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CIÊNCIAS SOCIAIS
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Resumo

O consumo excessivo de açúcar pode ter numerosas consequências para a saúde dos indivíduos. Uma estratégia para lidar com este problema envolve fornecer informação aos consumidores sobre as propriedades dos produtos, incluindo alegações nutricionais. O impacto deste tipo de informação na perceção de alimentos e tomada de decisão dos consumidores tem sido amplamente investigado. Porém, a investigação sobre a influência de alegações nutricionais sobre o teor de açúcar de alimentos é ainda escassa. Este estudo visa examinar como diferentes alegações de açúcar influenciam perceções de salubridade, calorias e sabor dos consumidores comparativamente com as versões regulares dos produtos. A amostra incluiu 200 indivíduos Portugueses (83% mulheres, M_{Idade} = 30.26, *DP* = 11.22), que se voluntariaram para colaborar num estudo online. Especificamente, pedimos aos participantes que avaliassem a salubridade, calorias e sabor percebido de quatro categorias de produto (i.e., iogurtes, gelados, bolachas e cereais) emparelhadas com quatro alegações acerca do teor de açúcar (i.e., "0% açúcar", "sem açúcar", "sem açúcar adicionado", "baixo teor de açúcar"), face à versão regular do produto. Os resultados mostraram que todos os produtos com alegações de açúcar foram avaliados como mais saudáveis, menos calóricos e menos saborosos do que os produtos regulares (i.e., sem estas alegações). A alegação "baixo teor de açúcar" foi percecionada como a menos saudável, mais calórica e mais saborosa das alegações. Este estudo contribui para a literatura atual ao mostrar que as perceções de salubridade, calorias e sabor podem ser diferentes dependendo da alegação de açúcar específica presente no pacote do produto.

Palavras-chave: alegações nutricionais, açúcar, perceção de alimentos, salubridade, calorias, sabor

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Abstract

Excessive sugar consumption can have numerous consequences for individuals' health. One strategy to address this problem involves providing consumers with information about products' properties, including nutrition claims. The impact of this type of information on consumers' perception of food and decision making has been thoroughly investigated. However, research regarding nutrition claims about sugar content is still scarce. This study aims to examine how different claims about sugar content influence consumers' perceptions of healthfulness, calories and taste, in comparison to the regular versions of the products. The sample included 200 Portuguese individuals (83% women, M_{Age} = 30.26, *SD* = 11.22), who volunteered to collaborate in an online study. Specifically, we asked participants to evaluate perceived healthfulness, calories and taste of four product categories (i.e., yogurts, ice creams, cookies and breakfast cereals) linked with four claims about sugar content ("0% sugar", "sugar free", "no added sugar", "low sugar"), in relation to the product's regular version. Results showed that all products with claims about sugar content were rated as healthier, less caloric and less tasty than the regular products (i.e., without these claims). The "low sugar" claim was perceived as the least healthy, most caloric and tastiest of the claims. This study contributes to the current literature by showing that perceptions of healthfulness, calories and taste can be different depending on the specific claim about sugar presented in the product's packaging.

Keywords: nutrition claims, sugar, food perceptions, healthfulness, calories, taste

APA PsycINFO Classification:
3360 Healthy Psychology and Medicine
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Introduction

Poor diet is a leading cause of ill health (Kaur et al., 2017), to the extent that dietary risks such as inadequate eating habits are among the top risk factors that contribute to the loss of healthy living years amongst the Portuguese population (Direção Geral de Saúde [DGS], 2017). What people eat and why they eat is more than a matter of nutritional value (Keane & Willetts, 1994). Factors such as motivation, hunger, age, gender and concern with health are also associated with an individual's diet (Marcelino et al., 2001; Reime et al., 2000). As such, helping consumers make better food choices and having healthy eating habits – which contributes for the prevention of diseases such as type 2 diabetes and obesity (Lê et al., 2013) – is an important goal of public health efforts (for a review, see Mitra et al., 2019). If people changed their eating behavior towards a healthier diet, much of the burden of disease worldwide could be reduced (Diepeveen et al., 2013). In that regard, dietary guidelines worldwide advise the reduction of saturated fat, sugar and salt, and an increase of fruit and vegetables on consumers' diets (Ballco et al., 2020).

Having a poor diet, which includes excessive sugar consumption, can have a lot of consequences. Indeed, overconsumption of sugar is a risk factor for various non-communicable diseases and has emerged as an important public health issue to focus on (Khan & Sievenpiper, 2016) due to its association with poor eating habits, obesity, dental caries, overweight and mortality (for reviews, see Azaïs-Braesco et al., 2017; Chien et al., 2018; Evans, 2017; Gupta et al., 2018; Vanderlee et al., 2015). To address the burden of a poor diet, food labels can be used to provide nutrition information to the consumer (Kaur et al., 2017). Nutrition information on packaged products can be presented in different ways, such as front-of-package labels (e.g., warning labels, Guideline Daily Amounts, Traffic Lights Labels) or health-related claims (i.e., health claims and nutrition claims). Informing consumers with detailed nutrition information is a strategy that has been introduced as part of the mandatory food labelling of the European Union and harmonized the law concerning nutrition and health claims (European Commission [EC], 2006; Miklavec et al., 2015; Steinhauser & Hamm, 2018). Specifically, the use of nutrition claims is becoming frequent worldwide and has the potential to improve public health by facilitating well informed choices, fostering healthier eating habits and prevent any practices that may mislead consumers (Leathwood et al., 2007; Miklavec et al., 2015). Nutrition claims generally refer to a nutrient, energy or other substance that a food contains (in reduced or increased proportions) or does not contain, and can be presented in terms of a product's nutrient content or its content in comparison with other products of the same category (EC, 2006).

Although health-related claims and their role in consumers' eating behavior has been explored in literature, research has mainly focused on how these claims in general are understood and how these can influence consumers' attitudes, perceptions and consumption behavior. However, when it comes to nutrition claims, specifically regarding sugar content, little is yet known. Indeed, research that explores differences between nutrition claims about sugar content and how they impact consumers' perceptions towards food products is still scarce. As the excessive consumption of sugar can lead to numerous health risks and diseases, the current study focuses on how different nutrition claims about sugar content influence consumers' perceptions of healthfulness, calories and taste of different products, compared with the regular version of such products (i.e., without these claims). This is important because it can help to understand which nutrition claims about sugar content are perceived by the consumer as healthier or less caloric, which is in line with a healthy diet. On the other hand, it helps to identify which nutrition claims about sugar content are perceived as being less tasty, giving us insights on how to improve these perspectives towards products with less sugar and, thus, foster healthier eating habits.

The present work includes four chapters. Chapter I considers the state of the art regarding the different types of sugars and its overconsumption consequences, describes what are health and nutrition claims and their influence on consumers, and how these claims relate with our three dependent variables (healthfulness, calories and taste perceptions). Chapters II and III present the methodology used and obtained results, respectively. At last, Chapter IV discusses the results in the light of present literature, how these add up to the already existent body of knowledge and the study's limitations, as well as suggestions for future research and policy-making contributions.

Chapter I: State of the Art

Different Types of Sugar and its Overconsumption Consequences

Although many people do not distinguish sugars coming from different sources, from a nutritional perspective several distinctions can be made in this regard. The term "total sugars" is often presented in many food packages and its definition does not distinguish sugars from different sources, thus assuming similar physiologic effects from sugars of any source. Although the molecules are the same, there is an important distinction in the health risks delivered by different dietary sources which supports the distinction between total, added, and free sugars (Mela & Woolner, 2018, p. 65).

As there seems to be no method to distinguish total sugars from added sugars, the presence of the latter can only be verified through the ingredients' list (Erickson & Slavin, 2015; Hess et al., 2012). The term "added sugars" is defined by the Food and Drug Administration (FDA, 2020) as sugars that are added to foods during processing or preparation, excluding naturally occurring sugars (Azaïs-Braesco et al., 2017; Bernstein et al., 2016; for reviews, see Erickson & Slavin, 2015; Scapin et al., 2018). These include foods packaged as sweeteners, sugars from syrups or honey, and sugars from concentrated fruit or vegetable juices, but not fruit juice itself (Erickson & Slavin, 2015; Evans, 2017; FDA, 2020; Scapin et al., 2018).

Nonetheless, it should be noted that there are different definitions amongst organizations. Although the FDA uses the term "added sugars", the World Health Organization (WHO) privileges the use of the term "free sugars" (Erickson & Slavin, 2015). Both added sugars and free sugars exclude naturally occurring sugars in intact foods (e.g., lactose in dairy foods, sucrose and/or fructose in intact fruits or vegetables, Mela & Woolner, 2018; for a review, see Scapin et al., 2018). The key distinction between these terms is that free sugars comprise all naturally present sugars in nonintact (i.e., juiced or pureed) fruit and vegetables, thus including juice (Mela & Woolner, 2018, see Table 1).

Table 1

General Definitions of Total, Added and Free Sugars

Name/Term	Definition
Total sugars or Sugars	All monosaccharides (i.e., glucose, fructose and galactose) and disaccharides (i.e., sucrose, lactose and maltose) from any different sources, encompassing a combination of free sugar and naturally occurring sugars (i.e., sugar found naturally within whole fruits, vegetables, dairy, and some grains).
Added sugars	All sugars added to foods (e.g., refined sugar, brown sugar, corn syrup, honey and fruit juice concentrate), excluding naturally occurring sugars (e.g., lactose)
Free sugars	All sugars added to foods including naturally occurring sugars in nonintact (juiced or pureed) fruit and vegetables (i.e., all sugars present in honey, syrups, fruit juices concentrate and fruit juice), excluding naturally occurring sugars (in whole/intact foods)

Note. Adapted from Azaïs-Braesco et al. (2017); Bernstein et al. (2016); Mela & Woolner (2018), WHO (2015)

As previously mentioned, excessive sugar consumption has been associated with several health complications and diseases. Specifically, consumption of added sugar is considered an important contributing factor to a positive energy balance, weight gain, obesity, heart disease, diabetes and dental caries (for review, see Erickson & Slavin, 2015). It has also been associated with metabolic problems and health conditions, cardiovascular disease and coronary heart disease (Li et al., 2015; for reviews, see Bernstein & L'Abbé, 2016; Hagger et al., 2017; Scapin et al., 2018). Yet, when compared to total or added sugars, free sugars have been most consistently associated to a positive energy balance, diabetes, dental caries, increased risk of obesity and cardiovascular disease (Mela & Woolner, 2018; for a review, see Bernstein et al., 2016). Moreover, when it comes to positive energy intake and weight gain, the concern seems to be aimed at free sugars (compared to added or total sugars), such that free sugars have been the basis for international recommendations (Mela & Woolner, 2018). As such, it has been strongly recommended that less than 10% of total energy intake should come from free sugars (i.e., 50 grams or 12 teaspoons per day based on a typical 2000-kilocalorie diet), with a further conditional recommendation of limiting free sugar intake to 5% (WHO, 2015, 2020). Nevertheless, as different organizations have proposed and resorted to different terms of sugar (added vs. free) – and given that both terms are similar in their definitions –, for future reference we will take into consideration the body of the literature that includes both, or either, terms.

In Portugal, inadequate eating habits, including an excessive intake of sugar, have emerged as the risk factor that most contributes to the loss of healthy living years by the

Portuguese population (DGS, 2017). On average, consumption of total sugars and free sugars has contributed to 18.5% (84 grams per day) and 7.5% (35 grams per day), respectively, of the total daily energy intake of the general Portuguese population. Despite these results, the average prevalence of individuals who exceed the free sugars intake recommendations (i.e., less than 10% of total energy intake) has been 24.3% among the adult population, 48.7% of adolescents, and 40.7% of children (Lopes et al., 2017). As such, overconsumption of sugar constitutes a problem not just worldwide, but also in Portugal.

Changing people's eating habits is a complicated task. One way to improve consumers' eating habits, including reducing the intake of sugar, involves informing consumers with detailed nutrition information (Miklavec et al., 2015). Providing information to consumers, particularly about nutrition on food labels, is supposed to encourage healthy eating habits and help consumers choose the right food products for them, while keeping freedom of choice and reducing search costs (Barreiro-Hurle et al., 2010; Berning et al., 2011). Health and nutrition claims (HNCs) are one example of nutrition information presented in packaged foods. Next, we will review previous research on how these types of claims influence consumers' attitudes, perceptions and consumption behavior.

Influence of Claims on Consumers

Packaged food products seem to be the key source of added/free sugars in various countries (for a review, see Scapin et al., 2018). With the aim of contributing to a reduction of the incidence of diet-related diseases, HNCs have become a recognized means of communication with the consumer (van Trijp & van der Lans, 2007) that strives to foster healthier eating habits in the general population (Gregori et al., 2014). As such, food labelling can be viewed as a legitimate informative tool for consumers to make educated choices regarding their intake of added/free sugars (Scapin et al., 2018; Wills et al., 2012).

The quality consumers infer from intrinsic (e.g., taste) and extrinsic (e.g., labels and claims) product characteristics can influence food purchase behavior (for a review, see Ballco et al., 2020, p. 2). Specifically, extrinsic characteristics, or credence attributes (Caswell & Mojduszka, 1996), are used by the consumer to form expectations about a product's quality and possible benefits (for a review, see Ballco et al., 2020). For instance, traditional food labels, such as nutrition facts panel, serving size information and ingredients list, are used to communicate basic nutrition information. However, as more health and nutritional benefits have been displayed on recent food packages, front-of-pack labels and health-related claims (i.e., health and nutrition claims) seem to have emerged (Anastasiou et al., 2019).

Claims can be defined as any message or representation (e.g., pictorial, graphic, or symbolic) which states, suggests or implies that a food has particular characteristics (EC, 2006). Within the European Union, European Regulation no. 1924/2006 (EC, 2006) allows two types of claims on food products: health claims and nutrition claims. Health claims (HCs) state that a nutritional characteristic has a beneficial health effect on the body (Steinhauser et al., 2019) and can be subdivided into function claims (e.g., "Vitamin C increases iron absorption") or reduction of disease risk claims (e.g., "Calcium helps to reduce the loss of bone mineral in post-menopausal women. Low bone mineral density is a risk factor for osteoporotic bone fractures", van Buul & Brouns, 2015). While a HC indicates a relation between the food and a health effect on the body, a nutrition claim conveys the nutrient content without explaining its relationship (Lähteenmäki, 2013).

A nutrition claim (NC) therefore states that a food has a certain nutritional characteristic (Steinhauser & Hamm, 2018) and makes assertions about a food's nutrition content without providing exhaustive information about the product's nutrient profile or further clarification of actual health outcomes (Lähteenmäki, 2013; Menger-Ogle & Graham, 2018, see Table 2). These are intended to emphasize key nutritional features meant to appeal to consumers (Kaur et al., 2017). Nutrition claims can be divided into content claims, stating the level of a nutrient contained (e.g., "Contains calcium", "sugar free") or comparative claims, comparing the nutrient and/or energy levels of two or more products (e.g., "reduced sugar", "light"; EC, 2006; van Buul & Brouns, 2015). The Codex Alimentarius further adds a non-addition category, in which these claims state that a specific ingredient has not been added (e.g., "sugar free" - de Boer & Bast, 2015; Codex Committee on Food Labelling, 2013). Andre et al. (2016), on the other hand, suggest a classification system of these claims based on two criteria: nature versus science based, positive or negative focus. Thus, four types of claims are possible: removing claims (i.e., science-based and negative-focused, e.g., "sugar free"), adding claims (i.e., science-based and positive-focused, e.g., "added vitamins"), not removing claims (i.e., nature-based and positive-focused, e.g., "organic") and not adding claims (i.e., nature-based and negative-focused, e.g., "no artificial flavor").

Table 2

Definitions and Categorization of Claims on Food Products

Name	Definition	Type of claim
Health claim	Any claim that states, suggests or implies a relationship between a food category, a food or one of its constituents and health, stating that a nutritional characteristic has a beneficial health effect on the body	Function claims Reduction of disease risk claims
Nutrition claim	Any claim that states, suggests or implies that a food has particular beneficial nutritional properties due to the energy, nutrients or other substances it contains, contains in reduced or increased proportions or does not contain	Content claims Comparative claims

Note. Based on European Regulation no. 1924/2006 (EC, 2006); van Buull & Brouns (2015)

Consumers can only take advantage of HNCs if these are accurate and well understood, because not understanding this information can have a negative impact on food choices (Hagmann et al., 2018; Nocella & Kennedy, 2012). As such, HNCs have become regulated in order to prevent potentially misleading claims, and to help consumers make informed decisions regarding the food they consume and increase healthy food choices (Miklavec et al., 2015; van Trijp & van der Lans, 2007). The use of HNCs should provide precise, scientific, and substantiated information about the mentioned ingredients and their potential outcomes on health (van Buul & Brouns, 2015). Indeed, European Regulation no. 1924/2006 (EC, 2006) declares that claims should not be false, ambiguous or misleading; raise doubts regarding the safety and/or the nutritional adequacy of other foods; encourage or condone excess consumption of a food; state, suggest or imply that a balanced and varied diet cannot provide appropriate quantities of nutrients in general; or refer to changes in bodily functions which could exploit fear in the consumer.

As such, the use of HNCs is only allowed if it has been proven that the presence, absence or reduced content of a nutrient or substance has a beneficial nutritional or physiological impact (EC, 2006). The nutrient or substance targeted by the claim must be present (or be absent or present in reduced quantity) in the final product in significant amount so that it exerts its effect; be found in a form that can be assimilated by the organism; the quantity of food likely to be consumed must provide a significant amount of the targeted nutrient or substance; it should be plausible that the average consumer understands the beneficial effects expressed by the claim; and it must refer to the product ready for consumption according to the manufacturer's

instructions (Associação Portuguesa dos Nutricionistas, 2017; EC, 2006). Moreover, according to European Regulation no. 1924/2006 (EC, 2006), there are specific conditions for using certain NCs about sugar content (also referred to as "sugar-related claims"). For example, for a product to contain a "low sugar" claim, or any claim likely to have the same meaning for the consumer, the product has to contain no more than 5 grams of sugar per 100 grams for solid foods or 2.5 grams of sugar per 100 milliliters for liquid foods. For a product to have a "sugar free" claim, or any claim likely to have the same meaning for the consumer (e.g., "0% sugar"), the product has to contain no more than 0.5 grams of sugar per 100 grams or 100 milliliters. As for products with a "no added sugar" claim, or any claim likely to have the same meaning for the consumer, the product cannot contain any added mono- or disaccharides or any other food used for its sweetening properties.

Although there are technical and legal differences between HNCs, it is important to notice that for consumers this distinction may not be clear and meaningful and, as such, they might not always understand it. Possibly, this may happen due to cultural differences between consumers, personal relevance for the consumer himself or the fact that all claims are based mostly on nutritional factors and describe a link between health and nutrition and, as such, consumers can simply process this information as being all the same (for reviews, see de Boer & Bast, 2015; Lähteenmäki, 2013). As for knowledge specifically regarding sugar, Chien et al. (2018) reported that mothers with low knowledge about sugar misunderstood NCs such as "no added sugar", which could lead to poor choices (e.g., excessive sugar intake) regarding their children's diets. Moreover, other studies found an inverse association between knowledge about sugar and the intake of foods and beverages containing sugar (for reviews, see Gupta et al., 2018; Rampersaud et al., 2014). On the other hand, it is important to remark that there are also studies that did not find a relationship between knowledge about sugar and intake of sugar-sweetened beverages intake (for a review, see Gupta et al., 2018).

Health and nutrition claims, when used responsibly, can help consumers make healthier and well informed food choices (for reviews, see Kaur et al., 2017; Leathwood et al., 2007). By being scientifically substantiated, HNCs show the consumer relevant information that could otherwise remain hidden (van Trijp & van der Lans, 2007). Nevertheless, these claims also have the potential to mislead consumers (for a review, see Kaur et al., 2017). In fact, highlighting some product attributes can bias and misdirect consumers towards food choices that may be against their own best interests or that are less healthy overall (e.g., Leathwood et al., 2007; Prada et al., 2016). As such, three effects have been described: a positivity bias (or the mere-label effect), a halo effect (or the overgeneralization effect) and/or a magic bullet effect.

A positivity bias or mere-label effect occurs when consumers give a higher or more favorable evaluation of a product overall due to the mere presence of a claim (Leathwood et al., 2007; Lynam et al., 2011; Miklavec et al., 2015; Roe et al., 1999) and perceive it more positively than a product without claim (Kaur et al., 2017; for a review, see Talati et al., 2016). In fact, almost any claim can be expected to enhance consumers' evaluations of a product (Leathwood et al., 2007, p. 479) and, as such, this effect seems to often be present in products with HNCs.

A halo or overgeneralization effect happens when a consumer incorrectly credits a product with positive attributes unrelated to the claim and generalizes this positive perception to other nutrients not explicitly mentioned by the claim (Kaur et al., 2017; Lynam et al., 2011; Roe et al., 1999; van Trijp & van der Lans, 2007). For example, a NC such as "low fat" can lead to the perception that a product (e.g., M&M's) has also less calories than its regular version without this claim (Wansink & Chandon, 2006), when in fact no such claim regarding calories is present. This can also occur with other claims, where organic products (e.g., M&M's, Oreos) are perceived as healthier and less caloric than their regular versions without such claims (Prada et al., 2016; Schuldt & Schwarz, 2010).

Finally, a magic-bullet effect occurs when consumers attribute excessive or inappropriate health benefits to a product with a claim (Lähteenmäki et al., 2010; Lynam et al., 2011; Roe et al., 1999). For example, Roe et al. (1999) found that individuals, when asked open-ended questions about the health benefits of eating a frozen lasagna with a "low fat and low cholesterol" claim, attributed inappropriate health benefits to the product, such as saying that low fat lasagna would reduce the risk of birth defects. Another example of this effect is when a consumer understands a claim such as "phytosterols reduce cholesterol" as meaning that the product protects against cardiovascular disease, which is an unsubstantiated extrapolation (Orquin & Scholderer, 2015, p. 145).

Consumers may also infer negative characteristics from HNCs (for a review, see Steinhauser et al., 2019). For example, Berning et al. (2011) conducted a study with the aim of understanding if nutrition labels influenced the consumer purchase behavior. The results demonstrated that, when people were exposed to NCs (e.g., low fat) on grocery store shelves below the products (e.g., microwave popcorn), sales of the product near the NC (i.e., popcorn with a "low fat" claim below the shelf) decreased while sales of "unhealthy" popcorn (i.e., without claim) increased. The authors however stated that it is not clear if the increase of "unhealthy" popcorn was due to an unknown store promotion, the presence of nutrition labels on other popcorn or both. The authors also suggested this might be due to consumers perceiving the additional information (i.e., the claims) negatively.

Although consumers claim to use nutrition information on foods frequently, there are not many who actually do so or that only read food labels when deciding to purchase a new product or brand (for reviews, see Nørgaard & Brunsø, 2009; Storcksdieck genannt Bonsmann & Wills, 2012; Williams, 2005). Moreover, Stranieri et al. (2010) conducted a study that explored consumers' interest towards nutrition labelling and claims and which information consumers considered important in their purchasing decisions. The authors found that although most of the participants considered nutrition labelling important, almost half of them stated they did not use it for their purchase decisions. Research has also shown that consumers look at HNCs and make decisions in very few seconds, making it difficult to process all the information available (Milosavljevic & Cerf, 2008; for a review, see van Buul & Brouns, 2015). Accordingly, some studies have shown that consumers only partially process food information and may be even unconscious of its presence (for a review, see Ballco et al., 2020). Nevertheless, consumers seem to frequently look for claims in food labels and to be genuinely interested in HNCs (for reviews, see Gorton et al., 2010; Nocella & Kennedy, 2012), such that even consumers who do not usually read nutrition labels seem to rely on NCs (Stranieri et al., 2010).

Impact of Claims on Consumers' Perceptions

Impact of Claims on Consumers' Perceptions of Healthfulness

Food packages and labels are used to provide information about a product's healthfulness (for a review, see Reis et al., 2017). Research has shown that products with HNCs (e.g., "probiotic", "no added sugar") are usually perceived as healthier than the regular products without such claims (Chien et al., 2018; Miklavec et al., 2015). Bailey and Muldrow (2019) showed that even healthfulness ratings of less healthy foods (i.e., chocolate breakfast cereals) with NCs (e.g., "low fat" and "a good source of fiber") may be higher than ratings for healthier options (i.e., regular breakfast cereals) with the same claims.

Other studies, however, did not observe these effects or only found weak effects of the presence of a claim in perceptions of healthfulness. Orquin and Scholderer (2015) conducted a series of experiments in order to understand if consumers were biased by the presence of HNCs. They found a positive effect of NCs (i.e., dairy product with "source of calcium" claim) on perceived healthfulness, suggesting that even NCs with redundant information (such as a dairy product having calcium) can lead consumers into believing that a product is more healthful than other similar products. However, for NCs about nutrient reductions (e.g., "contains less fat" or

"contains 20% less calories"), the authors did not observe effects on perceived healthfulness. In the same vein, Lähteenmäki et al. (2010) carried a study aiming to examine whether HNCs influenced consumers' perceptions of various food attributes (e.g., attractiveness, healthfulness, naturalness, tastiness and ability to reduce risk of disease). In this study, the ratings of several products (i.e., bread, yogurt and pork) were compared between versions with and without HNCs (e.g., "This yogurt contains bioactive peptides", "This bread contains omega-3 which enhances the memory function", "This bread contains omega-3 which prolongs the feeling of satiety and therefore helps to maintain bodyweight"). The findings suggested the known positive halo effect from HNCs to be of weak to moderate influence. Indeed, the presence of a claim such as "This yogurt contains omega-3" increased perceived healthfulness but, when the "bioactive peptides" claim was present, the effect on perceived healthfulness was negative, showing a negative halo effect when consumers were exposed to claims containing ingredients and benefits they were not familiar with. Additionally, Bialkova et al. (2016) explored the role of nutrition labels and advertising claims on consumers' experienced taste, perceived healthfulness and buying intention. The authors found that breakfast cereals with a "30% less sugar" claim were perceived as less healthy. This unexpected result was explained by the authors in relation to the fact that the study explored the combined effect of both nutrition labels (e.g., "30% less sugar") and advertising claims (e.g., "100% Healthful Pleasure"). Nonetheless, considering all the available evidence, there does seem to be an association between the presence of HNCs and perceptions of healthfulness – even if this is weak or negative in some cases.

Regarding NCs about sugar content specifically, a few studies have shown that products bearing sugar-related claims can be perceived as healthier when compared to other products with other types of claims or without claims (Carrillo et al., 2012a; Chien et al., 2018). Carrillo et al. (2012a) explored the effects of food package information, including various HNCs (e.g., "no added sugar", "66% cereal, whole wheat, source of fiber, helps you keep fit because of fiber content") and sensory characteristics (e.g. texture, taste) on perceptions of healthfulness and acceptability of cookies, among sessions, with and without taste tests. The authors found that, both in informed tasting and expected condition (without tasting), participants perceived the "no added sugar (diet-fiber)" cookie as the healthiest compared to the remaining cookies with different HNCs. Moreover, Chien et al. (2018) carried a study to explore the influence of mothers' knowledge and attitudes on purchase intentions for children's breakfast cereals with "no added sugar" claims. The results showed that more than half of the mothers in the study

believed that breakfast cereals with a "no added sugar" claim were healthier than regular breakfast cereals.

Impact of Claims on Consumers' Perceptions of Calories

Regarding calories, the presence of a claim (e.g., "organic") is able to influence one's caloric estimation of products (Lee et al., 2013). For instance, two studies explored the mechanisms underlying the bias of organic claims on leniency judgments (e.g., considering missing exercise as more or less acceptable when the target had consumed organic food, Prada et al., 2016) and if the perceived advantage of organic over regular food generalizes across different organic food types (Prada et al., 2017). It was concluded that consumers do perceive products with claims (e.g., "organic") as being less caloric than the regular products (i.e., without claim). Moreover, Wansink and Chandon (2006) conducted a study with the aim of discovering if "low fat" claims could contribute to obesity. They discovered that participants perceived products with a "low fat" claim as less caloric than products without NCs and would consume more of the product if it had this claim. Likewise, Patterson et al. (2012) conducted a study (with qualitative and quantitative research techniques) on consumer understanding of sugar-related claims on food and drink products, in which participants expected a calorie reduction when a product included a reduced content claim (e.g., "reduced sugar" or "low fat"), which could lead to eating more of the food product (Chan et al., 2005). Calorie estimation can be a cognitively demanding task and, as such, people might use claims (e.g., "organic") as a heuristic to simplify nutrition information, which therefore fosters lower calorie judgments through the previously mentioned halo effect (Schuldt & Schwarz, 2010).

Impact of Claims on Consumers' Perceptions of Taste

Just as for healthfulness, when it comes to perceptions of taste, the effects of HNCs do not seem to be linear. When consumers intend to buy a less healthy product, such as a treat, "fun" or "bad" food (e.g., chocolate or candy), they may not care for its nutritional content because this type of food intends to meet more hedonistic needs (Balasubramanian & Cole, 2002; Chan et al., 2005) and thus taste is seen as the most important factor (Loebnitz & Grunert, 2018). Hence, adding NCs on hedonic food products may lead to a negative effect on perceptions of taste, such that consumers may expect poorer taste (for a review, see Loebnitz & Grunert, 2018). Indeed, there seems to be a mismatch between positive attitudes expressed towards HNCs and consumers' purchase intentions, possibly due to negative taste expectations (Ballco et al., 2020).

Research has shown that HNCs can create the perception that food is less tasty (for reviews, see Bailey & Muldrow, 2019; Bialkova et al., 2016) and that consumers usually perceive products with a claim (e.g., "reduced fat", "organic") as less tasty than the regular product without the claim (Hamilton et al., 2000; Prada et al., 2016; Schuldt & Hannahan, 2013; for a review, see Steinhauser et al., 2019). Patterson et al. (2012) also found that participants expressed negative reactions when asked about reduced sugars claims (e.g., "I really don't like the taste"). This observation that products with claims are perceived as less tasty than products without such claims is one of the biggest challenges in the use and promotion of products bearing HNCs (Lähteenmäki, 2013; Petrovici et al., 2012). In fact, consumers may sometimes use nutrition labels to avoid products that possess characteristics they associate negatively with taste (e.g., avoid "low fat" ice cream because they expect a less satisfying taste than regular ice cream, Berning et al., 2011).

Moreover, research has shown an inverse relationship between perceived healthfulness and taste, and that consumers believe that food cannot be made healthier without sacrificing taste (i.e., health-pleasure trade-off effect, Loebnitz & Grunert, 2018; Nørgaard & Brunsø, 2009). For instance, Schuldt and Hannahan (2013) found that while organic foods were perceived as being healthier than regular foods, they were also perceived as less tasty. This relationship has also been reported among information about sugar reductions or replacements, which can have a negative impact on consumers' hedonic perceptions (for a review, see Reis et al., 2017). For example, Bialkova et al. (2016) also found that cereal bars, a product perceived as healthy, were perceived as less tasty when bearing a "30% less sugar" claim than the same product without claim. Carrillo et al. (2012a) has also found that, although the cookies with a package that stated "no added sugar (diet-fiber)" were perceived as the healthiest among cookies with other HNCs, these were also the least accepted cookies when participants saw both the product's package and its respective card with HNCs and tasted it (i.e., informed tasting session), possibly meaning that participants did not want to sacrifice taste for health benefits.

As consumers do not seem to be ready to compromise taste over health, except health-oriented consumers (Sabbe et al., 2009; Verbeke, 2006), their purchase behavior will only change towards healthier products if they perceive the taste to be equal or better (Ballco et al., 2020). Nonetheless, a study by Bailey and Muldrow (2019) investigated the impact of food claims (e.g., "great taste"; "low fat", "a good source of fiber"), food cues (i.e., image or words of food) and objective health characteristics (i.e., with or without sugar) on health categorization speed and accuracy, believability of claims and perceptions of health and taste. The authors found that less healthy products (i.e., with chocolate) bearing NCs (e.g., "low fat", "a good

source of fiber") were seen as tastier than healthier products, although the authors argue that this effect occurred perhaps due to the foods chosen (i.e., Kellogg's Special K breakfast cereals, Nature Valley granola bars and Subway submarine sandwiches), which were products and brands previously described in the literature as prompting halo effects.

Can Product Category Act as a Moderator of HNCs' Impact on Consumers' Perceptions?

Some research has shown that consumers' search or interest in nutrition information and the perception of HNCs can depend on various factors, including the type of product that carries the claim (for reviews, see Carrillo et al., 2012b; Fenko et al., 2016; Steinhauser & Hamm, 2018). As individuals tend to categorize foods in a dichotomic way, as either healthy or unhealthy (Bailey & Muldrow, 2019), consumers may not consider the specific nutritional composition of a food product but rather use heuristics, which is closely connected to product categories (for a review, see Steinhauser & Hamm, 2018).

Despite HNCs being legally regulated in order not to mislead consumers, these claims are present on both nutritionally favorable products and hedonic or less nutritionally favorable ones (for a review, see Steinhauser & Hamm, 2018). As NCs can create the image of healthfulness for less healthy products (for a review, see Menger-Ogle & Graham, 2018), this dichotomic way of perceiving foods can predispose consumers to classify products with HNCs as healthy or healthier than their regular alternatives, even when they are not (Gorton et al., 2010; for a review, see Bailey & Muldrow, 2019). Indeed, the presence of HNCs on less healthy food can lead to positive preferences because it can benefit from highlighting its health aspects (for a review, see Steinhauser et al., 2019). Research has shown that a HNC on an unhealthy product leads to higher preferences than a HNC on a healthy product (for a review, see Steinhauser & Hamm, 2018) and that consumers might find enrichments of less healthy food as more justified than enrichments of food already perceived as healthy (Bech-Larsen & Grunert, 2003). Krutulyte et al. (2011) also found that consumers tend to perceive a better fit between product and claim if the product that carries the claim is less healthy. However, there is also the possibility that, if consumers perceive a product (e.g., chocolate) as a treat or its category as unhealthy, they may simply ignore the information stated or find its nutritional content irrelevant to their purchase decisions (Chan et al., 2005; Steinhauser & Hamm, 2018). In that regard, other studies have also shown that HNCs can act as a form of justification and reduce consumer's guilt through an enhancement of the nutritional characteristics of less healthy products (for a review, see Steinhauser et al., 2019).

Contrarily, other studies have shown that the presence of a HNC leads to higher preferences when it is on a healthy product than when it is on an unhealthy product, such that on unhealthy foods these can lead to neutral or even negative effects on preferences, purchase intentions, and actual purchases (for reviews, see Steinhauser et al., 2019; Steinhauser & Hamm, 2018). Specifically, research has also shown that NCs on healthy products can lead to positive evaluations or increase in purchases (for a review, see Steinhauser et al., 2019). When it comes to healthy products, some consumers perceive these as more acceptable and credible products to carry HCs (for a review, see Fenko et al., 2016) while, on unhealthy products, HNCs might lead to skepticism and distrust (for reviews, see Krutulyte et al., 2011; Steinhauser et al., 2019). Moreover, some consumers also mention to pay more attention to HNCs on healthy food than on unhealthy food (Steinhauser et al., 2019).

Research has shown that yogurts and breakfast cereals are food categories where the use of HCs is most frequent (for a review, see Miklavec et al., 2015) and that HNCs seem to be positively linked to these (Johansen et al., 2010; for a review, see Steinhauser & Hamm, 2018). For example, Johansen et al. (2010) studied the acceptance (liking and purchase behavior) of yoghurt when information about sugar and fat content was provided while participants tasted the product (informed testing vs. blind testing). The authors found that sweetness (blind tasting) and information about sugar content (informed tasting) had significant effects on liking and purchase probability of yogurt, and that consumer acceptance of yogurt was generally increased by giving information about low sugar content (vs. no information).

Concluding, the current body of literature has shown that products with HNCs are generally perceived as being healthier and less caloric but less tasty than products without these claims, and that consumers can perceive HNCs differently depending on how the product is identified (healthy vs. unhealthy). However, while numerous studies have explored the relationship between HNCs and consumers' attitudes, perceptions and consumption behavior, we did not find any study that systematically examined possible differences between sugar-related claims and how these impact consumers' perceptions. As mentioned before, there are several possible reasons why consumers might not understand the differences between specific claims and, as such, it is important to explore how consumers might perceive each one. That said, in this study we aimed to understand how NCs regarding sugar content (i.e., "sugar free", "no added sugar", "0% sugar" and "low sugar") influence how consumers perceive the healthfulness, calories and taste perceptions of different products in comparison with the same products without such claims. Given that research has shown that the influence of HNCs can

be moderated by the product category, for replication purposes, we decided to use four product categories that may vary in a priori perceived healthfulness (i.e., yogurts, ice creams, breakfast cereals and cookies, see Choi et al., 2012).

Hence, our hypotheses are as follows:

H1: Products with nutrition claims regarding sugar content will be perceived as healthier and less caloric than products without nutrition claims, and

H2: Products with nutrition claims regarding sugar content will be perceived as less tasty than products without nutrition claims.

Chapter II: Method

Participants

The sample included 200 individuals (83% women), aged between 18 and 70 years (M = 30.26, SD = 11.22), who volunteered to collaborate in an online study. Most participants (82.5%) were recruited via email or social media, whereas the remaining received partial course credit and responded to the survey in the Social and Organizational Psychology Laboratory (LAPSO) of Iscte - Instituto Universitário de Lisboa (Iscte-IUL). The inclusion criteria were having at least 18 years-old and having Portuguese nationality or residing in Portugal for the past five years.

As shown in Table 3, almost half of the participants reported living in the metropolitan area of Lisbon (44.5%) and two-thirds had completed (or were attending) a higher education degree (e.g., bachelor, masters, doctoral, 67.5%). Half of the participants (50%) reported having qualifications related with health (e.g., nutrition, medicine, psychology, nursing, sports' science, pharmaceutics, biochemistry, veterinary).

Participants evaluated their level of qualifications in health as moderate (M = 4.03, SD = 1.77, 95% CI [3.78, 4.28], 7-point scale), despite being highly interest in health (M = 5.51, SD = 1.53, 95% CI [5.29, 5.72], 7-point scale). Participants were also highly interested in nutrition (M = 5.03, SD = 1.79, 95% CI [4.78, 5.28], 7-point scale) but self-reported qualifications in this domain were low (M = 3.63, SD = 1.66, 95% CI [3.40, 3.86], 7-point scale).

Table 3

Participants' Sociodemographic Information (N = 200)

Variable	*n*	%
Residency[a]		
Metropolitan Area of Lisbon	89	44.5
Alentejo	17	8.5
Algarve	1	0.5
Center	62	31
North	27	13.5
Madeira	3	1.5
Education		
Basic	7	3.5
Secondary	58	29
Bachelor/Undergraduate	80	40
Masters or postgraduate	51	25.5
Doctoral	4	2
Area of studies		
Nutrition/Food engeneering	7	3.5
Health	27	13.5
Psychology	45	22.5
Health-related	21	10.5
Other	75	37.5
Not specific/No higher education	25	12.5

[a] Analysis conducted for 199 subjects, 1 missing

The majority of the participants followed a regular diet (91%) and reported not having any health conditions (87%, e.g., do not have allergies, diabetes, cholesterol). Most participants (64%) had a normal Body Mass Index (BMI) and almost half (46.5%) perceived their body image as similar to the average person with same age and sex (see Table 4).

Table 4

Participants' Health-related Information (N = 200)

Variable	*n*	*%*
Diet		
Regular/Omnivor	182	91
Vegetarian	12	6
Vegan	2	1
Other	4	2
Health condition		
Allergies (general)	2	1
Food allergies/intolerances	9	4.5
Diabetes	3	1.5
Cholesterol	2	1
Gastrointestinal diseases	4	2
Eating disorders	1	0.5
Other (non-diet-related)	5	2.5
BMI[a,b]		
Underweight (< 18.5)	12	6
Normal weight (18.5-24.9)	128	64
Pre-obesity (25-29.9)	39	19.5
Obesity (> 30)	10	5
Perception of body image		
Below the average person	35	17.5
Similar to the average person	93	46.5
Above the average person	72	36

[a] Analysis conducted for 189 subjects, 11 missing

[b] BMI was computed using the metric formula (Weight in kilograms)/(Height in meters x Height in meters) (WHO, n.d.)

Study Design

Participants were asked to rate food products showing different types of sugar content claims in relation to their relative healthfulness, calories and taste in comparison to the regular versions of the same product (i.e., without claim). The study followed a within-subjects design, with 4 (product categories: breakfast cereals, cookies, yogurts and ice creams) x 4 (types of claim: "0% sugar", "sugar free", "low sugar" and "no added sugar"), across three dimensions (healthfulness, calories and taste).

Procedure

The data were collected between 19th November 2019 and 13th December 2019 through an online questionnaire, created in Qualtrics platform and disseminated through a snowball

method, mostly across social networks (e.g., Facebook, Instagram, LinkedIn), and sessions at LAPSO in Iscte-IUL. The questionnaire included 16 items plus the main task and demographic questions – taking approximately 10 minutes to complete.

Before starting the questionnaire, participants were informed that they would be collaborating in a study developed in the context of a master's dissertation in Psychology, with the aim of exploring consumers' perceptions about different food products in Portugal. The participants were also informed that their participation was voluntary, that their responses were confidential, and that they could quit the questionnaire whenever they chose to by simply closing the internet browser. After agreeing to participate in the study, individuals would first be questioned about their sociodemographic information (see Table 3) and later about the measures described in Table 4. Specifically, the questionnaire included three main blocks: sociodemographic questions (see Appendix A), main task (i.e., evaluation of four product categories in relation to four different sugar-related claims, see Appendix B) and control questions (see Appendix C).

Measures

The sociodemographic block included questions related to age, sex, education level, area of studies and perception of socioeconomic status (Adler et al., 2000).

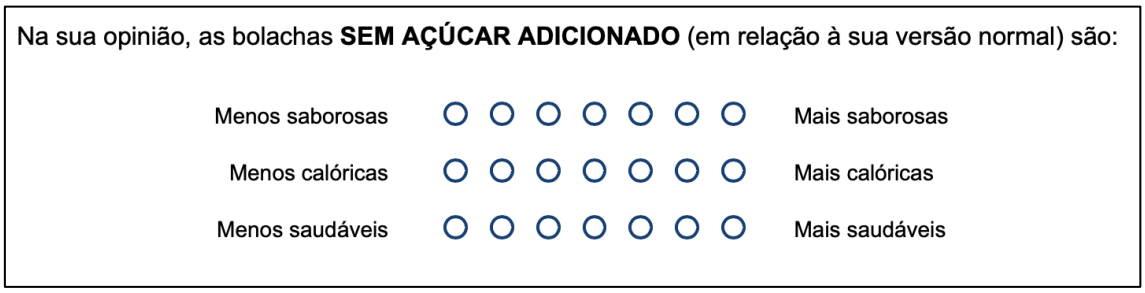
As for the block with the main task, participants were informed that they would find a set of product categories with lower sugar content and, as such, they would be asked to evaluate the products in relation to their regular version regarding their level of healthfulness, calories and taste. Participants were requested to think of a given product category, namely yogurts, ice cream, cookies or breakfast cereals (presented in random order). Each category was then paired, in random order, with the four claims (i.e., "0% sugar", "sugar free", "no added sugar", "low sugar")[1]. The task consisted in evaluating each category/claim pair regarding its level of perceived healthfulness (*1 = Less healthy* to *7 = Healthier*), calories (*1 = Less caloric* to *7 = More caloric*) and taste (*1 = Less tasty* to *7 = Tastier*) in comparison with the regular version without a claim, using 7-points ratings scales (Prada et al., 2017). The evaluative dimensions were also presented in random order. As shown in Figure 1, the type of claim was capitalized and presented in bold in order to stand out and to make sure the participants would perceive the differences between trials (e.g., "In your opinion, **NO ADDED SUGAR** cookies (in relation to

[1] In Portuguese, "0% açúcar", "sem açúcar", "sem açúcar adicionado" and "baixo teor de açúcar", respectively

their regular version) are..."). This section included 16 trials, presented in independent screens, in order to evaluate the product categories and types of claims altogether.

Figure 1

Example of Product Evaluation Trial (Main Task)



Note. Here we present an example for cookies with a "no added sugar" claim

After the main task, the last block included four sets of control questions. The first set aimed to assess self-reported influence of three aspects – use of nutritional table, list of ingredients and NCs – on consumption decisions (Tierney et al., 2017). Specifically, instructions stated that "Food packaging contains a set of information that seeks to clarify the consumer about the nutritional composition of the food (list of ingredients, nutritional table and presence or absence of certain statements on the front of the package (i.e., sugar free, with stevia)" and participants were asked to indicate how often each of the sources influenced their consumption decisions, using a 7-point rating scale (*1 = Never* to *7 = Always*). The second set aimed to assess self-reported perceptions of products with sugar-related claims. Specifically, instructions stated that "Some foods may contain certain nutritional information on the front of the packaging relating to the content or type of sugar contained" and participants were asked to evaluate these products using 7-point rating scales (*1= Unhealthy* to *7 = Very healthy*, *1 = Less tasty* to *7 = Very tasty*, *1 = Less caloric* to *7 = Very caloric*, *1 = Unnatural* to *7 = Very natural*, *1 = Cheap* to *7 = Expensive*, *1 = Bad* to *7 = Good* , and *1 = Distrustful* to *7 = Trustworthy*, Prada et al., 2019)[2]. In the third set participants were asked to indicate how often they payed attention to their sugar intake, using a 7-point rating scale (*1 = Never* to *7 = Always,* Hagmann et al., 2018). Finally, in the last set participants were also asked to indicate how they classify their level of qualifications in health and nutrition, and their level of interest in health and nutrition, using a 7-point rating scale (*1 = Elementary* to *7 = Advanced*), and to indicate how

[2] We created an index (general perception of products with sugar-related claims), comprising all dimensions except cost (Cronbach α = .72)

they would rate their weight in comparison to people of the same age and sex, using a 7-point rating scale (*1 = Well below average* to *7 = Well above average)*. They were also asked to indicate their type of diet (e.g., regular/omnivorous, vegetarian, vegan, other), height, weight and health condition.

At the end of the study, participants were thanked and debriefed, and the project's email was provided, so that they could contact the research team later if they had any questions or comments.

Data Analysis

Only completed questionnaires were retained and statistical analyses were performed using IBM SPSS Statistics v.26.

Firstly, we will present descriptive results regarding the overall evaluations of products with sugar-related claims compared with regular products. To examine participants' overall evaluations of products with sugar-related claims versus regular products across the evaluative dimensions (irrespectively of product categories), we used a one-sample *t*-test against the 7-point rating scale's midpoint.

Secondly, we will present the results examining the impact of the claims on ratings, according to product categories, for each evaluative dimension (i.e., healthfulness, calories and taste). To analyze the impact of the type of claim on the three evaluative dimensions, we conducted a repeated-measures ANOVA considering the full 4 (product category) x 4 (type of claim) within-participants design. Whenever assumptions of sphericity were violated, Huynh-Feldt correction was applied. The post-hoc tests reported include Bonferroni correction.

Finally, we will present participants' general perception of products with sugar-related claims, the influence of NCs on their purchase decisions and their consumption of products with sugar-related claims. For these additional analyses, we used a one-sample *t*-test against the 7-point rating scale's midpoint to explore participants' general perception of products with sugar-related claims, and created a correlations matrix between the influence of NCs on purchase decisions, the consumption of products with sugar-related claims and other items (i.e., age, perception of socioeconomic status, nutrition qualifications, interest in nutrition, attention to sugar intake, and general perception of products with sugar-related claims).

Chapter III: Results

Evaluations of Products with Sugar-related Claims Versus Regular Products

To examine the differences in the overall evaluations of products with sugar-related claims versus regular products across the evaluative dimensions (irrespectively of product categories), we compared mean ratings against the 7-point rating scale's midpoint (i.e., a mean score of 4 indicates that the product with a sugar-related claim is equated to the regular version of the product).

There was a significant difference between products with a sugar-related claim and regular products without a claim. As shown in Table 5, products with sugar-related claims were rated as healthier, less caloric and less tasty than the regular products without these claims.

Table 5

Evaluations of Products with Sugar-related Claims across Evaluative Dimensions Compared to Regular Products

Type of claim	Healthfulness			Calories			Taste		
	M	*SD*	*t*(199)[a]	*M*	*SD*	*t*(199)[a]	*M*	*SD*	*t*(199)[a]
0% sugar	5.29	1.20	15.19***	2.7	1.07	-17.16***	3.29	1.08	-9.23***
Sugar free	5.34	1.12	16.84***	2.69	1.06	-17.51***	3.27	1.09	-9.49***
No added sugar	5.23	1.04	16.71***	2.89	1.06	-14.86***	3.54	1.01	-6.41***
Low sugar	4.88	1.13	10.93***	3.13	1.01	-12.17***	3.73	0.98	-3.86***

[a] Value for the one-sample *t*-test = 4 (scale's midpoint)

*** $p < .001$

Impact of Type of Claim on Evaluative Dimensions

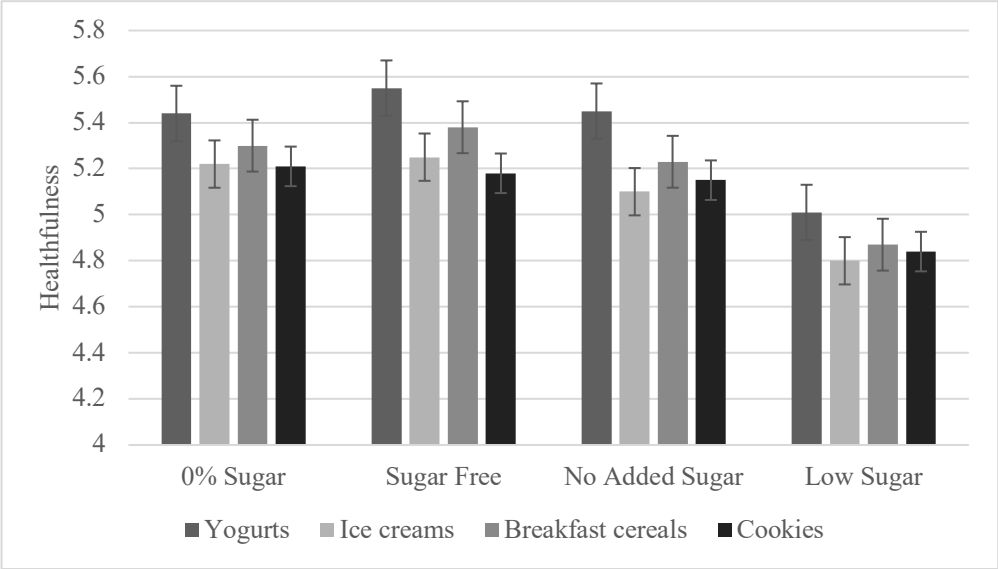
Healthfulness Ratings

Results showed a main effect of the type of claim on perception of healthfulness, $F(2.89,575.37) = 27.43$, $p < .001$, $\eta_p^2 = 0.12$. Specifically, post-hoc tests showed that, in comparison with the regular version of the products, products with the "low sugar" claim were perceived as the least healthy of the products with sugar-related claims ($M = 4.88$, $SE = 0.08$), all ps $< .001$. The healthfulness ratings for products with the remaining claims did not differ significantly, all ps $\geq .337$. We also found a significant main effect of the product category on perception of healthfulness, $F(2.94,585.08) = 8.45$, $p < .001$, $\eta_p^2 = 0.04$, such that yogurts were rated as the healthiest product category ($M = 5.36$, $SE = 0.08$), all ps $\leq .033$. The healthfulness ratings for

the remaining product categories did not differ significantly, all *p*s > .471. As shown in Figure 2, the interaction effect between product category and type of claim was not statistically significant, $F(8.31,1653.66) = .48$, $p = .875$.

Figure 2

Effect of Type of Claim on Perception of Healthfulness by Product Category

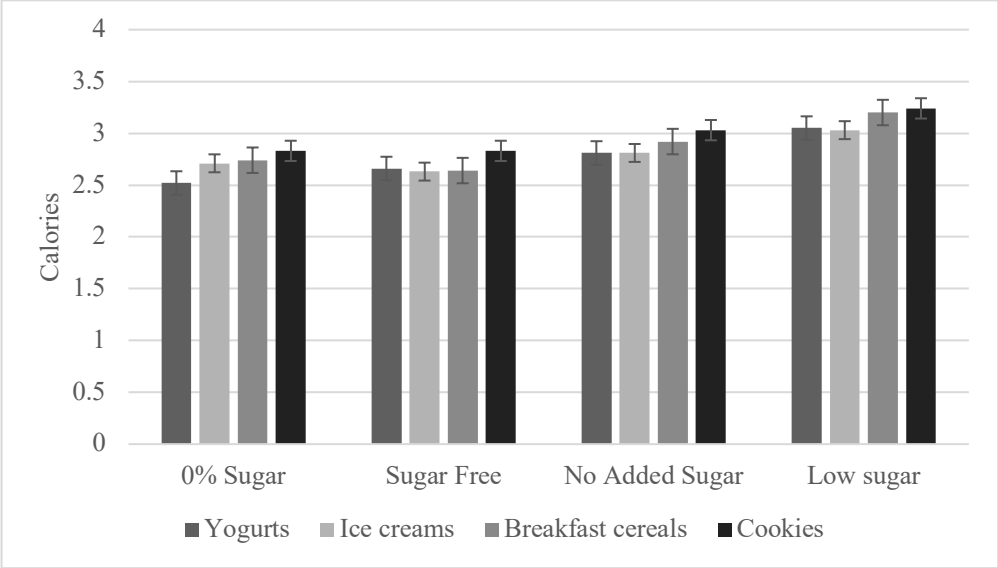


Calories Ratings

Results showed a main effect of the type of claim on perception of calories, $F(2.78,553.72) = 32.93$, $p < .001$, $\eta_p^2 = 0.14$. Specifically, post-hoc tests showed that, in comparison with the regular version of the products, products with the "low sugar" claim were perceived as the most caloric of the products with sugar-related claims ($M = 3.13$, $SE = 0.07$), all *p*s < .001, followed by products with the "no added sugar" claim ($M = 2.89$, $SE = 0.08$), all *p*s ≤ .001. The calorie ratings of products with the remaining claims did not differ significantly, all *p*s = 1.000. We also found a significant effect of the product category on perception of calories, $F(3,597) = 5.90$, $p < .01$, $\eta_p^2 = 0.03$, such that cookies were rated as the most caloric product category ($M = 2.98$, $SE = 0.08$), being significantly different from yogurts, $p = .002$, and ice creams, $p = .016$, but not from breakfast cereals, $p = .247$. The calorie ratings of the products with the remaining claims did not differ significantly, all *p*s ≥ .247. As shown in Figure 3, the interaction effect between product category and type of claim was not statistically significant, $F(8.48,1688.06) = .83$, $p = .585$.

Figure 3

Effect of Type of Claim on Perception of Calories by Product Category

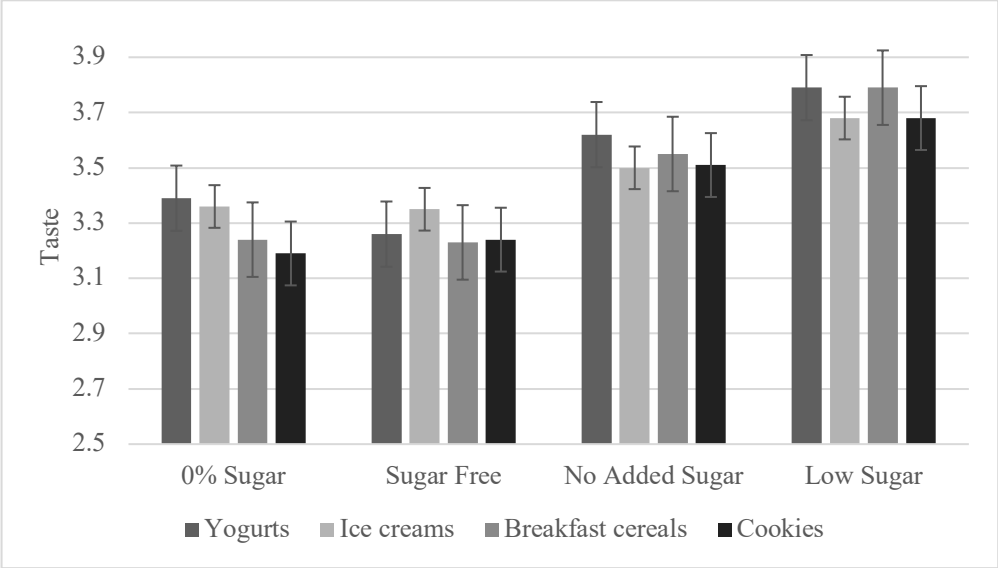


Taste Ratings

Results showed a main effect of the type of claim on perception of taste, $F(2.77,550.53) = 32.15$, $p < .001$, $\eta_p^2 = 0.14$. Specifically, post-hoc tests showed that, in comparison with the regular version of the products, products with the "low sugar" claim were perceived as the tastiest of the products with sugar-related claims ($M = 3.73$, $SE = 0.07$), all ps $\leq .005$, followed by products with the "no added sugar" claim ($M = 3.54$, $SE = 0.07$), all ps $\leq .005$. The taste ratings of products with "0% sugar" and "sugar free" claims did not differ, $p = 1.000$. The main effect of the product category was not statistically significant, $F(2.83,562.94) = .74$, $p = .524$, nor the interaction effect between product category and type of claim, $F(8.75,1741.30) = 1.05$, $p = .399$ (see Figure 4).

Figure 4

Effect of Type of Claim on Perception of Taste by Product Category



Additional Analyses

General Perception of Products with Sugar-related Claims

To examine participants' general perceptions toward products with sugar-related claims, we compared mean ratings against the 7-point rating scales' midpoint (i.e., a mean score different from 4 in a given dimension indicates that, overall, participants consider that the products are either low or high in that dimension).

Products with sugar-related claims were rated as healthy, natural, positive, and low in calories, all *p*s $\leq$ .021. However, participants rated products with sugar-related claims negatively regarding taste, $p = .013$, and cost, $p < .001$, and as moderately trustworthy, $p = .709$ (see Table 6).

For the following analyses, we created an index of general perception of products with sugar-related claims, comprising all dimensions except cost (Cronbach $\alpha = .72$)[3].

[3] No differences were found between general perception of products with sugar-related claims and sex, $t(198) = 0.73$, $p = .468$, nor having a higher education, $t(198) = 1.50$, $p = .136$

Table 6

General Perception of Products with Sugar-related Claims

Dimension	*M*	*SD*	*t*(199)[a]
Healthfulness	4.82	1.27	9.06***
Taste	3.79	1.21	-2.52*
Calories (r)	4.80	1.22	9.25***
Naturalness	4.22	1.37	2.33*
Cost (r)	2.70	1.18	-15.61***
Valence	4.70	1.28	7.68***
Trust	4.04	1.51	0.37

Note. (r) = reversed rating (i.e., higher ratings indicate less calories and cheaper cost)

[a]Value for the one-sample *t*-test = 4 (scale's midpoint)

*** $p < .001$, * $p < .050$

Influence of Nutrition Claims on Purchase Decisions

Results showed that participants mentioned being frequently influenced by NCs on their purchase decisions, $t(199) = 2.33$, $p = .021$. The influence of NCs on purchase decisions did not vary according to sex, $t(198) = -1.77$, $p = .078$, nor having a higher education, $t(198) = 0.66$, $p = .508$. As shown in Table 7, we found a positive relationship between the influence of NCs on purchase decisions and the consumption of products with sugar-related claims ($r = .42$, $p < .001$), self-reported nutrition qualifications ($r = .35$, $p < .001$), interest in nutrition ($r = .40$, $p < .001$), attention to sugar intake ($r = .42$, $p < .001$) and general perception of products with sugar-related claims ($r = .14$, $p = .041$). In other words, individuals that mentioned being often influenced by NCs in their purchase decisions, also reported consuming products with sugar-related claims more often, having more nutrition qualifications and interest in nutrition, paying more attention to their sugar intake and had a more positive general perception of products with sugar-related claims (see Table 6). However, the influence of NCs on purchase decisions was not correlated with age ($r = -.10$, $p = .146$) nor with the perception of socioeconomic status ($r = -.01$, $p = .903$).

Consumption of Products with Sugar-related Claims

Results showed that participants mentioned to often consume products with sugar-related claims, $t(199) = 2.76$, $p = .006$. Consumption of products with sugar-related claims did not vary according to sex, $t(198) = -1.25$, $p = .213$, nor having a higher education, $t(198) = 0.84$, $p = .402$. As shown in Table 7, we observed a positive relationship between the consumption of

products with sugar-related claims and self-reported nutrition qualifications ($r = .25$, $p < .001$), interest in nutrition ($r = .30$, $p < .001$), attention to sugar intake ($r = .50$, $p < .001$) and general perception of products with sugar-related claims ($r = .30$, $p < .001$). In other words, individuals that mentioned consuming products with sugar-related claims often, also reported having more nutrition qualifications and interest in nutrition, more attention to their sugar intake and had a more positive general perception of products with sugar-related claims. However, the consumption of products with sugar-related claims was not correlated with age ($r = .10$, $p = .167$) nor with the perception of socioeconomic status ($r = -.06$, $p = .424$).

Table 7

Correlations

Variable	1	2	3	4	5	6	7	8
1. Influence of NCs on purchase decisions	-							
2. Consumption of products with sugar-related claims	.42***	-						
3. Age	-.10	0.10	-					
4. Perception of socioeconomic status	-.01	-.06	-.28***	-				
5. Nutrition qualifications[a]	.35***	.25***	-.07	.07	-			
6. Interest in nutrition	.40***	.30***	-.09	.15*	.64***	-		
7. Attention to sugar intake	.42***	.50***	-.00	.07	.42***	.56***	-	
8. General perception of products with sugar-related claims[b]	.14*	.30***	.02	.02	-.03	-.09	-.05	-

[a] Self-reported

[b] This index includes six dimensions (Cronbach $\alpha = .72$)

*** $p < .001$, ** $p < .010$, * $p < .050$

Chapter IV: Discussion

It has been extensively documented how excessive sugar consumption is a public health problem and is associated with numerous health risks and diseases (for a review, see Hagmann et al., 2018), including in the Portuguese population where there is a high prevalence of excessive consumption of sugar (Lopes et al., 2017). One strategy to address this problem and improve consumers' eating habits is to provide consumers with nutrition information on food labels (Kaur et al., 2017; Miklavec et al., 2015). Up until now, research has mainly focused on how HNCs in general are perceived and understood and how these influence consumers' attitudes, perceptions and consumption behavior (e.g., Bialkova et al., 2016; Loebnitz & Grunert, 2018; Menger-Ogle & Graham, 2018). To the best of our knowledge, research on NCs specifically about sugar content is still scarce and no study has yet systematically examined possible differences between sugar-related claims and how these can impact consumers' perceptions. As such, with this study we aimed to contribute to the literature on how sugar-related claims can impact consumers' perceptions of healthfulness, calories and taste.

As expected, our two hypotheses were corroborated. Our results show that products with a sugar-related claim, independently of the product category, were perceived as healthier and less caloric (H1) than their regular versions (i.e., without these claims). These effects have already been reported in literature as halo and positivity bias effects (Prada et al., 2017; Roe et al., 1999; Wansink & Chandon, 2006), such that when a product contains a given HNC consumers seem to extrapolate its nutrient statement to other nutrients (e.g., by having less sugar it should mean it is also less caloric) and to provide a better evaluation of the product overall (e.g., being healthier). For example, regarding calories, Wansink and Chandon (2006) showed that consumers perceive products with NCs (e.g., "less fat") as less caloric than products without such claims and Patterson et al. (2012) found that more than half of the study's subjects expected that a product with a NC regarding a sugar reduction (e.g., "reduced sugars", "no added sugars") had a similar calorie reduction.

The fact that products with claims are perceived as less caloric can also have negative consequences towards consumption behavior. For instance, it has been reported an association between foods with HNCs and rates of obesity, also mentioned as the obesity paradox (for a review, see Bailey & Muldrow, 2019). Moreover, Wansink and Chandon (2006) found that all participants underestimated the calories they ate and were unaware that a claim such as "low fat" could influence their consumption. The study also showed that this perception that a product with a NC has less calories than its regular version lead to overconsumption. Regarding this, it is also of important note that the "low fat" claim lead overweight consumers to eat

significantly more (as they perceived the product to be guilt-free) than normal weight consumers, who behaved as if the product (M&M's) was for hedonic purposes regardless of the presence of a claim. This is also relevant to the topic of sugar, as low-fat versions of products may contain more sugar (Nguyen et al., 2016).

We also found that products with sugar-related claims were perceived as being less tasty than products without such claims (H2). Literature has extensively shown that products with HNCs in general are usually perceived as being less tasty (Hamilton et al., 2000; Prada et al., 2016; Schuldt & Hannahan, 2013), linking these results with the already explored health-pleasure trade-off effect (Nørgaard & Brunsø, 2009; for reviews, see Bailey & Muldrow, 2019; Bialkova et al., 2016). As for sugar-related claims specifically, Patterson et al. (2012), Bialkova et al. (2016) and Carrillo et al. (2012a) also found this negative influence of NCs regarding reduced sugar content on taste perceptions. Research has already shown that giving an emphasis on the healthfulness of a product can lead to negative expectations of taste (i.e., health-pleasure trade-off effect, for a review, see Fenko et al., 2016) and, consequently, undesirable results in purchases. Our study exemplifies this when products that claim to have no sugar (i.e., "0% sugar", "sugar free", "no added sugar") are perceived as healthier but less tasty than products that claim to have a reduced sugar content product (i.e., "low sugar"). Although our study only explores perceptions and not consumption behavior per se, previous research has shown that this health-pleasure trade-off effect is real and can indeed occur. This means that, even though consumers might be interested in the health aspects of a product (i.e., being healthy because it has less sugar), they may also not be ready to sacrifice taste (i.e., being healthy because it has less sugar also means being less tasty).

Regarding the impact of the different types of sugar-related claims on the three evaluative dimensions, in comparison with the regular product without these claims, our results showed that participants consistently perceived products with the "low sugar" claim as being the least healthy and the most caloric of the products with sugar-related claims. Moreover, products with the "low sugar" claim were also perceived as the tastiest of the products with sugar-related claims. This suggests that participants were sensitive to a difference between NCs that state there is a reduction in sugar content (i.e., "low sugar") and NCs that state the product has no sugar content (e.g., "0% sugar", "sugar free", "no added sugar") for healthfulness, calories and taste.

The fact that, for healthfulness, there were no differences between any of the products with sugar-related claims except for the products with the "low sugar" claim, suggests that consumers see the "0% sugar", "sugar free" and "no added sugar" claims as being equally

healthy, although all products with any of these claims seem to be perceived as healthier than the regular product (i.e., without these claims).

For taste and calories, however, not only were the products with the "low sugar" claim perceived as different (i.e., tastiest and most caloric) from the remaining products with sugar-related claims, but products with a "no added sugar" claim followed (i.e., second tastier and second most caloric) by also being perceived as different from the rest. Accordingly, and although there is not much research exploring these differences between types of claims, Patterson et al. (2012) found that products with a "no added sugars" claim were preferred to products with a "reduced sugars" claim and that consumers were more likely to expect the latter to contain sugar. It is to note however that the study of Patterson et al. (2012) did not use our dependent variables, even though their results do reinforce this notion of distinct sugar-related claims ("no added sugar" vs. "reduced/low sugar") being perceived as different.

Arguably, when it comes to healthfulness, the difference between lack of sugar content and just reduced content may be enough for consumers to infer differences in perceived healthfulness ("0% sugar", "sugar free", "no added sugar" > "low sugar"). In contrast, for taste and calories consumers may make more comparisons between each type of claim ("low sugar" > "no added sugar"; "no added sugar > sugar free"; "no added sugar > 0% sugar") because these dimensions are more tangible than healthfulness (i.e., one can explicitly see the number of calories in a given product and taste it, while health benefits are not as perceptible). For instance, research has already shown that taste is an attribute that can be verified after purchase, while healthfulness cannot and consumers do not feel it right after consuming the product (Fenko et al., 2016; Menger-Ogle & Graham, 2018).

Moreover, as already mentioned, products with a "0% sugar" claim or a "sugar free" claim are supposed to have the same sugar content (i.e., no more than 0.5 grams per 100 grams or milliliters) but to be different from a product with a "no added sugar" claim (i.e., no added mono- or disaccharides, EC, 2006). Likewise, our results showed that participants do perceive the two formers (i.e., products with "0% sugar" and "sugar free" claims) as different (i.e., less tasty and less caloric) from a product with a "no added sugar" claim. This is positive from a consumer's perspective because it suggests that consumers might recognize that a product which claims to have "no added sugars" is not the same has one that does not have sugar at all (at least when it comes to taste and calories). A possible explanation for this is that consumers might expect a product that claims to have "0% sugar" or be "sugar free" to be less tasty and also less caloric because it explicitly states that the product has no sugar, while a "no added sugar" claim does not state or make this information (i.e., that the product does not have sugar)

clear in the product. This goes accordingly with European Regulation no. 1924/2006 (EC, 2006), which states that a "no added sugars" claim cannot have added sugars but does not state that it cannot have sugar (e.g., naturally occurring sugars). Unlike results from a previous study (Chien et al., 2018), where almost half of the mothers believed that a "no added sugar" claim was the same as a "sugar free" claim, according to our results, this might only be true for a healthfulness dimension, given that for taste and calories participants perceived the products with a "no added sugar" claim as being tastier and more caloric than products with the "sugar free" claim.

The fact that we did not find statistical differences between products with a "0% sugar" claim and products with a "sugar free" claim in all of the considered dimensions also supports that these are perceived by the participants as equal in healthfulness, calories and taste. Indeed, overall results seem to suggest that, as European Regulation no. 1924/2006 (EC, 2006) delimited, consumers can perceive the differences between sugar-related claims for some dimensions such as healthfulness ("0% sugar", "sugar free", "no added sugar" vs "low sugar"), calories (e.g., "no added sugar" vs "sugar free") and taste (e.g., "no added sugar" vs "0% sugar").

Given that it would be difficult to explore the impact of claims on consumers' perceptions without any context, we used different product categories in our analysis. Although yogurts were perceived as the healthiest product category and cookies were perceived as the most caloric of the product categories, it is also of note that we did not find an interaction effect between type of claim and product category. Previous research has already mentioned yogurts and breakfast cereals as healthy product categories, and ice creams and cookies as unhealthy product categories (e.g., Choi et al., 2012). However, our results showed that the impact of sugar-related claims on consumers' perceptions of healthfulness, calories and taste did not depend on the product category, which suggests that these results can be generalized.

Regarding our additional analyses, we also found that products with sugar-related claims are generally perceived as healthier, less tasty, less caloric, more natural, more expensive and more positive. This also shows the previously mentioned positivity bias effect, such that participants' perceptions of products with sugar-related claims were positive overall. The current body of research remarks the effect that HCs have on healthfulness, tastiness, naturalness and liking (for a review, see Menger-Ogle & Graham, 2018) and, as such, our results suggest that this relationship may also exist amongst NCs regarding sugar content. Moreover, research has also showed that some consumers may be willing to pay premium prices for products with redundant labels (e.g., Wilson & Lusk, 2020). As for products with food

claims being perceived as less caloric than regular products without claims, research regarding this relationship seems to be in accordance with our results (e.g., Prada et al., 2017; Schuldt & Schwarz, 2010; Wansink & Chandon, 2006).

Regarding the influence of NCs on consumers' purchase decisions, results showed that participants mentioned being frequently influenced by NCs on their purchase decisions, and we found that these individuals also reported having higher nutrition qualifications. It is to note however that self-reported qualifications are not the same as objective knowledge and, as such, these analyses must be approached with caution. Nonetheless, a positive relationship between the use of nutrition labels and health and nutrition knowledge has been previously reported (Grunert & Wills, 2007; for reviews, see Storcksdieck genannt Bonsmann & Wills, 2012; Stranieri et al., 2010), which goes in line with our results. Moreover, our results showed that those who reported being influenced by NCs on their purchase decisions, also mentioned to have more interest in nutrition. In the same vein, a positive relationship between the use of HNCs and an interest in nutrition has already been reported in literature (for a review, see Nocella & Kennedy, 2012).

Finally, we also found that participants mentioned to often consume products with sugar-related claims, and that these individuals also reported having more nutrition qualifications. Regarding this relationship there seems to be mixed evidence, although our results seem to be in line with studies that have shown that consumers with higher nutrition knowledge have higher preferences and/or purchase intentions of products with HNCs (for reviews, see Kaur et al., 2017; Steinhauser & Hamm, 2018) – though, as previously mentioned, self-reported nutrition qualifications may not be the same as nutrition knowledge per se. Also, our results show a positive correlation between the consumption of products with sugar-related claims and attention to sugar intake and general perception of products with sugar-related claims. This seems to go accordingly with the study of Chien et al. (2018), who found a positive relationship between purchase intention and the importance of sugar content and attitudes towards breakfast cereals with a "no added sugar" claim. Although purchase intentions do not necessarily translate into actual consumption (for a review, see Liem et al., 2012), it is interesting to find these relationships in other studies.

The findings of this study have practical implications, such as the fact that perceptions of healthfulness, calories and taste can be different depending on the specific sugar-related claim presented in the packaging of the product. This suggests a need for caution and special attention when altering products' nutritional composition in order to contain NCs about sugar content in food's packages. Moreover, these results show that more NCs should be compared

amongst them in order to better understand consumers perspectives and opinions regarding different types of claims. If improving consumers' diets is indeed an important public health objective, we should be able to recognize what characteristics drive them to certain products and what makes them avoid others.

Despite the aforementioned contributions, this study has some limitations. Firstly, we recommend caution in the generalization of our results to the general population, due to the fact that our sample was mainly constituted of female subjects and individuals with a higher education. Indeed, it has been reported that women and highly educated people are more likely to participate in nutrition-related studies (Andreeva et al., 2015). Moreover, women have been described in literature as being more likely to use and understand food labels, being more interested in and having higher preferences for foods with HNCs, perceiving HNCs as more advantageous and having higher intention of buying or trying foods with HNCs (Nocella & Kennedy, 2012; for reviews, see Anastasiou et al., 2019; Drichoutis et al., 2006; Steinhauser & Hamm, 2018; Storcksdieck genannt Bonsmann & Wills, 2012; Stranieri et al., 2010). Although we did not observe gender differences regarding the general perception of products with sugar-related claims, the influence of NCs on purchase decisions, nor the consumption of products with sugar-related claims, we would advise a representative sample of the general population in further replications of this study. Additionally, the fact that the participants were recruited through a university may have also contributed to the sample being composed of two-thirds that had or were attending a higher education, which could have some implications in our results. Although the evidence on the relationship between the level of education and use of HNCs is mixed, higher educated people tend to use HCs more frequently, search more for information and to be better at interpreting information on nutrition labels (Nocella & Kennedy, 2012; for reviews, see Drichoutis et al., 2006; Stranieri et al., 2010). It is to not however that we did not find differences of a higher level of education regarding the general perception of products with sugar-related claims, the influence of NCs on purchase decisions, nor the consumption of products with sugar-related claims.

We also have to point out that the ecologic validity of the study might be compromised due to the fact that this study landed on self-reported answers on a computer and did not resort to in-store experiments, which means that the results found may not be the same as in real-life settings. Moreover, this form of questionnaire can also lead to the social desirability effect. For future studies, it would be interesting to explore the impact of these claims in an in-store environment, perhaps with other additional outcome variables such as acceptance, purchase intention and actual purchases of these products.

As already mentioned, the fact that we did not find an interaction effect between type of claim and product category leaves the possibility of these results occurring with other product categories. As such, for future studies it would be interesting to expand the number and diversity of product categories to other foods (i.e., healthy versus unhealthy; e.g., cereal bars, chocolate, candy) and even drinks (e.g., SSBs, teas, fruit juices, milkshakes), use different exemplars within the same product category, and to pretest these.

Furthermore, the fact that we asked participants to think about a general product category does not control the possibility of the subjects thinking about a specific product or brand they are familiar with. For instance, Bailey and Muldrow (2019) found that showing images of foods with NCs improved healthfulness and taste perceptions, although their results may have occurred due to the foods and brands that were chosen (i.e., Kellogg's Special K breakfast cereals, Nature Valley granola bars and Subway submarine sandwiches). This limitation must be taken in consideration and, for this reason, replicating this study with photos of actual products, perhaps without an associated brand or with different brands within the same product, could approximate the study's results to the existing reality. Finally, it would also be interesting to further investigate the effects found with other variables as moderators or mediators, such as nutrition knowledge or interest in health.

This study contributes to the current literature by showing that not all NCs regarding sugar content are perceived as the same by consumers. Indeed, there seems to be differences between the impact that different sugar-related claims have on healthfulness, calories and taste perceptions. Moreover, the fact that participants were able to perceive differences between products with different sugar-related claims shows that consumers might be more informed and/or attentive to HNCs than research has previously shown. Finally, in order to foster healthier diets and food choices, it should be studied which HNCs are more positively perceived so that the food market can create and advertise products with HNCs that are aligned with consumers' positive perceptions, which will help consumers not avoid products with HNCs associated with worse taste but encourage them to choose products that are healthier and less caloric.

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Appendices

Appendix A

Survey's Sociodemographic Questions and General Instructions

Start of Block: Default Question Block

Ins1 O presente estudo está a ser desenvolvido por uma equipa do ISCTE-IUL, no âmbito de uma dissertação de mestrado em Psicologia. Como tal, estamos interessados em explorar as perceções dos consumidores acerca de diferentes produtos alimentares em Portugal.

Não existem respostas certas ou erradas. A sua participação é voluntária e as suas respostas confidenciais, sendo que pode desistir em qualquer momento ao fechar a janela do browser. O estudo tem uma duração estimada de 10 minutos. Pedimos-lhe assim que responda a este questionário de uma só vez, sem interrupções.

Antes de iniciar, por favor confirme as seguintes informações:

1. Estou consciente de que a minha participação é voluntária e posso interromper em qualquer momento; 2. As minhas respostas serão anónimas e ninguém poderá aceder à minha identidade; 3. Sou maior de idade.

- ○ SIM, confirmo a informação e desejo continuar (1)
- ○ NÃO pretendo continuar a responder a este questionário (2)

Skip To: End of Survey If O presente estudo está a ser desenvolvido por uma equipa do ISCTE-IUL, no âmbito de uma dissertaç... = 2

Ins2 Antes de iniciar o estudo, pedimos-lhe que responda a um conjunto de questões de carácter sociodemográfico. Por favor, indique...

*

Age A sua idade:

_____

Sex O seu sexo:

- ○ Masculino (1)
- ○ Feminino (2)
- ○ Outro (indique qual). (3) _____

Nac A sua nacionalidade:

- ○ Portuguesa (1)
- ○ Outra (indique qual) (2) _____

Ocupacap A sua ocupação atual:

- ○ Trabalhador por conta de outrem / por conta própria (1)
- ○ Trabalhador-estudante (2)
- ○ Estudante (3)
- ○ Reformado (4)
- ○ Desempregado (5)
- ○ Outro (indique qual) (6) _____

Habilitacoes O último grau concluído (ou, caso seja estudante, o grau em que se encontra atualmente):

- ○ Ensino Básico (1º ao 9º ano) (1)
- ○ Ensino Secundário (10º ao 12º ano) (2)
- ○ Licenciatura (3)
- ○ Mestrado / Pós-graduação (4)
- ○ Doutoramento (5)

area A sua área de formação:

_____

residencia A sua área de residência:

- ○ Área Metropolitana de Lisboa (1)
- ○ Alentejo (2)
- ○ Algarve (3)
- ○ Centro (4)
- ○ Norte (5)
- ○ Madeira (6)
- ○ Açores (7)

amor Em que situação se encontra atualmente:

- ○ Sem relacionamento amoroso (1)
- ○ Em relacionamento amoroso, sem co-habitação (moram separados/as) (2)
- ○ Em relacionamento amoroso, em co-habitação (moram juntos/as) (3)
- ○ Outra situação (indique qual) (4) _____

Agregado Quantas pessoas fazem parte do seu agregado familiar?

▼ 1 (1) ... 6 ou mais pessoas (6)

filhos Quantos menores de 18 anos fazem parte do seu agregado familiar?

▼ 0 (0) ... 6 ou mais (6)

status Por favor pense numa escada com 10 degraus, onde se podem colocar os Portugueses. No **degrau 10** estão as pessoas que estão melhor na vida (os mais ricos, com melhor educação e melhores empregos) e no **degrau 1** estão os Portugueses que estão pior na vida (os que têm menos dinheiro, menos educação e piores empregos). Em que degrau desta escada se situa?

▼ 1 (1) ... 10 (10)

Instarefa De seguida, irá dar início à tarefa.

End of Block: Default Question Block

Start of Block: InsAvQuanti

InsQuanti Na tarefa seguinte irá encontrar um conjunto de categorias de alimentos com **menor teor de açúcar**. Como tal, ser-lhe-á pedido que avalie as categorias de produto em relação à sua versão normal/regular.
Especificamente, indique, em relação à sua versão normal, em que medida considera que são:

Menos saudáveis versus **Mais saudáveis**

Menos saborosos versus **Mais saborosos**

Menos calóricos versus **Mais calóricos**

(Note que a ordem de apresentação das questões vai variando)

End of Block: InsAvQuanti

Appendix B

Survey's Main Task

Start of Block: Iogurtes_QT

I_Iogurtes
Pense na seguinte categoria de produto:

IOGURTES[4]

End of Block: Iogurtes_QT

Start of Block: Claim1_QTIogurtes

0sugariog Na sua opinião, os iogurtes **0% AÇÚCAR** (em relação à sua versão normal) são:

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Menos saudáveis	○	○	○	○	○	○	○	Mais saudáveis
Menos saborosos	○	○	○	○	○	○	○	Mais saborosos
Menos calóricos	○	○	○	○	○	○	○	Mais calóricos

End of Block: Claim1_QTIogurtes

Start of Block: Claim2_QTIogurtes

nosugaryog Na sua opinião, os iogurtes **SEM AÇÚCAR** (em relação à sua versão normal) são:

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Menos saudáveis	○	○	○	○	○	○	○	Mais saudáveis
Menos saborosos	○	○	○	○	○	○	○	Mais saborosos
Menos calóricos	○	○	○	○	○	○	○	Mais calóricos

End of Block: Claim2_QTIogurtes

Start of Block: Claim3_QTIogurtes

[4] The presentation order of the product categories and the pairing of category/claim were randomized. Here we present an example of the yogurts category. The first example states "In your opinion, "0% sugar" yogurts (in relation to their regular version) are:more/less healthy, tasty, caloric"

NoaddedYog Na sua opinião, os iogurtes **SEM AÇÚCAR ADICIONADO** (em relação à sua versão normal) são:

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Menos saudáveis	○	○	○	○	○	○	○	Mais saudáveis
Menos saborosos	○	○	○	○	○	○	○	Mais saborosos
Menos calóricos	○	○	○	○	○	○	○	Mais calóricos

End of Block: Claim3_QTIogurtes

Start of Block: Claim4_QTIogurtes

LowsugarYog Na sua opinião, os iogurtes **BAIXO TEOR DE AÇÚCAR** (em relação à sua versão normal) são:

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Menos saudáveis	○	○	○	○	○	○	○	Mais saudáveis
Menos saborosos	○	○	○	○	○	○	○	Mais saborosos
Menos calóricos	○	○	○	○	○	○	○	Mais calóricos

End of Block: Claim4_QTBolachas

Start of Block: BLOCO1

Instfimtarefa Terminou a fase de avaliação de alimentos. Pedimos-lhe agora que responda a algumas questões gerais.

Appendix C

Survey's Control Questions

InstBloco1 As embalagens dos alimentos contêm um conjunto de informações que pretendem esclarecer o consumidor acerca da composição nutricional do alimento (lista de ingredientes, tabela nutricional e presença ou ausência de determinadas afirmações na parte da frente das embalagens). Face a esta informação, por favor indique:

freqfontes Com que frequência as seguintes fontes de informação nutricional influenciam as suas decisões de consumo

	Nunca (1)	(2)	(3)	(4)	(5)	(6)	Sempre (7)
Tabela nutricional (1)	○	○	○	○	○	○	○
Lista de ingredientes (2)	○	○	○	○	○	○	○
Afirmações nutricionais (e.g., sem açúcar, com stevia etc) (3)	○	○	○	○	○	○	○

End of Block: BLOCO1

Start of Block: BLOCO2

InstBloco2 Alguns alimentos podem conter determinadas informações nutricionais na parte da frente da embalagem relativas ao teor ou tipo de açúcar neles contido. Face a esta informação, por favor responda às seguintes questões.

attQT Em geral, considero que os produtos identificados como tendo **baixo teor ou sem açúcar** são...

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Pouco saudáveis	○	○	○	○	○	○	○	Muito saudáveis
Pouco saborosos	○	○	○	○	○	○	○	Muito saborosos
Pouco calóricos	○	○	○	○	○	○	○	Muito calóricos
Pouco naturais	○	○	○	○	○	○	○	Muito naturais
Baratos	○	○	○	○	○	○	○	Caros
Maus	○	○	○	○	○	○	○	Bons
Duvidosos	○	○	○	○	○	○	○	De confiança

freqconsumoQT Com que frequência consome produtos com baixo teor ou sem açúcar...

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Nunca	○	○	○	○	○	○	○	Sempre

CatProdQT Que tipo de produtos com **baixo teor ou sem açúcar** consome habitualmente?

consumonormais Com que frequência costuma consumir os seguintes produtos na sua versão normal (com açúcar)

	Nunca ou menos de 1 vez por mês (1)	1 a 3 vezes por mês (2)	1 vez por semana (3)	2 a 4 vezes por semana (4)	5 a 6 vezes por semana (5)	1 vez por dia (6)	Mais do que 1 vez por dia (7)
Cereais (1)	○	○	○	○	○	○	○
Bolachas (2)	○	○	○	○	○	○	○
Iogurtes (3)	○	○	○	○	○	○	○
Gelados (4)	○	○	○	○	○	○	○

recomendações Eu conheço as recomendações portuguesas relativas à ingestão de açúcar

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Discordo totalmente	○	○	○	○	○	○	○	Concordo totalmente

valormax Qual acha ser o valor máximo diário recomendado de açúcar (em gramas)

○ Gramas: (1) _____

○ Não sei (2)

End of Block: BLOCO 3

Start of Block: BLOCO4

importancia É importante para mim que a comida que eu como num dia típico:

	Extremamente pouco importante (1)	(2)	(3)	(4)	(5)	(6)	Extremamente importante (7)
Me mantenha saudável (1)	○	○	○	○	○	○	○
Me saiba bem (2)	○	○	○	○	○	○	○
Seja baixa em calorias (3)	○	○	○	○	○	○	○

End of Block: BLOCO4

Start of Block: BLOCO FINAL

Instblocofinal Por fim, pedimos-lhe que responda a algumas questões gerais.Por favor, indique...

formsaude Como classifica o seu **nível de formação** nas seguintes áreas:

	Elementar (1)	(2)	(3)	(4)	(5)	(6)	Avançado (7)
Saúde (1)	○	○	○	○	○	○	○
Nutrição (2)	○	○	○	○	○	○	○

interessenutri Como classifica o seu **interesse** pelas seguintes áreas:

	Reduzido (1)	(2)	(3)	(4)	(5)	(6)	Elevado (7)
Saúde (1)	○	○	○	○	○	○	○
Nutrição (2)	○	○	○	○	○	○	○

regalimentar Qual o seu tipo de regime alimentar

- ○ Regular/omnívora (1)
- ○ Vegetariana (2)
- ○ Vegana (3)
- ○ Outra (indique qual) (4) _____

altura Indique a sua altura

- ○ cm: (1) _____
- ○ Não sei / Não respondo (2)

peso Indique o seu peso

- ○ kgs: (1) _____
- ○ Não sei / Não respondo (2)

perceçãocorpo Comparativamente a pessoas da mesma idade e do mesmo sexo, como classificaria o seu peso?

	1 (1)	2 (2)	3 (3)	4 (4)	5 (5)	6 (6)	7 (7)	
Muito abaixo da média	○	○	○	○	○	○	○	Muito acima da média

condsaude Tem alguma condição de saúde diagnosticada e que condiciona a sua alimentação (diabetes, alergias, intolerâncias alimentares etc.)

- ○ Não (1)
- ○ Sim (indique qual/quais) (2) _____

End of Block: BLOCO FINAL

Start of Block: DEBRIFIENG

Instfinal Obrigada pela sua participação. Através dos dados recolhidos neste questionário pretendemos entender as perceções dos consumidores portugueses face às informações nutricionais contidas nas

embalagens sobre teor e tipos de açúcar adicionado aos produtos. Caso tenha alguma questão ou comentário que queira ver respondido, por favor, envie um email para a investigadora responsável: rethink-sugar.cis@iscte-iul.pt

End of Block: DEBRIFIENG