ISCTE ◈ IUL
Instituto Universitário de Lisboa

ISCTE- IUL – School of Social Sciences

Department of Social and Organizational Psychology

Gluten, With or Without It –

The Impact of Color of "Gluten-Free" and "With-Gluten" Claims in Food Perception.

Filipe Alexandre Recto Rosendo

Dissertation submitted as partial requirement for the conferral of

Master in Social and Organizational Psychology

Supervisor:

Dr. Marília Prada, Invited Assistant Professor

ISCTE – Instituto Universitário de Lisboa

September, 2018

AGRADECIMENTOS

Quero começar por agradecer aos meus pais. Não por esta dissertação, não pelo mestrado ou outro momento em específico. Agradeço-lhes por fazerem de mim quem sou hoje, por me encherem de objetivos e de sonhos por concretizar; São os responsáveis por ter em mim próprio a vontade para continuar, por olhar em frente, por procurar mais desafios e concluir mais etapas - sejam elas quais forem.

Aos meus avós, por todo o apoio, por serem o meu porto mas, acima de tudo, pelo orgulho que têm em mim, obrigado.

Gostava também de agradecer aos meus amigos, à Folia, aos de Sintra e aos do ISPA-IU, os que vejo todos os dias e os que vejo de tempo a tempo. Pelas experiências do passado e pelas que ainda hei de viver com eles; porque tudo o que retiro delas me fazem ser mais de mim. Todos são importantes, desde os que estão comigo agora, aos que as circunstâncias foram deixando para trás.

Gostava de dedicar um especial obrigado à minha prima, pela paciência, pelos cafés infinitos e por gostar tanto de partilhar o seu tempo comigo como eu gosto de partilhar o meu com ela. Por ser a irmã que sempre esteve comigo.

No que respeita à realização desta dissertação, gostaria ainda de agradecer ao *designer* gráfico, Nuno Porto, que dedicou do seu tempo para ajudar à criação das imagens e rótulos utilizados neste trabalho e, sem dúvida, à minha orientadora, Profª Marília Prada, pela disponibilidade e todo o acompanhamento ao longo deste (extenso) processo.

Nenhum destes obrigados é mais relevante que outro. Todos eles me trouxeram até aqui e todos me vão levar mais longe. Obrigado a todos.

RESUMO

Várias modas emergem frequentemente no que diz respeito à alimentação saudável e os produtos livres de glúten são uma das mais relevantes atualmente. A presente investigação tem como objetivo entender o impacto da informação relativamente à presença ou ausência deste componente nas embalagens de produtos alimentares (rótulos "com glúten" e "sem glúten") na perceção dos alimentos. Propomo-nos ainda a entender de que forma a manipulação da cor deste rótulo (verde vs. vermelho) pode influenciar tais avaliações. Neste estudo experimental conduzido online (Qualtrics) colaboraram voluntariamente 370 participantes (77.6% mulheres, M_{Idade} = 28.57 DP = 10.61) distribuídos aleatoriamente pelas seis condições resultantes do delineamento : 3 (livre de glúten; contém glúten; control) x 2 (verde; vermelho). A tarefa consistia em avaliar um conjunto de 12 exemplares de produtos alimentares (e.g., diferentes tipos de pão e bolachas) relativamente à sua salubridade, teor calórico e sabor. Verificou-se que os participantes tendem a considerar mais saudáveis e menos calóricos os alimentos que possuem o rótulo "sem glúten" comparativamente a alimentos sem qualquer rotulagem. Porém, a condição "com glúten" não se diferenciou significativamente diferente da condição "sem glúten" ou da de controlo. Não se verificou um impacto direto da manipulação da cor na perceção dos alimentos, nem uma interação deste fator com o tipo de rótulo. As avaliações de sabor não diferiram significativamente entre as condições de nenhuma das variáveis independentes. É ainda relevante mencionar que os sujeitos tendem a subestimar o seu conhecimento relativamente ao glúten – quando comparado com o seu conhecimento objetivo – e que estes entendem uma dieta livre de glúten como sendo superior a uma dieta convencional. Esta investigação representa uma contribuição para entender como os consumidores percebem os alimentos e de que forma este tipo de instrumentos informativos podem enviesar as suas escolhas alimentares.

Palavras-chave: Glúten, dieta livre de glúten, rotulagem alimentar, alegações alimentares, teor calórico, salubridade, sabor

Código de Classificação PsychINFO:
2323 (Visual Perception)
3900 (Psicologia do Consumidor);
3920 (Atitudes e Comportamento do Consumidor)

ABSTRACT

Various trends emerge frequently concerning healthy eating and gluten-free products are one of the most relevant at the moment. The present research has the goal of understanding how information regarding this component (claims "with-gluten" and "gluten-free) on the package of food products impacts the consumer's evaluations of healthiness, caloric content and taste. We also seek to understand how the manipulation of the color of this label (green and red) can lead to a change in said evaluations. In this experimental study conducted online (Qualtrics) voluntarily participated 370 subjects (77.6% women, M_{age} = 28.57, SD = 10.61) distributed randomly between six conditions of the design: 3 (gluten-free, with-gluten and control) x 2 (red and green). The task consisted on the evaluation of 12 items from two distinct food categories – biscuits and bakery goods. We verified that subjects tend to consider products with the claim "gluten-free" as healthier and less caloric than others without claim; the "with gluten" condition did not differ significantly from the control condition neither from the "gluten-free" one. The manipulation of color did not impact significantly any of the evaluations. Nor did de evaluations of taste differ significantly for any of the conditions of the independent variables. It is also relevant to mention that the self-evaluated knowledge of gluten tends to be underestimated – when compared to objective knowledge – and that a gluten-free diet is thought of as superior to a conventional diet. This investigation represents a contribution for the understanding of how consumers perceive aliments and how this type of informational instruments can bias their food choices.

INDEX

TABLE INDEX

FIGURE INDEX

ACRONYMS GLOSSARY

GFD – Gluten-free Diet

GF – Gluten-free

NCD – Noncommunicable Diseases

NIP – Nutritional Information Panel

FoPL – Front-of-Pack Labels

BMI – Body Mass Index

INTRODUCTION

With the increasing awareness of consumers about the importance of living a healthy lifestyle, comes the acknowledgement of how crucial a balanced diet is in maintaining the health of an individual. Several trends emerge from time to time regarding the food consumption habits of society and the gluten-free diet (GFD) is exponentially becoming one of those trends (Lis, Stellingwerff, Shing, Ahuja, & Fell, 2015; McCabe, 2010).

A diet free from gluten is being more and more adopted by individuals with no health conditions regarding this component (Gaesser & Angadi, 2012) and research has suggested that it is not always the healthiest option (e.g., McCabe, 2010; Quinteros-Fernandez, 2015; Worosz & Wilson, 2012). Hence, it is the scientific community's responsibility to uncover as much of this phenomenon as possible in order to understand how to prevent potential negative outcomes from it.

For that reason, the current work tries to shine a light on a particular subject of this matter: how claims about gluten content on food packaging influence the consumer's perception of the product. Specifically, we are interested in examining how such claims impact consumer's perception of healthiness, caloric content and taste of food products. The present dissertation is divided into four main chapters:

1. The first chapter is dedicated to review the theoretical framework of diet trends and impact of labels and claims on the consumer. Initially we approach the emergence of health eating trends and how diet and food choices relate with the health of an individual. Then follows a topic presenting an overview of all the instruments on foodstuff's packaging that intent to orient and give information to the consumer, detailing how claims – specifically health claims - have been framed by past literature in the array of all the different labels. A third part considers how health information and health claims have been shown to impact different aspects of food products in past studies. The following part focuses on providing a notion as to what gluten and GFD are, what health conditions surround this component, as well as characterizing how the adherence to this type of diet has been increasing. A fifth part reviews the scarce previous experimental research focused on the influence of the gluten-free (GF) claim on food perception, both internationally and for the Portuguese context. Afterwards, we clarify the impact of color on perception of risk and – considering the premises of pragmatic persuasion – how that perception can be manipulated. Finally, we state the goal and hypothesis for the present study.

2. On the second chapter we present the method used for conducting this research. Firstly, a characterization of the sample and explanation of the design of the study. Then, a description of the used instruments, the material and a detailed explanation of the procedure.

3. The third chapter concerns the analysis of results; all the statistical analysis was conducted with the usage of the software SPSS Statistics (version 24).

4. Lastly, a fourth chapter is dedicated to discussing the results and establishing a parallelism between the conclusions from the present research and others with similar goals. On a first approach, we discuss if the data supported our hypothesis and, afterwards, limitations, implications and future research directions are discussed.

CHAPTER I – THEORETICAL FRAMEWORK AND HYPOTHESIS

1.1 Diet, Health and Trends

Our dietary habits have a direct impact on our health. Indeed, healthy eating helps to prevent or to cope with some pathologies (Viana, 2002; World Health Organization, 2015). In turn, unhealthy eating habits are one of the primary causes of non-communicable diseases (NCD) which are currently the leading cause of death in modern societies (Musaiger, Al-Mufty, & Al-Hazzaa, 2014). For instance, one of this NCD is obesity, which has already reached epidemic proportions in the western societies (Campos, Doxey, & Hammond, 2011; Mancini, Marchini, & Simeone, 2016).

Nowadays, individuals are more concerned about the effect (may it be positive or negative) that certain food products can have on their health and wellbeing (Bigliardi & Galati, 2013). Food itself has gotten a lot more attention drawn to it, and there is more information available for the lay people about several aspects such as its nutritional quality or production method. As the awareness of the impact of dietary habits on health increases, new health trends have emerged. Certain food products grow in popularity and, even if they do not cause the direct change in the subject's eating habits, the information about the alleged "ultimate healthy food" is spread. These constantly emerging trends may lead individuals to enroll in different eating behaviors such as opting for organic products, functional foods, going vegan, vegetarian or even adopting GFDs (Prada, Rodrigues, & Garrido, 2016).

Because of this relationship between what we eat and our overall health, this topic has been very much addressed by institutions, such as the World Health Organization, who are concerned with providing the population with information as to what healthy eating is and how to prevent diet related pathologies from occurring with so much frequency (World Health Organization, 2015).

1.2 Consumers' Sources of Information and Product Claims

As a mean to help the population in choosing better and healthier options for its diet, some instruments were created. According to Cavaliere, Ricci, & Banterle (2015), these instruments can be divided into two categories: means of market intervention (e.g., taxes over less healthy products); and means of information (e.g., informative campaigns, nutritional education campaigns and health claims). The latter category includes the nutritional information transmitted to the consumer through food packaging, namely the nutritional information panel (NIP), the health claims and the front-of-pack labels (FoPL) (Talati, Pettigrew, Hughes, et al., 2016). These three elements are usually positioned in different places of the package and intent to give to the consumer different types of information.

The NIP appears in the back or side of the food pack reporting the levels of some key nutrients (e.g., sugar, fiber). As for the claims, they are usually placed in front of the pack but generally only refer to a singular nutritional characteristic. In a similar way, FoPL's, as the name implies, are also placed in the front of the package but transmit numeric information about the level of some key nutrients included in the product (Talati, Pettigrew, Hughes, et al., 2016). In this last category fits the Nutritional Traffic Lights system, which presents nutritional levels (typically regarding less healthy nutrients like fat or sugar) considering their recommended daily dosages with an association to the colors red, amber and green to symbolize high, medium and low quantities of the component (Sacks, Rayner, & Swinburn, 2009).

Considering that understanding how claims impact the consumer is the main goal for the present paper, it is of relevance to understand them in a more detailed way. According to the review conducted by Fernqvist and Ekelund (2014), one can distinguish – among other types of credence – three main categories of claims: origin claims – which provide the consumer with clues regarding the provenance of the product (e.g., "national product"); production method claims – which transmit information concerning the methods of processing of the product until it arrives to the consumer (e.g. "organic", "fair trade"); and health claims – which allow the inference of particular nutritional attributes in the foodstuff (e.g., "gluten-free").

Currently, in the European Union, the inclusion of claims in food packages is regulated (Regulation No. 1924/2006) to minimize the risk of the deceitful impact that claims tend to exert on the consumers. This regulation defines claim as "any message or representation, which is not mandatory under community or national legislation, including pictorial, graphic or symbolic representation, in any form, which states, suggests or implies that a food has

particular characteristics" (Regulation No. 1924/2006, p. 11). Although this regulation specifies a lot of details regarding this issue, in a general way it demands that such allegations are only to be made if an established nutritional profile provides enough evidence for it and if it concerns a scientifically proven beneficial nutrient. This allows for a more regulated control over the allowed type of claims, as well as for how the consumers are biased by it, topic discussed in the next chapter.

1.3 Impact of Health Information and Claims on the Consumer

According to the review conducted by Campos et al. (2011), it is safe to assume that – independently of the country – the use of labels to guide food nutrition choices is very common and widespread among the population (typically more than 50% in most reviewed studies). Despite health claims representing only one of the many labelling categories that intent to provide the consumer with information of foodstuffs, they have been considered as one of the types of most importance for their dietary choice (for a review, see Campos et al., 2011). Being so, the persuasive impact of health claims over the consumer's behavior is of special interest, for it may lead the consumers into making different dietary choices just for their presence.

Research has been providing evidence suggesting that consumers do value health information when considering food products. Moreover, consumers often infer properties unrelated to the claim – a bias known as the health halo effect (Chandon & Wansink, 2007). For example, Chandon and Wansink (2007) compared the caloric estimation of meals from both McDonald's and Subway – American fast-food chains. These two restaurants diverge in how healthy they claim their food to be (with Subway delivering a more health-concerned message to the consumer). The results allow for a conclusion that this "healthy" brand positioning actually leads towards consistently biased conclusions about the caloric estimation of a meal; with Subway receiving significantly lower estimations even when the meals were in fact 50% higher in calories. Similar results can be observed in a study addressing how providing health information (regarding antioxidant properties) influenced various perceptions towards two types of açaí juices (Sabbe, Verbeke, Deliza, Matta, & Van Damme, 2009). The results demonstrated that whenever the participants were informed about the health benefits of the product, the overall liking, perceived nutritional value, taste and purchase intention significantly improved. These findings are of particular interest because

inferring completely unrelated attributes in a food product can potentially be harmful for the consumers' habits leading into biased and unhealthier dietary choices.

In a similar way, regarding packaging information, the presence of production method claims like "organic" – which has been extensively studied– seems to allow the inference of completely unrelated attributes like healthiness, diminished caloric content and increased tastefulness (when compared to the conventional counterparts; Prada, Garrido, & Rodrigues, 2017). A study from Lee, Shimizu, Kniffin, and Wansink (2013) also found evidence that specific nutritional components like expected fiber and fat content were positively influenced by this credence. Specifically for the case of health claims in the packaging of food products, they have also been shown to cause a positivity bias in multiple dimensions regarding the product. Research has been finding evidence of favorable influence over factors such as purchase intention, attitudes towards the product, nutritional value (Kozup, Creyer, & Burton, 2003; Lee et al., 2013) as well as healthiness (Priven, Baum, Vieira, Fung, & Herbold, 2015) and caloric content (Lopes, 2017).

Even though this halo effect has been reported multiple times, it is important to mention that not all placement of claims influence the subject in the same way, nor does the claim per se is going to make the subject dramatically change its attitude towards a specific product – some other variables are at play. In the review elaborated by Wänke and Reutner (2010), based on pragmatic persuasion, one can withdraw some possible explanations for these nuances and its underlying mechanism. The authors defend a phenomenon in which a subject is persuaded by the inferences they make from an argument (and not from the information contained in said argument). Giving examples for this specific kind of persuasion, they argue that it is not the information itself that convinces the subject, but what he makes of it. For the ignorant receiver, presenting an argument perceived with the intention to support a specific conclusion, makes it of potential relevance for said conclusion. For example, for this specific context, if the consumer perceives the intent of placing the "high on fiber" claim on the package to be an attempt to make it more desirable, it must be a good attribute of the product, otherwise it would not be mentioned.

In this work we will focus on the impact of health claims and, more specifically, how gluten claims affect the consumer. To our knowledge at the present moment, the studies carried out on gluten claims only use the statement of its absence; using foodstuffs typically named as "free-from" products (Priven et al., 2015). In the subsequent chapter we will focus on this nutrient, providing an overview of its particularities and increasing popularity.

1.4 Gluten and the Gluten-free Diet

Regarding the aforementioned emerging healthy-eating trends, gluten is one of the food compounds that has been getting more and more attention - consequentially GF products have been increasing in variety and popularity. Portuguese retailers have addressed this higher demand by increasing the variety of GF products available. As an example, the online retailer *Continente.pt* now provides a special tab – with the name "Healthy and Bio" – in their website which contains GF alternatives ranging from loafs of bread to complete ready-to-eat meals. Up to now, this retailer already counts with up to 150 different products in this category.

Gluten is a general name given to a mixture of protein that can be found mainly in wheat – but also in rye and barley – which can exert a toxic effect in individuals with specific health concerns like celiac disease. This condition is a chronic systemic autoimmune disorder provoked by the permanent intolerance to this specific protein and the person's inability to digest it in the gastric system and the only way these individuals can cope with this condition is by following a strict GFD (Green, Rostami, & Marsh, 2005; Saturni, Ferretti, & Bacchetti, 2010)

With the number of cases of celiacs increasing (Saturni et al., 2010; Worosz & Wilson, 2012) - an estimation of around 1 to 1.5% of population already being affected by this condition – and other 5 to 10% of population being diagnosed with gluten sensitivity (Lis et al., 2015; Sanders & Aziz, 2012), it is natural that the demand for gluten-free products is also growing. Nonetheless, according to Packaged Facts (2013, cit. by Lis et al., 2015) the adherence to a GFD has increased around 28% from 2008 to 2012 (data from Canada). Hence, one can understand that the general consumer – with no health restrictions related to this compound – is also opting for gluten-free products (Gaesser & Angadi, 2015).

Several factors have contributed to this increased adherence to a GFD among non-celiacs. For example, this diet has received extensive media exposure; many celebrities have been popularizing the health benefits of the GF lifestyle, books are being written on this topic and the general consumer seems to believe this idea (Marcason, 2011) and adhere to a GFD because of this advertisement (Quinteros-Fernandez, 2015).

The connection between going gluten-free and weight-loss is by far the most popular alleged benefit. Unfortunately, there is no scientific evidence to support this claim on healthy individuals (Gaesser & Angadi, 2012, 2015; Marcason, 2011). For example, a correlational study from Quinteros-Fernandez (2015) found no significant results on reported benefits for eliminating gluten when the individuals were not medically diagnosed with a gluten-related disorder. As a matter of fact, some research has been showing the opposite results. A study

conducted with celiac individuals showed that, initially overweight individuals who followed a GFD for two years ended up gaining weight (for a review, read Gaesser & Angadi, 2012).

Some other negative issues have been reported to surround the adherence to this restricted diet. Research on healthy subjects who followed a strict GFD, concluded that this diet is not always the healthiest option (McCabe, 2010; Quinteros-Fernandez, 2015; Worosz & Wilson, 2012) and that it is common for these subjects to present nutritional deficiencies such as low calorie ingestion, lack of protein, dietary fiber, minerals and vitamins (Lee, Ng, Zivin, & Green, 2007; Miranda, Lasa, Bustamante, Churruca, & Simon, 2014; Saturni et al., 2010). Furthermore, the financial impact of this diet is also very noticeable, with studies reporting the gluten-free products being two to three times more expensive than their conventional counterparts (Lee et al., 2007; Stevens & Rashid, 2008).

1.5 Gluten-related and Free-from Claims

When considering gluten claims, it is very noticeable that food products usually only include "free-from" claims. With gluten being perceived as a potential health hazard, it is starting to be understood as a risky nutrient for consumption (Priven et al., 2015). Therefore, it makes sense that the retail market opts for presenting it with the statement of its absence – potentially increasing sales with consumers aware of this characteristic. Recent examples can demonstrate this trend with products like a new *Cornetto* ice-cream being added to the current array solely for being gluten-free (and advertised as such) or brands like *Herbal Essences* shampoo opting for (and marketing) leaving out gluten in their composition. For the ice-cream example, it can be justified with being a food product directed towards people with restricted diets for medical reasons. However, considering gluten does not have known negative consequences on contact with skin (Beyond Celiac, 2018), the second example seems to constitute an example of taking advantage from the free-from label's influence alongside the consumer.

When considering the influence of gluten-free claims on the evaluation of foodstuffs, the research is scarce; especially when compared to claims such as "organic" (for a review see Prada et al., 2017). Nonetheless, an exception for this is the study conducted by Priven et al. (2015) that presented to the participants two packages of crackers with whether no claim or a gluten-free claim, and to a different group, the same package with no claim a or fabricated false claim (MUI-free). On the two different groups the participants were asked to choose between the crackers in regard to which was healthier (the ones with the free-from claim or

the one with no claim); the option to consider them equally healthy was also given. The results point out that both the MUI-free and the gluten-free claimed products where significantly more times considered healthier than the conventional product – but did not differ significantly from each other. Hence, prior risk information about the component itself had little to no impact over how healthy subjects considered the product – the free-from claim is responsible for this effect. Being so, one can conclude that, not only does this study provide an insight of the aforementioned health halo effect regarding specifically gluten-free products, but it also allows the drawing of other interesting conclusions regarding the influence of previous information about what the product is free-from on the consumer.

As for the Portuguese context, to our knowledge and up to the moment of writing of this paper, only one study focused on the impact of the specific gluten-free claim in the evaluation of products. In this work from Lopes (2017), participants evaluated an array of four food products in regard to their healthiness, taste and caloric content. These products presented whether a gluten-free claim or no claim at all. The results pointed towards a significantly more favorable evaluation – in terms of healthiness and caloric content – for the products containing the GF claims. Curiously, this health halo effect was also found in products which are typically gluten-free – e.g., rice cakes (Lopes, 2017).

1.6 The Influence of Color on (Food) Risk Perception

Assuming that consumers may perceive gluten as a hazardous component (Priven et al., 2015), it makes sense to construe gluten-free claims as some kind of warning. This may happen especially for those who have impeding health conditions or are trying to follow a GFD for any other reason.

Therefore, having in mind the aforementioned premises of pragmatic persuasion (Wänke & Reutner, 2010), it is important to analyze how the intents of the message are perceived by the consumer. It is reasonable to argue that a claim may cause different evaluations of the product when it is perceived as a cautionary advice or as way to favorably highlight the qualities of the product (ultimately with the purpose of increasing sales).

When reviewing possible variables (extrinsic to the subject of manipulation) that may have the capacity to influence this judgement, we came across one that represents a very common association in a subject's day-to-day life – color. The examples where colors in our everyday life – specifically red and green – are associated with whether positive or negative messages are numerous. For example, in the case of traffic lights, green means "go" and red

means "stop", whereas in the beach flags code green means "safe" and red means "danger"; the same type of reasoning is present for the functioning of the nutritional traffic lights explained before.

Supporting this well-spread lay association, there is empirical research showing that red is strongly associated with risk signal words (Griffith & Leonard, 1997; Pravossoudovitch, Cury, Young, & Elliot, 2014). On the other end of the spectrum, though to a lower degree, green has been found to be associated with words like safety (Pravossoudovitch et al., 2014), as well as very strongly related with positive emotions such as hope and calmness (Kaya & Epps, 2004).

Some research has been establishing this associations with color to also be true in the context of food. As an example, a study carried out by Rohr, Kamm, Koenigstorfer, Groeppel-Klein and Wentura (2015) using color information in circles surrounding different food products – specifically red and green – found evidence that red elicits avoidance behavior whereas green is more associated with approach behavior. Other studies also found this tendency to be true, with red colored plates and cups significantly reducing snack and drinks consumption when compared to blue and white ones (Genschow, Reutner, & Wänke, 2012).

Some studies have focused on the specific impact of these colors on the consumer and, even though not all results point in the same direction, some research identifies the capability of color to simplify the consumer decision making process (presenting itself as a simple clue; Hieke & Wilczynski, 2012). Furthermore, the research conducted by Schuldt (2013) on this matter shows that the presence of the color green on this type of credence (as it is seen many times on packaging) symbolizes the product as being a healthier option and having lower calories. Specifically, for the credence in food products, to the best of our knowledge, no other study has examined the combined effect of colored claims on consumer evaluation.

1.7 Goals and Hypothesis

Presenting health claims on food packaging has the potential for influencing the way an individual perceives the product and, ultimately, eating behavior. Some types of claims have been extensively studied (e.g., organic, for a review see Prada et al., 2017), whereas others – such as gluten-free – are still understudied (for an exception, see Priven et al., 2015). The relevance of examining the influence of gluten-related claims on food perception emerges

from the recent increase of adherence to GFD among non-celiac individuals as a way to attain a healthier lifestyle.

Besides replicating the results found by other studies for the gluten-free claim (Lopes, 2017; Priven et al., 2015), the present paper focuses on understanding the effects of manipulating this claim in a way that states the presence of gluten – i.e., introducing a "contains gluten" claim. This manipulation may help us understand if, like the results of Priven et al. (2015) show, the sole introduction of the claim affects positively the evaluations of a product regardless of the information contained in it – even when this information clearly states the presence of a risky component.

Based on the principles of pragmatic persuasion (Wänke & Reutner, 2010), the variation of the color of the claim was also introduced with the intent of manipulating the perception of the subject regarding the intent of the claim. The color green was expected to draw better evaluation towards the product (Kaya & Epps, 2004; Pravossoudovitch et al., 2014), while the contrary effect was expected for the color red (Griffith & Leonard, 1997; Pravossoudovitch et al., 2014).

With this being stated, the present study focuses on examining the effects of a "gluten-free" and "with-gluten" claims with different colors – either red or green – on the evaluation of food products on three main dimensions: healthiness, taste and caloric content. As our first hypothesis, we expect to observe a main effect of type of claim on these evaluations. However, two patterns of results are possible. First, products with any of the claims (i.e., with-gluten and gluten-free) will be evaluated more positively than the products without claims (i.e., control condition). This would mean that the claim has a value on its own and does not depend on the type of information being conveyed. In contrast, a second possibility is that the evaluation of products would show a linear trend with more positive evaluations observed for the gluten-free claim, followed by the control condition and then the with-gluten claim. This pattern would suggest that the presence of gluten is of more importance for the consumer (than the mere presence of the claim), because it is perceived as a risky component.

Moreover, we also expect to observe a main effect of the color of the label such that products with green labels would be evaluated more positively regarding healthiness, caloric content and taste than those with red labels.

Finally, we also explore if the color moderates the impact of the claim. For example, it is possible that the positive impact of the claims on the evaluation of products would be more noticeable when presented along with a green label.

CHAPTER II – METHODOLOGY

2.1 Participants and Design

The present study had the voluntary collaboration of 370 Portuguese participants[1] (77.6% women), between 18 and 76 years old ($M = 28.57$; $SD = 10.61$), and most of them had completed high-school education (33.0%) or a bachelor's degree (39.7%). Regarding their occupation, more than half of the sample were students (51.9%) or workers (45.1%). Considering their diet, the greatest majority of the sample reported not following a specific type of diet (73.0%) with the second most chosen option being weigh loss diet (15.7%). No participants reported any form of color blindness. More detailed information regarding this data can be found in the Table 1. The participants were also asked their height and weight (optional) – from which was latter calculated the Body Mass Index (BMI) – in order to better characterize the sample. According to the criteria from World Health Organization (2018), the majority of the participants sat in the normal BMI category (60.8%) and the second most prevalent category was that of overweight (19.2%).

Participants were randomly assigned to one of the six conditions resulting of the design: 3 (claim: gluten-free; with-gluten; control) x 2 (color: red; green). Both factors were manipulated between-participants.

Table 1

Characterization of the Sample

Variable	Absolut Frequency (*n*)	Relative Frequency (%)
Ocupation		
Student	192	51.9
Independent Worker	24	6.5
Dependent Worker	143	38.6
Retired	4	1.1
Unemployed	7	1.9
Level of Study		
Basic Education	6	1.6
High School	122	33.0

---

[1] The total number of participants to answer the questionnaire was 396. Nonetheless, two subjects were excluded for being under the pre-established age of 18, 14 for stating they followed a GFD, as well as 10 for not having answered this question.

Bachelor	147	39.7
Post-Graduation	27	7.3
Master	56	15.1
Doctorate	12	3.2
Special Diet		
None	270	73.0
Weight Loss	58	15.7
Vegetarian	12	3.2
Vegan	2	0.5
Other	28	7.6
BMI*		
Underweight (< 18.5)	18	4.9
Normal Range (18.5 – 24.99)	225	60.8
Overweight (25 – 29.99)	71	19.2
Obese (≥ 30)	17	4.6
Missing	39	10.5

Note. *Intervals calculated according to World Health Organization (2018).

2.2 Instruments

This research was conducted in the Portuguese context with only Portuguese speaking respondents. Being so, the following described instruments were applied in Portuguese in the questionnaire, only being translated for the purpose of the present paper. The full questionnaire with the original measures can be found in the Appendix A (example for the category "gluten-free" x "green").

1. Perception towards Foods

In order to evaluate the perception towards different food products, the participants used three of the ten dimensions comprised in the work of Prada, Rodrigues, Garrido, and Lopes (2017). Specifically, in the current work participants were asked to respond to the following dimensions: healthiness, caloric content and tastiness, using 9 point scales (1 = *Not healthy at all/ Not caloric at all/Not tasty at all;* 9 = *Very healthy/Very caloric/Very tasty*).

2. Diet Characterization

Because the dietary habits followed by the participants may be relevant to better understanding how they evaluate food products, two questions (adapted from Quinteros-Fernandez, 2015) regarding their diet were also included in the questionnaire for control. The

first question asked the participant if they followed any kind of special diet; some options were shown to choose from – "*No*", "*Fat Loss Diet*", "*Vegetarian*", "*Gluten-free*", "*Vegan*" and "*Other*"; in this last option an open field was provided for the participant to specify.

The second was directed towards the GDF. This question asked about the frequency of consumption of GF products, providing the respondent with a scale of nine points (where 1 = *Never*; and 9 = *Always*).

3. Attitudes towards a gluten-free diet

Five items – to be answered according to a nine point scale – were included in order to better understand the subject's attitudes towards a GFD. This instrument was adapted from Prada, et al. (2017) and the participant was asked: "*In your opinion, comparing to a conventional diet, the gluten-free diet is…*" (1 = *Less caloric/Unhealthier/More adequate for weigh loss/Less transformed/Less natural*; 9= *More caloric/Healthier/Less adequate for weight loss/More transformed/More natural).*

4. Subjective knowledge over gluten

The participant was asked to evaluate subjectively how knowledgeable they were of gluten-free products using a nine-point scale (i.e., *How would you evaluate your knowledge of gluten-free products";* 1 = *Little knowledge*; 9 = *Very knowledgeable*).

5. Objective knowledge about gluten

Objective knowledge about gluten was assessed by asking participants to indicate the gluten content of a set of 16 food products. We selected these products from the foodstuff used in the "Gluten-free diet knowledge scale" developed by Silvester, Weiten, Graff, Walker and Duerksen (2016) and the check list present in Quinteros-Fernandez's (2015) research. To this list we added the type of items used in the questionnaire's food pics (this allowed us for the assessment of knowledge directly towards the products evaluated for the present research). Regarding these last items, because they would stand out from the others if inserted one by one by their specific name, it was opted for a more general approach; i.e., instead of using options like "chocolate chip digestive cookies" and "malted milk biscuits", the term "wheat flour based cookies" was used to designate this specific category. The final list included nine gluten-free products (i.e., milk, balsamic vinegar, rice, cocoa, oats, rice cakes, yogurt, beans and corn) and seven gluten-containing products (i.e., wheat flour, sausages, wheat based bread, crab sticks, toasts, biscuits and bread-like products).

In this specific question, the participant was asked to state the degree as to which they were certain that the product contained gluten (1 = *Certainly does not contain gluten*; 9 = *Certainly contains gluten*). This allows us to have a continuous scale and a deeper understanding of the certainty the participant has regarding their answers.

6. Control questions and manipulation checks

Because this research is based on an experimental design, a question was added to the questionnaire in order to assess if the manipulation between conditions had been successful (i.e., in this case, if the participant had noticed the claim in the packaging). For this, we introduced the following question "*The food products you evaluated in this questionnaire…*" and gave the participant four possible answers: "*Contained gluten (i.e., With-Gluten)*"; "*Did not contain gluten (i.e., Gluten-free)*"; "*No information regarding gluten was shown*"; and "*There was information regarding gluten, but I cannot recall it*".

To better comprehend our results, some control questions were also placed in order for the participants to evaluate the food categories in which the products used in the questionnaire fit (i.e., biscuits and bakery goods). These categories were evaluated regarding seven dimensions: arousal, valence (positive or negative), preference, familiarity, consumption frequency, desire to eat and perceived level of transformation. As an example, in the case of biscuits the question was: "*Think about the category of biscuits (e.g., bread, wraps, hamburguer buns) and indicate…*". Afterwards, a nine-point scale was provided for every dimension (1 = *Not arousing at all/Very negative/I don't like at all/I can never find it/I never eat it/I never feel desire for eating it/Not transformed at all*; 9 = *Very arousing/Very positive/I really like it/I find it frequently/I frequently eat it/I frequently feel desire for eating it/Very transformed*).

2.3 Material

With the assistance of a professional graphic designer, we developed a set of labels related to gluten content that could either present verbal information (i.e., gluten-free and with-gluten) or not (control condition) in a green or red background (see Table 2).

Table 2

Set of labels used in all six conditions.

		Verbal Information		
		Gluten-free claim	*With-Gluten claim*	*Control condition*
Baackground Color	Green			
	Trigo			

We selected a set of 12 images from an international retailers' website. These images depicted bakery goods (e.g., bread roll) and biscuits (e.g., malted biscuits). We chose these products because, although they typically contain gluten, gluten-free counterparts are also likely to be available. All products belonged to the retailer's private label, allowing for a uniform packaging style.

All images were treated in order not to show any sources of nutritional information, sign of the brand they belonged to, or other claims. This process helps insuring the least possible contaminating variables when the participant evaluates the products. Regarding the size of the images, all of them were standardized and presented with a resolution of 500 x 500 pixels in the online questionnaire.

Concerning the positioning of the claims for the manipulation, it was made sure that all claims were presented with the same size at the top right corner of all packages and, specifically for the same image (in all six manipulation conditions), all of them were placed in the exact same spot. An example of one of these products can be found in the Table 3, representing all six conditions.

Table 3

Example image with claims from all six conditions.

		Claim	
	Gluten-free claim	*With-gluten claim*	*Control condition*
Color Green			
Red			

2.4 Procedure

All procedures were conducted in agreement with the ethical guidelines issued by ISCTE-IUL. The questionnaire used in the current study was developed in the online survey platform *Qualtrics*. Individuals were invited (e.g., institutional email, social network websites) to collaborate in a consumer behavior web survey about the perception and evaluation of food images.

In line with the between-subjects design of this study, each participant was only presented to one of the conditions – which were assigned automatically by the software according to the answers quotas (which were split evenly). The only part in which the questionnaire differed between conditions was the set of 12 images presented with the rest of it being constant for all subjects.

In the first part of the survey, the participant was given a brief description of the research purpose and informed of the expected time duration for the questionnaire (i.e., 10 minutes). Informed consent information regarding the anonymity, confidentiality and the voluntary nature participation was also presented at this point. Participants were also told that they could terminate the study at any time by closing the web browser. After consenting to participate, participants were asked to provide demographical indicators (e.g., age; gender; occupation; and literary habilitations).

Before evaluating the products, the instructions emphasized that we were interested in participants' opinions about the products and, therefore, there were no right or wrong answers, and provided a brief explanation of the evaluative dimensions (healthiness, tastiness and caloric content).

Additional seven control questions were presented regarding the dimensions of arousal, valence (positive or negative), preference, familiarity, consumption frequency, desire to eat and perceived level of transformation. The participant would be asked to evaluate these dimensions regarding the general food group of bakery goods and biscuits (separately).

Afterwards, the manipulation check for the claim, as well as the diet characterization question and the scale for measuring attitudes towards a GFD were shown. Then, followed the scales for evaluation of subjective and objective knowledge of gluten.

In the last part of the questionnaire, because it consisted mainly on the analysis of images and colors, a control question regarding vision impairments was introduced. The participant was also asked to provide their height, weight as well as information regarding what device was used to answer (i.e., computer). After completion, participants were thanked and debriefed, including contact information of the research team.

CHAPTER III – RESULTS

We included data from participants who completed the evaluation of the 12 food exemplars and that responded to the question about the type of diet. Control dimensions may present missing data (up to 9.2% missing data). Next, we present the following analyses:

(a) Manipulation checks regarding claim: In order to assess how successful the manipulation was, this section is composed by a frequency analysis of the answers to the manipulation check question according to the participant's condition.

(b) Claim and label color influence on food perception: To examine the role played by claim and color on the evaluation of healthiness, caloric content and taste of the food products, we conducted a 2 x 3 univariate ANOVA per dimension.

(c) General evaluations of food category: To determine if there were any differences regarding the evaluative dimensions (i.e., frequency of consumption, liking, valence, perceived transformation and desire to eat) between the food categories of biscuits and bakery goods, a paired sample t-test was conducted.

(d) Effect of food category in the manipulations of claim and color: A 2 (product category) x 2 (color) x 3 (claim) repeated measures mixed ANOVA was conducted to understand how the different food categories could influence the manipulations of claim and color on the results for the evaluative dimensions of healthiness, caloric content and taste.

(e) Subjective and objective knowledge of gluten: Participants' subjective knowledge was analyzed recurring to a t-test against the midpoint of the scale. Regarding objective knowledge, in order to understand if the answers were significantly different from the value representing uncertainty, the mean answer per each item in the questionnaire was subject to a one sample t-test against the midpoint of five. In order to understand if the objective knowledge was above or below average, a score percentage of correct answers was also calculated for every item and the overall percentage was compared to 50% using a one sample t-test.

(f) Attitudes towards GFDs: With the purpose of analyzing how attitudes towards a GFD compare to those towards conventional diets, a t-test against the midpoint was conducted for each dimension (i.e., caloric, healthy, adequate do weight loss, transformation and naturality). Posteriorly, a composite score of all dimensions was computed to simplify subsequent analysis.

(g) Correlation between individual variables and attitudes towards GFDs: Pearson correlations were calculated in order to understand the pattern of correlations between individual variables (i.e., age, body mass index, GF consumption frequency, subjective knowledge and objective knowledge) and attitudes towards a GFD.

3.1 Manipulation Check regarding Claim

Because the present research was conducted with an experimental design, a manipulation check regarding the claim was placed in the questionnaire. In this question we asked the participant to recall what information was stated by the label on the packaging of the food products shown. Table 4 summarizes the percentual answers to this question according to the condition the participant was assigned to.

Table 4

Answers to manipulation check by claim condition.

	"Contained Gluten"	*"Did not contain Gluten"*	*"No information regarding gluten was shown"*	*"There was information about gluten but I cannot recall"*
Gluten-Free	7.8%	75%	6.9%	10.3%
Control	26.7%	2.3%	55.7%	15.3%
With-Gluten	69.9%	8.9%	8.9%	12.2%

In general, we can state the majority of the participants noticed and could recall the correct information of the claim for their condition. It was in the case of the gluten-free condition that most participants correctly recalled the information in the packaging (75%); followed by the with-gluten condition (69.9%); and, lastly, the control condition (55.7%).

In all conditions more than 10% of the participants stated that they could not recall the information about gluten. This was more noticeable for the control condition (15.3%) than for the with-gluten (12.2%) or the gluten-free (10.3%) condition.

3.2 Impact of the Credence (color and claim) on the Evaluations of Healthiness, Caloric Content and Taste

In order to collect the evaluations for healthiness, caloric content and taste, the participants were asked to rate every food image presented with the claim of the condition they were attributed to. Being so, 2 (color red vs. color green) x 3 (control, gluten-free and with-gluten claim) univariate ANOVAs were conducted per evaluative dimension in order to compare the means of each condition – the results are summarized in Table 5.

Table 5

Means and standard deviations for each evaluative dimension according to claim and color.

	Green		Red		Total	
	M	*SD*	*M*	*SD*	*M*	*SD*
Healthfulness						
Control	3.92	(1.11)	3.82	(1.16)	*3.87[a]*	*(1.13)*
Gluten-free	4.27	(1.15)	4.18	(1.39)	*4.22[b]*	*(1.28)*
With Gluten	4.13	(1.11)	4.16	(1.28)	*4.15[ab]*	*(1.19)*
Total	*4.10[1]*	*(1.12)*	*4.05[1]*	*(1.28)*		
Calories						
Control	6.37	(1.14)	6.32	(1.12)	*6.35[a]*	*(1.13)*
Gluten-free	5.98	(1.07)	5.87	(1.17)	*5.92[b]*	*(1.12)*
With Gluten	6.18	(1.06)	6.03	(1.22)	*6.11[ab]*	*(1.14)*
Total	*6.19[1]*	*(1.10)*	*6.08[1]*	*(1.18)*		
Taste						
Control	5.66	(1.31)	5.65	(1.16)	*5.65[a]*	*(1.23)*
Gluten-free	5.65	(1.17)	5.68	(1.30)	*5.67[a]*	*(1.23)*
With Gluten	5.77	(1.09)	5.57	(.97)	*5.67[a]*	*(1.04)*
Total	*5.70[1]*	*(1.19)*	*5.63[1]*	*(1.15)*		

Note. Means in the same line – [1,2] (means associated with the main effect of color) – and means in the same column – [a,b,c] (means associated with the main effect of claim, Bonferroni adjustment for multiple comparisons – with identical superscripts did not differ significantly.

3.2.1 Healthiness

As expected, the type of claim influenced the evaluation of healthiness, $F(2,364) = 3.02$, $MSE = 4.37$, $p = .050$, $\eta_p^2 = .016$, such that there was tendency for gluten-free products ($M = 4.22$, $SD = 1.28$) to be rated as healthier than products in the control condition ($M = 3.87$, $SD = 1.13$), $p = .064$ (see Figure 1). Noteworthy, gluten-free products did not differ

from with-gluten products ($M = 4.15$, $SD = 1.19$), $p = 1.000$. The healthiness evaluations of with gluten products also did not differ from those in the control condition, $p = .202$ (Pairwise comparisons with Bonferroni correction). We did not observe a main effect of color in healthiness ratings, $F < 1$, nor an interaction between claim and color, $F < 1$.
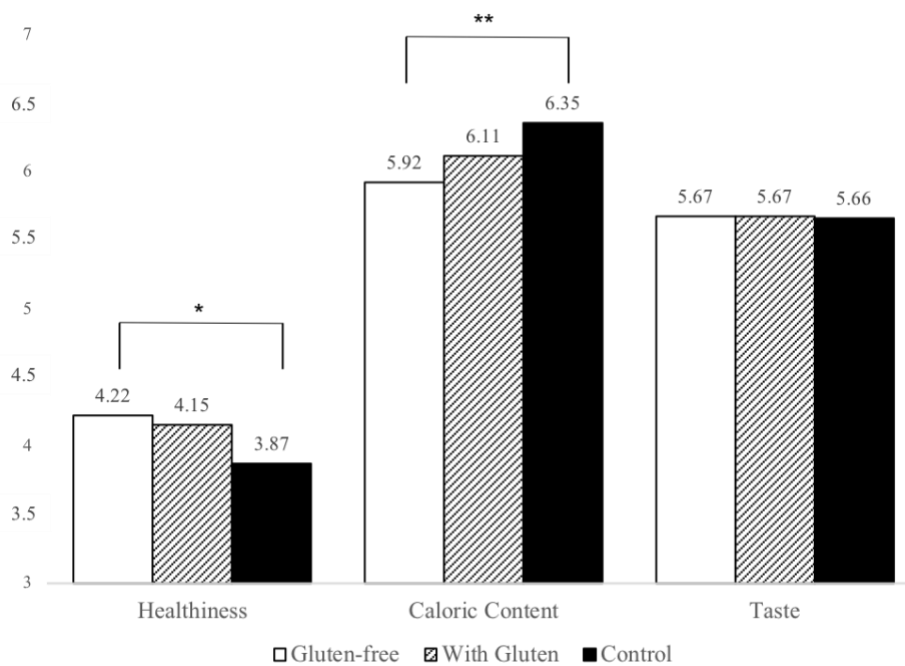
3.2.2 Caloric Content

Similarly to the pattern observed for the healthfulness dimension, the type of claim influenced the evaluations of caloric content, $F(2,364) = 4.34$, $MSE = 5.58$, $p = .014$, $\eta_p^2 = .023$. The results show gluten-free products ($M = 5.92$, $SD = 1.12$) were evaluated as less caloric than the products in the control condition ($M = 6.35$, $SD = 1.13$), $p = .011$. No other differences were found: gluten-free products did not differ from with-gluten products ($M = 6.11$, $SD = 1.14$), $p = .652$, nor did the with gluten products differ from the control condition, $p = .271$ (Pairwise comparisons with Bonferroni correction). Again, the results do not support a main effect of color, $F < 1$, or of interaction between claim and color, $F < 1$, in the evaluations of caloric content.

3.3.3 Taste

Unlike expected, neither the variable claim, color, or the interaction between claim and color presented an impact on the product evaluations of taste, $F < 1$. The products in the gluten-free ($M = 5.67$, $SD = 1.23.$), the control ($M = 5.65$, $SD = 1.23$) and the with gluten condition ($M = 5.67$, $SD = 1.04$) were evaluated as equally tasty.

Figure 1. *Comparison of mean evaluations for healthiness, caloric content and taste between categories of claim presented in the package (i.e., gluten-free, with-gluten and control). *p = .064; **p = .014*

3.3 General Evaluations of Food Categories

In the current study we included exemplars of two food categories: biscuits and bakery goods. We asked participants to rate the general frequency of consumption, liking, valence, perceived transformation and desire to eat for each category. Table 6 summarizes these results.

Table 6

Means and standard deviations for each evaluative dimension according to food category.

	Bakery Goods		Biscuits		Difference Test[a]	
	M	SD	M	SD	t(369)	p
Dimension						
Frequency	4.88	2.49	5.07	2.35	-1.31	.193
Liking	5.93*	2.21	6.62*	2.03	-5.54	< .001
Valence	4.21*	2.02	4.17*	2.02	< 1	ns
Perceived Transformation	6.75*	1.99	6.92*	1.86	-1.64	.103
Desire to Eat	5.05	2.42	5.80*	2.34	-4.95	< .001

Note. * Mean differs from the scale midpoint (one sample t-tests against 5). [a] Difference tests refer to the comparison of the means observed for each food category across evaluative dimensions.

25

Overall, as shown in Table 6, participants reported consuming both biscuits and bakery goods moderately. The reported desire to eat was also moderate for the category of bakery goods, but above average for biscuits. It is also noteworthy that participants rated the products negatively, despite liking them. Finally, both product categories were also rated as highly transformed.

Regarding the comparison of ratings according to the product categories, we only found differences for the liking and desire to eat dimensions, such that participants gave higher ratings to biscuits (vs. bakery goods) in both dimensions.

3.4 Effect of Food Category on Evaluations of Healthiness, Caloric Content and Taste

Given that we observed differences in overall evaluations between food categories, we proposed to explore if the categories of food products (i.e., biscuits and bakery goods) influenced how the claim and color manipulations impacted the evaluations of healthiness, caloric content and taste of the products. We conducted a 2 (product category) x 2 (color) x 3 (claim) repeated measures mixed ANOVA. The first factor was within-participants and the latter two between-participants.

3.3.1 Healthiness

We did not observe a main effect of product category on the evaluations of healthiness, $F < 1$. Moreover, this factor did not interact with the variable claim, $F < 1$, nor with color, $F < 1$. The third order interaction was also non-significant, $F(2,364) = 1.37$, $MSE = 0.95$, $p = .255$, $\eta_p^2 = .007$.

3.3.2 Caloric Content

We observed a main effect of product category on caloric content evaluations, such that biscuits ($M = 6.33$, $SD = 1.31$) were rated as higher in calories than bakery goods ($M = 5.92$, $SD = 1.24$), $F(1,364) = 52.40$, $MSE = 32.16$, $p < .001$, $\eta_p^2 = .126$. However, product category did not interact with claim, $F(1,364) = 1.39$, $MSE = 0.86$, $p = .250$, $\eta_p^2 = .008$, nor with color, $F < 1$. The third order interaction was also non-significant, $F < 1$.

3.3.3 Taste

Regarding the evaluations of taste, a main effect of product category was observed with biscuits ($M = 6.17$, $SD = 1.34$) obtaining higher taste ratings than bakery goods ($M = 5.13$, $SD = 1.37$), $F(1,364) = 209.16$, $MSE = 200.46$, $p < .001$, $\eta_p^2 = .365$. Again, product

category did not interact significantly with claim, $F < 1$, nor with color, $F < 1$ and the third order interaction was also non-significant, $F < 1$. The discriminated values for the mixed ANOVA of all three evaluations can be found in the Table 7.

Table 7

Differences in evaluations regarding food product category.

	df	*F (364)*	*p*
Healthiness			
Product Category	1	0.267	0.606
Color*Product Category	1	0.01	0.978
Claim*Product Category	2	0.14	0.870
Calories			
Product Category	1	52.40	< .001*
Color*Product Category	1	0.99	0.320
Claim*Product Category	2	1.393	0.250
Taste			
Product Category	1	209.16	< .001*
Color*Product Category	1	0.04	0.846
Claim*Product Category	2	0.22	0.805

Note. *Significant at the p<0.01 level

Overall, as shown in Table 7, participants judged the two product categories to be different regarding their caloric content and taste. On both cases biscuits got higher ratings than bakery. No significant impact of the product category was seen on the evaluations of healthiness. Product category did not interact significantly with the variable claim nor color on the evaluations of any of the three dimensions.

3.5 Subjective and Objective Knowledge about Gluten

Overall, participants reported a low level of subjective knowledge about gluten-free products ($M = 3.56$, $SD = 2.22$), $t(365) = -12.42$, $p < .001$ (one sample *t*-test against the scale midpoint, 5). Importantly, we did not observe differences between conditions for this variable, suggesting equivalent *a priori* knowledge, $F < 1$.

To assess participants' knowledge about gluten content more objectively, we asked them to indicate how certain they were about the presence of gluten for a set of 16 products. Means higher than the scale midpoint (i.e., 5) indicate that participants were certain about the product containing gluten, whereas means lower than the scale midpoint indicate that

participants were certain that it did not contain gluten. Means that do not differ from the scale midpoint reflect uncertainty about gluten content. Results for all food products are summarized in Table 8.

Table 8

Mean answers and percentage of correct answers per food product on the assessment of objective knowledge of gluten.

	M	*SD*	*Correct answers (%)*[a]
Milk	4.34*	3.13	49.5
Balsamic Vinegar	2.65*	2.11	68.4
Wheat Flour (G)	7.92*	1.83	78.3
Rice	4.66	3.00	43.4
Cocoa	3.86*	2.57	52.5
Sausages (G)	4.47*	2.81	33.8
Oats	5.57*	2.93	30.6
Rice Wafer	4.99	2.87	39.6
Flavored Yogurt	4.64	2.87	40.7
Beans	3.50*	2.57	57.8
Wheat Bread (G)	8.11*	1.59	81.1
Crab Sticks (G)	3.68*	2.55	21.0
Toasts (G)	7.66*	1.84	76.5
Corn	4.77	2.92	42.9
Biscuits (G)	7.77*	1.64	78.8
Bread-like products (G)	7.97*	1.65	80.1

Note. (G) Products that typically contain gluten. [a]To calculate the percentage of correct answers for typically gluten-free products we counted answers below 5. In contrast, for products that typically contain gluten, we counted answer above 5. Because the mid-point of the scale (5) represented uncertainty, this value was excluded from the percentage analysis. *Mean differs from the scale midpoint (one sample *t*-tests against 5), $p < 0.05$.

A one sample *t*-test against the midpoint of the scale was conducted for every product. Considering foodstuffs that typically contain gluten, the mean answers for wheat flour, wheat bread, toasts, biscuits and bread-like products are higher than and significantly different from

five (5), indicating that participants did consider the product to contain gluten. On the other hand, sausages and crab sticks scored mean answers significantly lower than five – even though they typically contain gluten – leading to the conclusion that participants believed these products to be gluten-free.

As for the gluten-free items on the list such as milk, balsamic vinegar, cocoa and beans, these scored means significantly lower than the midpoint of five (5), indicating that participants understand these items as being free from gluten. With means also significantly different from five (5), but higher than this value, oats were thought by the participants as a product that typically contains gluten.

Only gluten-free products such as rice, rice wafer, flavored yogurt and corn leaded to mean scores statistically not different from the mid-point (which represents uncertainty). This allows the conclusion that participants did not know if these products contained gluten in their composition.

Moreover, when examining Table 8, one can understand that, some of the most straight forward gluten-containing products – like wheat flour or wheat bread – got a higher percentage of correct answers – 78.3% and 81.1%, respectively – with a relatively high mean degree of certainty – 7.92 and 8.11, respectively. On the other hand, when analyzing more ambiguous products – like sausages or crab sticks – the percentage of correct answers dropped considerably – 33.8% and 21.0%, respectively.

We also analyzed the overall percentage of correct answers regarding the gluten content of products, showing that participants actually have a higher than average level of objective knowledge ($M = 62.23\%$, $SD = 16.19\%$), $t(374) = 14.09$, $p < .001$ (one sample t-test against scale midpoint, 50%).

3.6 Attitudes towards a Gluten-free Diet

We asked participants to report attitudes towards a GFD, by comparing it to a conventional diet regarding several aspects (healthiness, caloric content, adequate to weight loss, level of processing and naturalness).

Higher means indicate that participants reported the gluten free diet to be superior than the conventional diet in a given dimension (for this purpose, items for calories, weight loss and transformation were reverse-coded).

Table 9

Attitudes towards a gluten-free diet comparing to a conventional diet.

Dimension	*M*	*SD*	*t*(365)	*p*
Caloric [i]	5.96	1.63	11.22	< .001
Healthy	6.00	1.83	10.41	< .001
Adequate to weight loss [i]	5.61	1.80	6.47	< .001
Transformed [i]	5.55	2.05	5.13	< .001
Natural	5.36	2.02	3.36	.001

Note. [i] inverted items.

A one-sample *t*-test was performed against the midpoint of the scale – five (5). As shown in Table 9, overall, the GFD was perceived as superior than a conventional diet for all dimensions. Specifically, participants rated the gluten free (vs. conventional) diet as less caloric, healthier and more adequate to weigh loss purposes. Moreover, participants also reported it to be less transformed and more natural.

In order to simplify the subsequent analysis of results, a total score was computed using the five items. A reliability analysis was conducted and this scale – attitudes towards GFDs - was found to be highly reliable (5 items, $\alpha = .73$). Similarly, a *t*-test against the midpoint of five was conducted for this score. In its whole, a GFD is considered to be superior to a conventional diet ($M = 5.69$, $SD = 1.30$), $t(365) = 10.20$, $p < .001$.

3.7 Correlation between Individual Characteristics and Attitudes towards a Gluten-free Diet

We examined the association between individual characteristics (i.e., age, body mass index) and variables related to habits, knowledge and attitudes towards gluten (i.e., frequency of gluten-free products' consumption, subjective and objective knowledge about gluten, and attitudes towards a GFD). Results are summarized in Table 10.

Results show a weak positive association between age and BMI, $r = .29$, $p < .001$, meaning that older participants are also likely to have a higher BMI.

More importantly, the reported frequency of GF consumption correlates with both subjective and objective knowledge about gluten. This association was moderate with the subjective knowledge, $r = .32$, $p < .001$, and weak with objective knowledge, $r = .17$, $p = .002$. This means that the more frequent is the consumption of gluten-free products, the more knowledgeable an individual is about the gluten content of food products.

The consumption frequency also establishes a weak significant correlation with the attitudes towards a GFD, $r = .17$, $p = .001$, meaning that, when an individual's frequency of consumption of gluten-free products is higher, the more superior they consider the GFD.

As for the subjective and objective dimensions of knowledge, they establish a positive moderate correlation between each other, $r = 0.32$, $p < .001$. This implies that the subject's self-evaluation of their knowledge of gluten is linked to some extent to their objective knowledge.

Table 10

Pearson correlation between individual characteristics and attitudes towards a gluten-free diet.

Dimension	1	2	3	4	5	6
1. Age	1	.29***	-.016	-.07	.02	.06
2. BMI		1	.043	-.013	-.07	.11
3. GF Frequency			1	.39***	.17**	.17**
4. Subjective Knowledge				1	.32***	-.05
5. Objective Knowledge					1	-.08
6. Attitudes GFD						1

** Significant Correlation, $p < .010$
*** Significant Correlation, $p < .001$

CHAPTER IV – DISCUSSION

With food choices being more and more understood as of key importance for living a healthy lifestyle, consumers' awareness to the nutritional value of the products they choose also grows (Bigliardi & Galati, 2013). To inform their choice, they rely on information instruments such as packaging claims that intent on guiding their dietary choices (Cavaliere et al., 2015).

Past studies have already shown that health claims (e.g., Kozup et al., 2003; Lee et al., 2013) and, in particular, "gluten-free" claims (Lopes, 2017; Priven et al., 2015) can bias individuals towards a more positive evaluation of a certain food product. Nonetheless, the present research brought to light how subjects interpret potentially perceived risky information in packaging with the introduction of a specific condition stating the presence of gluten (i.e., "with gluten" claim). This kind of manipulation is, to the best of our knowledge, an innovative contribution as it represents a different way to approach the positivity bias reported to be caused by health claims.

The introduction of colored labels along with the claims is also something new to the research on this topic. While color in general gets a lot of attention from the scientific community, especially in the psychology field, its intertwining with food products and eating is still scarce (for exceptions see Genschow et al., 2012; Rohr et al., 2015).

Our first hypothesis stated the possibility that the mere presence of any claim would lead to more positive evaluations of the product and this can be confirmed to some extent. The results support that the claim exerts a significant influence on the evaluations of healthiness and caloric content but not tastiness. Even though the post-hoc tests only show a significant difference in both evaluations between the "gluten-free" and control claim in particular, it is curious to see that the "gluten-free" and the "with gluten" condition did not differ significantly from each other. Additionally, the pattern of the means suggests a tendency for better evaluations of the "with gluten" claim when compared to control. Therefore, our results corroborate the findings of Lopes (2017) and Priven et al. (2015) in regard to the "gluten-free" claim. However, there may only be slight evidence suggesting that subjects tend to evaluate more positively a food product with any type of claim – like stated by Wänke & Reutner (2010) – as being healthier and less caloric than their conventional counterpart.

Evaluations of taste, on the other hand, did not differ for products with claims. Although there are some contributions showing that perception of taste is positively

influenced by health information (Sabbe et al., 2009), the considerations of one study (Lopes, 2017) – the only one found combining taste and gluten claims – suggests otherwise. They hypothesized that this effect might have not been found due to the low hedonic nature of the used food products (i.e., rice cakes, rice, bread and flour). Nevertheless, one can argue that especially biscuits (which present themselves as significantly more liked and desired to eat than bakery goods) carry a higher hedonic value when comparing the foodstuffs used by Lopes (2017). Perhaps this is not the reason why the impact of the claims did not show on the evaluations of taste or, on the other hand, biscuits are still not high enough on hedonic value.

Considering the second hypothesis of this research, it was theorized that claims colored with green would lead – similarly to the presence of a health claim itself – to more positive evaluations than a red colored one by manipulating how the consumer understands the reasons behind placing the claim. By the evidence provided by the results, this was not confirmed - none of the three collected evaluations appears to have been influenced by the color of the label.

Although past research has been finding significant effects of color information on different behaviors towards food (Genschow et al., 2012; Rohr et al., 2015; Schuldt, 2013), none had ever introduced this manipulation in packaging claims with different conveyed information, nor had it investigated its impact on evaluations of food attributes. It can be argued that this kind of cue can affect behavior towards food, but does not affect the perception of the products themselves. On the other hand, it is important to mention that the work of Rohr et al. (2015) shows an effect of color presented as much more impactful when in regard to typically considered unhealthy food (e.g., pizza, hamburgers, ice cream); with our results showing no significant impact of the food categories on the evaluations of healthiness, one can think that the picked products were just not considered unhealthy enough for the effect to be significant.

We also explored if color would exert a moderating effect of the impact of the claim; this hypothesis was also not confirmed. The hypothesized moderation is based on the premises of pragmatic persuasion (Wänke & Reutner, 2010) with color differentiation representing an attempt to affect the individual's perception as to why the health claim was presented - color red directing the subject to a sign of warning (Griffith & Leonard, 1997; Pravossoudovitch, Cury, Young, & Elliot, 2014) and green representing safety and a way to enhance the product (Pravossoudovitch et al., 2014; Kaya & Epps, 2004). One can argue that this clue might not have been enough to lead the participants towards perceiving the manufacturer's motifs as intended by the manipulation, especially when considering that the

color manipulation was circumscribed to the label surrounding the claim and not widespread among the packaging. Another possible explanation is the fact that, by not including subjects who followed a GFD, no participants in the sample suffered from a gluten-related health condition; since the red color was specifically introduced with the intent to increase the perception of risk and symbolizing a warning, this color may not have caused this expected effect on healthy individuals.

Aside from the main focus of this study, some other data regarding the knowledge of gluten is of particular importance. In a general way, two important conclusions can be withdrawn from the results: (1) it can be concluded that individuals tend to underestimate how knowledgeable they are of gluten – with subjective knowledge of gluten getting lower than average reports but the results of objective knowledge sitting above this mark and; (2) although the participants report not knowing much about gluten, claims respecting to this component still impacted the evaluations of healthiness and caloric content. These results are in line with the research from Lopes (2017) who reported the exact same effect.

Another interesting finding regarding the participants' knowledge about gluten, is the fact that GF products consumption frequency seems to correlate more strongly with subjective knowledge than objective knowledge. Meaning that, the more frequently GF products are consumed, the more elevated is the objective knowledge of gluten but also, to a higher magnitude, the self-evaluated knowledge gluten arises. The interpretation of these results must be cautious – especially considering no known studies have focused on understanding this relationship and its direction – but this might lead us to assume that, even though an individual does gets more knowledgeable on this matter through consuming GF products, their assumption of what they know elevates to a higher degree.

Considering the attitudes towards a GFD, results show that participants believe that this type of diet is superior to a conventional one. In particular, going gluten-free is considered to be healthier, better for losing weight, less caloric and less transformed. These findings are also in line with past literature (e.g., Lopes, 2017; Marcason, 2011). It is also of notice that the frequency of consumption of GF products establishes a weak, but significant, correlation with the attitudes towards GFD – explicitly, the higher the frequency of consumption of GF products, the more this type of diet it considered to be superior.

While the present design performed adequately in meeting the goal and providing answers to the hypothesis of the research, it is important to understand its shortcomings and limitations. Firstly, a limitation regarding the instruments can be pointed out. Although the questionnaire was carefully prepared, it is important to state that, aside from the questions

used from the scale of Prada, Rodrigues, et al. (2017), no other questions were previously validated for the Portuguese context.

One can also identify as a shortcoming the lack of manipulation checks for the color of the label. We have seen by the manipulation check analysis for the information regarding gluten that the majority of participants did notice label (translated in the way that they could indeed recall the information contained in it), especially for the gluten-free and with-gluten condition. Nevertheless, with the results not corroborating our hypothesis that variation between green and red would impact differently the evaluations of the product, some questions as to why are left unanswered. Did the participant notice the color of the label? Was the label big enough for the color to have an impact? Did this manipulation lead, as we expected, to different perceptions of the retailers motif for the claim placement? Or is the effect of this variable just not significant on the evaluations?

Even though an effort was made to restrain as many extraneous variables as possible, the addition of some other control questions could also be of benefit. As an example, the work of Prada, Garrido, et al. (2017) concluded that individuals tend to evaluate organic food – compared to conventional products – more positively when they are environmentally concerned. This measurement would be important to better understand all the underlying mechanisms on the evaluations and to this effect for gluten related claims specifically.

Finally, the last limitation to be recognized is the sample size. Even though the present research counted with the collaboration of 370 participants, this experimental inter-subject design required the creation of six different conditions, dividing this total number between them. This low number may have caused the computed tests to lose some of their statistical power, thus not showing some of the effects that may have occurred.

Some possible directions regarding future studies can be withdrawn from this research. For example, in order to understand if the nonsignificant impact of colors on the evaluations is, as discussed before, due to the used foodstuffs not being considered unhealthy enough, another study with a similar design could be conducted with products considered unhealthier – characteristic that could be ensured with the use of a pre-test to evaluate the participants perception for specific foods. Still on this topic, a study sample focused on individuals with gluten-related health conditions may be a better manner to study if the expected warning effect from the red color on the label occurs as seen in past literature (Genschow et al., 2012; Rohr et al., 2015; Schuldt, 2013).

In addition, this type of design does not allow us to comprehend the direction of the correlation between the attitudes towards a GFD and GF products consumption. Being so,

future studies should focus on this matter, making an effort to understand whether this correlation is due to participants feeling the benefits of eating GF products, thus judging more positively GFDs, or if they increment their consumption of GF foods because a GFD is thought to be healthier.

Lastly, we deem the replication of this study with an incremented amount of participants of utmost importance. Although it being of low relevance statistically, we cannot ignore the tendency seen in the mean evaluations of healthiness of the with-gluten claim condition to be higher and the mean evaluations of caloric content to be lower than the ones in control condition. The only way to ensure the post-hoc did not corroborate the hypothesis due to a low number of subjects is to collect more data and conducting a new analysis.

CONCLUSION

The present dissertation represents a contribution to the scientific community for a better understanding of how consumers perceive food – which ultimately shapes their food choices – and how different variables of the process can make a difference in its outcome. This study demonstrated that, as seen in past research, individuals rely on packaging cues to establish different inferences from a foodstuff.

The collected data allows us to understand that the gluten-free claim is a powerful tool in boosting evaluations of healthiness, as well as diminishing the expected caloric content of a product. This observed impact is even corroborated with more positive attitudes towards a GFD when comparing to a conventional one. Such conclusions are in line with the general lay popularity of gluten being a component to avoid when seeking a healthier lifestyle or trying to attain a weight loss goal.

Several studies have been disproving this idea of a GFD as being the correct regimen for a balanced diet, showing its nutritional deficiencies and setbacks for individuals with no gluten-related conditions, as well as gluten-free products to usually be higher in calories than the conventional counterparts. The fact that, as seen by our results, this claim has the potential to bias an individual so powerfully only elevates the importance of educating the general population on this matter. Gluten has to be demystified in order not to mislead the general population into a nutritionally unconscious diet.

This dissertation is also of significance to marketing, especially for food retailers. Our desired outcome from it is to help marketers better understand how packaging can bias someone into incurring in unhealthier eating habits and advise them for the social responsibility of their actions. Along the same lines, these findings may also alert policy makers' for this type of phenomena, better directing their policies with the goal of lowering the nefarious effects of these bias.

We also aspire that this investigation opens a path for other research to follow the open questions left to debate from our results. There are a lot of details still to be uncovered on this topic and the scientific community has a responsibility in providing knowledge and contributing to a healthier society.

REFERENCES

Bigliardi, B., & Galati, F. (2013). Innovation trends in the food industry: The case of functional foods. *Trends in Food Science & Technology*, *31*(2), 118–129. doi:10.1016/j.tifs.2013.03.006

Beyond Celiac (2018). Myths about celiac disease, gluten sensitivity and the gluten-free diet. From https://www.beyondceliac.org/celiac-disease/myths/. Access on July, 30th of 2018.

Campos, S., Doxey, J., & Hammond, D. (2011). Nutrition labels on pre-packaged foods: a systematic review. *Public Health Nutrition, 14*(08), 1496–1506. doi:10.1017/S1368980010003290

Cavaliere, A., Ricci, E. C., & Banterle, A. (2015). Nutrition and health claims: Who is interested? An empirical analysis of consumer preferences in Italy. *Food Quality and Preference, 41,* 44–51. doi:10.1016/j.foodqual.2014.11.002

Chandon, P., & Wansink, B. (2007). The biasing health halos of fast-food restaurant health claims: lower calorie estimates and higher side-dish consumption intentions. *Journal of Consumer Research, 34*(3), 301–314.

Fernqvist, F., & Ekelund, L. (2014). Credence and the effect on consumer liking of food – A review. *Food Quality and Preference, 32,* 340–353. doi: 10.1016/j.foodqual.2013.10.005

Gaesser, G. A., & Angadi, S. S. (2012). Gluten-Free diet: Imprudent dietary advice for the general population? *Journal of the Academy of Nutrition and Dietetics, 112*(9), 1330–1333. doi: 10.1016/j.jand.2012.06.009

Gaesser, G. A., & Angadi, S. S. (2015). Navigating the gluten-free boom. *Journal of the American Academy of Physician Assistants, 28*(8), 1–7. doi:10.1097/01.JAA.0000469434.67572.a4

Genschow, O., Reutner, L., & Wänke, M. (2012). The color red reduces snack food and soft drink intake. *Appetite, 58*(2), 699–702.

Green, P. H. R., Rostami, K., & Marsh, M. N. (2005). Diagnosis of coeliac disease. *Best Practice & Research Clinical Gastroenterology, 19*(3), 389–400. doi:10.1016/j.bpg.2005.02.006

Griffith, L. J., & Leonard, S. D. (1997). Association of colors with warning signal words. *International Journal of Industrial Ergonomics, 20*(4), 317–325.

Hieke, S., & Wilczynski, P. (2012). Colour me in – an empirical study on consumer responses to the traffic light signposting system in nutrition labelling. *Public Health Nutrition, 15*(05), 773–782. doi:10.1017/S1368980011002874

Kaya, N., & Epps, H. (2004). Relationship between color and emotion: A study of college students. *College Student J, 38*(3), 396.

Kozup, J. C., Creyer, E. H., & Burton, S. (2003). Making healthful food choices: the influence of health claims and nutrition information on consumers' evaluations of packaged food products and restaurant menu items. *Journal of Marketing, 67*(2), 19–34.

Lee, A. R., Ng, D. L., Zivin, J., & Green, P. H. R. (2007). Economic burden of a gluten-free diet. *Journal of human Nutrition and Dietetics, 20*(5), 423–430.

Lee, W. J., Shimizu, M., Kniffin, K. M., & Wansink, B. (2013). You taste what you see: Do organic labels bias taste perceptions? *Food Quality and Preference, 29*(1), 33–39. doi:10.1016/j.foodqual.2013.01.010

Lis, D. M., Stellingwerff, T., Shing, C. M., Ahuja, K. D. K., & Fell, J. W. (2015). Exploring the popularity, experiences, and beliefs surrounding gluten-free diets in nonceliac athletes. *International Journal of Sport Nutrition and Exercise Metabolism, 25*(1), 37–45. doi:10.1123/ijsnem.2013-0247

Lopes, C. (2017). *Se não tem glúten, deve fazer bem... Impacto da rotulagem «sem glúten» na avaliação de diferentes tipos de alimentos* (Master's Thesis). ISCTE-IUL, Lisboa.

Mancini, P., Marchini, A., & Simeone, M. (2016). Eating behaviour and well-being: An analysis on the aspects of italian daily life. *Agriculture and Agricultural Science Procedia, 8*, 228–235. doi:10.1016/j.aaspro.2016.02.097

Marcason, W. (2011). Is there evidence to support the claim that a gluten-free diet should be used for weight loss? J*ournal of the American Dietetic Association, 111*(11), 1786. doi:10.1016/j.jada.2011.09.030

McCabe, M. S. (2010). Balancing consumer protection and scientific integrity in the face of uncertainty: the example of gluten-free foods. *Food & Drug LJ, 65*, 367.

Miranda, J., Lasa, A., Bustamante, M. A., Churruca, I., & Simon, E. (2014). Nutritional differences between a gluten-free diet and a diet containing equivalent products with gluten. *Plant Foods for Human Nutrition, 69*(2), 182–187. doi:10.1007/s11130-014-0410-4

Musaiger, A. O., Al-Mufty, B. A., & Al-Hazzaa, H. M. (2014). Eating habits, inactivity, and sedentary behavior among adolescents in iraq: Sex differences in the hidden risks of noncommunicable diseases. *Food and Nutrition Bulletin, 35*(1), 12–19. doi:10.1177/156482651403500102

Prada, M., Garrido, M. V., & Rodrigues, D. (2017). Lost in processing? Perceived healthfulness, taste and caloric content of whole and processed organic food. *Appetite, 114*, 175–186. doi:10.1016/j.appet.2017.03.031

Prada, M., Rodrigues, D., & Garrido, M. V. (2016). Deliberate choices or strong motives: Exploring the mechanisms underlying the bias of organic claims on leniency judgments. *Appetite, 103*, 8–16. doi:10.1016/j.appet.2016.03.012

Prada, M., Rodrigues, D., Garrido, M. V., & Lopes, J. (2017). Food-pics-PT: Portuguese validation of food images in 10 subjective evaluative dimensions. *Food Quality and Preference, 61*, 15–25. doi:10.1016/j.foodqual.2017.04.015

Pravossoudovitch, K., Cury, F., Young, S. G., & Elliot, A. J. (2014). Is red the colour of danger? Testing an implicit red–danger association. *Ergonomics, 57*(4), 503–510. doi:10.1080/00140139.2014.889220

Priven, M., Baum, J., Vieira, E., Fung, T., & Herbold, N. (2015). The influence of a factitious free-from food product label on consumer perceptions of healthfulness. *Journal of the Academy of Nutrition and Dietetics, 115*(11), 1808–1814. doi:10.1016/j.jand.2015.03.013

Quinteros-Fernandez, S. A. (2015). *Knowledge and behaviors surrounding a gluten-free diet between medically and self- diagnosed individuals* (Master's Thesis). Syracuse University.

Ref. European Union Regulation No 1924/2006 - "Regulation (EC) No 1924/2006 of the european parliament and of the council of 20 December 2006 on nutrition and health claims made on foods"

Rohr, M., Kamm, F., Koenigstorfer, J., Groeppel-Klein, A., & Wentura, D. (2015). The color red supports avoidance reactions to unhealthy food. *Experimental Psychology, 62*(5), 335–345. doi:10.1027/1618-3169/a000299

Sabbe, S., Verbeke, W., Deliza, R., Matta, V., & Van Damme, P. (2009). Effect of a health claim and personal characteristics on consumer acceptance of fruit juices with different concentrations of açaí. *Appetite, 53*(1), 84–92. doi:10.1016/j.appet.2009.05.014

Sacks, G., Rayner, M., & Swinburn, B. (2009). Impact of front-of-pack «traffic-light» nutrition labelling on consumer food purchases in the UK. *Health Promotion International, 24*(4), 344–352. doi:10.1093/heapro/dap032

Sanders, D. S., & Aziz, I. (2012). Editorial: Non-celiac wheat sensitivity: Separating the wheat from the chat! *The American Journal of Gastroenterology, 107*(12), 1908–1912. doi:10.1038/ajg.2012.344

Saturni, L., Ferretti, G., & Bacchetti, T. (2010). The gluten-free diet: Safety and nutritional quality. *Nutrients, 2(*1), 16–34. doi:10.3390/nu2010016

Schuldt, J. P. (2013). Does green mean healthy? Nutrition label color affects perceptions of healthfulness. *Health Communication, 28*(8), 814–821. doi:10.1080/10410236.2012.725270

Silvester, J. A., Weiten, D., Graff, L. A., Walker, J. R., & Duerksen, D. R. (2016). Is it gluten-free? Relationship between self-reported gluten-free diet adherence and knowledge of gluten content of foods. *Nutrition, 32*(7–8), 777–783. doi:10.1016/j.nut.2016.01.021

Stevens, L., & Rashid, M. (2008). Gluten-free and regular foods: a cost comparison. *Canadian Journal of Dietetic Practice and Research, 69*(3), 147–150.

Talati, Z., Pettigrew, S., Hughes, C., Dixon, H., Kelly, B., Ball, K., & Miller, C. (2016). The combined effect of front-of-pack nutrition labels and health claims on consumers' evaluation of food products. *Food Quality and Preference, 53*, 57–65. doi:10.1016/j.foodqual.2016.05.016

Viana, V. (2002). Psicologia, saúde e nutrição: Contributo para o estudo do comportamento alimentar. *Análise Psicológica, 20*(4), 611–624.

Wänke, M., & Reutner, L. (2010). Pragmatic persuasion or the persuasion paradox. The *Psychology of Attitudes & Attitude Change*, 183–198.

World Health Organization (2015). *Healthy diet*. From: http://www.who.int/mediacentre/factsheets/fs394/en/. Access on January 11th 2018

World Health Organization (2018). *BMI Classification.* From: http://apps.who.int/bmi/index.jsp?introPage=intro_3.html. Access on September 28th 2018

Worosz, M. R., & Wilson, N. L. W. (2012). A cautionary tale of purity, labeling and product literacy in the gluten-free market. *Journal of Consumer Affairs, 46*(2), 288–318. doi:10.1111/j.1745-6606.2012.01230.x

Caro(a) participante, Este estudo incide sobre a forma as pessoas avaliam diferentes alimentos. Para o efeito, venho por este meio solicitar a sua colaboração no preenchimento deste questionário que **demorará aproximadamente 10 minutos**.

A sua **participação tem um carácter voluntário**. Por motivos éticos, o participante tem a possibilidade de negar a participação ou de se retirar do estudo a qualquer momento, bastando para isso fechar esta página de navegação. De acordo com as normas da comissão de Protecção de Dados, os dados recolhidos são anónimos e a sua eventual publicação só poderá ter lugar em revistas da especialidade. Pedimos-lhe que responda a este questionário de uma só vez, evitando interrupções.

Obrigada desde já pela sua colaboração!

Tendo tomado conhecimento sobre a informação disponível acerca do estudo, declaro aceitar participar:

◯ Sim

◯ Não

Antes de começar, por favor indique:

Idade _____

- -

Sexo

◯ Feminino

◯ Masculino

◯ Outro

Indique o nível máximo (i.e, último ano concluído) de escolaridade que completou:

◯ Ensino básico

◯ Ensino secundário

◯ Licenciatura

◯ Pós-graduação

◯ Mestrado

◯ Doutoramento

Indique a sua ocupação:

◯ Estudante

◯ Trabalhador independente

◯ Trabalhador por conta de outrem

◯ Reformado

◯ Desempregado

Neste estudo, estamos interessados em perceber a forma como as pessoas avaliam diferentes **alimentos.**

Para tal iremos pedir-lhe que avalie **doze alimentos** indicando em que medida o alimento lhe parece:

... saboroso (1 = Nada saboroso a 9 = Muito saboroso)   ... calórico (1 = Nada calórico a 9 = Muito calórico)... saudável (1 = Nada saudável a 9 = Muito saudável)

Estas avaliações devem ser rápidas e espontâneas. Estamos apenas interessados na sua opinião, logo não existem respostas certas nem erradas. Note ainda que a ordem de resposta a estas questões varia entre imagens.

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Este alimento:

	1	2	3	4	5	6	7	8	9	
Nada saudável	○	○	○	○	○	○	○	○	○	Muito saudável
Nada saboroso	○	○	○	○	○	○	○	○	○	Muito saboroso
Nada calórico	○	○	○	○	○	○	○	○	○	Muito calórico

Pedimos-lhe agora que responda a um conjunto de questões de controlo relativamente a algumas **categorias de alimentos**.

Pense na categoria de **PRODUTOS TIPO PÃO** (e.g. pão de forma, wraps/tortilhas, pão de hamburger) e indique...

	1	2	3	4	5	6	7	8	9	
Raramente como	○	○	○	○	○	○	○	○	○	Como frequentemente
Não gosto	○	○	○	○	○	○	○	○	○	Gosto muito
Alimentos negativos	○	○	○	○	○	○	○	○	○	Alimentos positivos
Alimentos pouco processados	○	○	○	○	○	○	○	○	○	Alimentos muito processados
Raramente me apetece comer	○	○	○	○	○	○	○	○	○	Apetece-me comer frequentemente

Pense na categoria de **BOLACHAS** (e.g. aveia, chocolate, digestivas) e indique...

	1	2	3	4	5	6	7	8	9	
Raramente como	○	○	○	○	○	○	○	○	○	Como frequentemente
Não gosto	○	○	○	○	○	○	○	○	○	Gosto muito
Alimentos negativos	○	○	○	○	○	○	○	○	○	Alimentos positivos
Alimentos pouco processados	○	○	○	○	○	○	○	○	○	Alimentos muito processados
Raramente me apetece comer	○	○	○	○	○	○	○	○	○	Apetece-me comer frequentemente

Os alimentos que avaliou neste questionário...

○ Continham glúten (i.e., "Com glúten")

○ Não continham glúten (i.e., "Sem glúten")

○ Não havia informação acerca do glúten

○ Havia informação sobre o glúten, mas não me recordo

Como sabe existem vários tipos de dieta que nos fazem optar por certos alimentos em detrimento de outros. Responda por favor às questões que seguem sobre os vários tipos de dieta.

Segue algum tipo de dieta especial?

○ Não

○ Perda de Peso

○ Vegetariano

○ Livre de glúten

○ Vegana

○ Outro (especifique) _____

Indique com que frequência come **alimentos livres de glúten**:

○ 1- Nunca

○ 2

○ 3

○ 4

○ 5

○ 6

○ 7

○ 8

○ 9- Sempre

Na sua opinião, comparativamente a uma dieta convencional, a dieta sem glúten é:

	1	2	3	4	5	6	7	8	9	
Menos calórica	◯	◯	◯	◯	◯	◯	◯	◯	◯	Mais calórica
Menos saudável	◯	◯	◯	◯	◯	◯	◯	◯	◯	Mais saudável
Mais adequada para a perda de peso	◯	◯	◯	◯	◯	◯	◯	◯	◯	Menos adequada para a perda de peso
Menos processada	◯	◯	◯	◯	◯	◯	◯	◯	◯	Mais processada
Menos natural	◯	◯	◯	◯	◯	◯	◯	◯	◯	Mais natural

Como avalia o seu conhecimento acerca dos produtos sem glúten?

	1	2	3	4	5	6	7	8	9	
Pouco conhecimento	◯	◯	◯	◯	◯	◯	◯	◯	◯	Muito conhecimento

Em que medida considera que cada um dos produtos contém glúten?

	1 Certamente que não tem glúten	2 3 4 5 6 7 8	9 Certamente que tem glúten
Leite	○		○
Vinagre balsâmico	○		○
Farinha de Trigo	○		○
Arroz	○		○
Cacau	○		○
Salsichas	○		○
Aveia	○		○
Bolachas de arroz	○		○
Iogurte com aroma	○		○
Feijão	○		○
Pão à base de farinha de trigo	○		○
Delícias do mar	○		○
Tostas	○		○
Milho	○		○
Bolachas	○		○

Produtos tipo pão | ○   ○

Relativamente à sua visão, por favor selecione a opção (ou opções) que se adequam ao seu caso:

Visão Normal

Miopia

Astigmatismo

Daltonismo

Outro _____

Utiliza algum tipo de aparelho correctivo para a visão (e.g. óculos, lentes de contacto, etc.)?

○ Sim

○ Não

Por favor indique a sua altura

_____

Por favor indique o seu peso

_____

Por favor, indique que equipamento utilizou para responder a este questionário

○ Computador

○ Smartphone/Telemóvel

○ Tablet

○ Outro _____

O estudo chegou ao fim.

Mais uma vez agradeço a sua participação!

Em caso de necessidade de algum esclarecimento adicional, não hesite em contactar-me via e-mail (farro@iscte-iul.pt).