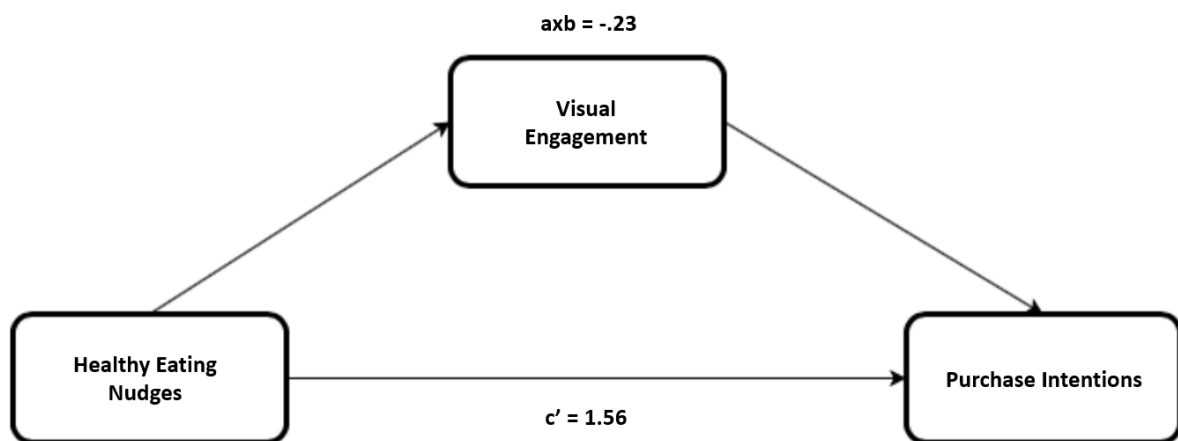


Figure 2 – Types of Packaging Warnings

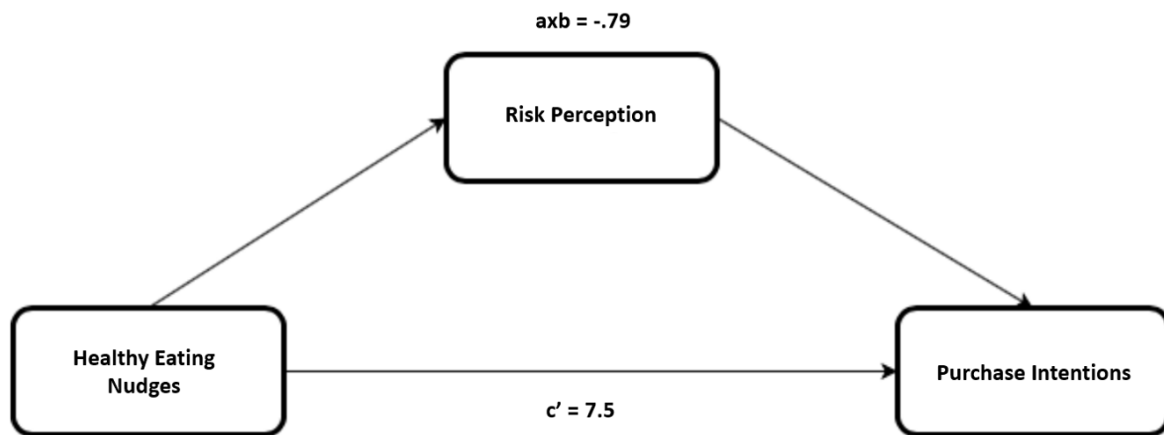


Figure 3 – Packaging Warnings



Mediator	Effect	BootSE	BootLLCI	BootULCI
Visual Engagement	-,2309	,0769	-,3908	-,0915
Emotions	-,0685	,0386	-,1577	-,0081

Figure 4 – Mediators in Study 1: Visual Engagement and Emotions



Mediator	Effect	BootSE	BootLLCI	BootULCI
Risk Perception	-,7948	,2625	-1,3283	-,3009

**Figure 5** – Mediator in Study 2: Risk Perception

