Practicing the (Un)Healthy=Tasty Intuition: Toward an Ecological View of the Relationship Between Health and Taste in Consumer Judgments

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Abstract

Recent research has provided some first indications that not all consumers apply an unhealthy=more tasty heuristic when judging the healthiness and tastiness of food products. To address the question of whether and when consumers perceive food in accordance with unhealthy=tasty or healthy=tasty views, we conducted two studies in two European countries with consumers who were stratified along important demographic characteristics. In both studies, we presented participants with a random sample of real food products from two product categories available at a large supermarket chain. We hypothesized a positive relationship between subjective healthiness and tastiness judgments, which we assume has its bases in an evolutionary mechanism, personal consumption experiences and consumption trends. Our results consistently revealed the expected positive association between subjective healthiness and tastiness judgments across participants, countries, and products. However, the magnitude and valence of this relationship varied across product categories and depended on differences in the extents to which consumers believed in the unhealthy=tasty intuition, were interested in health, and exhibited a food pleasure orientation.

Keywords: healthiness, tastiness, consumer judgments, food products, product packaging, ecological validity

1. Introduction

The combined focus on health and taste has recently received considerable attention in food advertising research (Kim, Cheong, & Zheng, 2009). But do consumers readily associate a food's taste with its healthiness? Research on the perceived relation between healthiness and tastiness has offered mixed results. On the one hand, research in the US found evidence for the so-called unhealthy=tasty intuition, a belief that unhealthy food tastes better (Raghunathan, Naylor, & Hoyer, 2006). On the other hand, the universality of the unhealthy=tasty intuition has been directly questioned by recent evidence from France, which found positive associations between perceptions of tastiness and perceptions of healthiness (Werle, Trendel, & Ardito, 2013). Thus, it makes sense to ask just how relevant and universal the unhealthy=tasty intuition is for consumers in real life.

The aforementioned research findings on the perceived association between the healthiness and tastiness of food products provide important insights into how consumers infer the taste of products that are prototypically or explicitly presented as either healthy or unhealthy. For example, Raghunathan et al. (2006) manipulated the perceived healthiness of crackers by explicitly describing the consequences of different kinds of fat and portraying crackers as containing a lot of "good" fat, linked to healthy consequences, or "bad" fat, linked to unhealthy consequences. Studies in which the associations between healthiness and tastiness have been measured directly have compared prototypically healthy food items (e.g., broccoli) and prototypically unhealthy food items (e.g., burgers; Raghunathan et al., 2006; Werle et al., 2013). Whereas knowledge about the effects of explicit health claims or comparisons of products that are notorious for being unhealthy or healthy is important, past research

findings have allowed only limited conclusions about products that are not explicitly labeled, have not represented the extremes of the healthiness spectrum, or have fallen into only one category. In particular, the existing studies have revealed only a partial picture of the perceived association between the healthiness and tastiness of food products for four critical reasons.

First, it is rare and, from a legal perspective, also problematic for companies to explicitly label food products as healthy. In the EU, for example, legislation allows health claims only when they are clear, accurate, and substantiated by scientific evidence (European Commission, 2012). Nevertheless, companies communicate healthiness via a broad range of marketing strategies (Chrysochou, 2010), and consumers subjectively infer a product's healthiness from cues such as package design, brand image, or familiarity (Orquin, 2014; van Ooijen, Fransen, Verlegh, & Smit, 2017).

Second, previous studies have always used a limited selection of products, and we are not aware of any studies that have presented a representative sample of all products from a certain product category. Such a wider selection would embody wider gradients on the healthiness and tastiness dimensions. Investigating the healthiness-tastiness relationship with a representative sample of products is indeed important, because otherwise researchers will not be able to rule out the possibility that the (un)healthy=tasty intuition affects only the specific selection of products.

Third, the studies by Werle et al. (2013) highlighted that it is important to study the perceived relationship between healthiness and tastiness in different contexts. The American and French cultural contexts that were tested in previous studies differ substantially with regard to food habits and food attitudes. However, not

all European countries share the strong focus on food quality and pleasure from consumption found in France. Hence, further replications are necessary.

Fourth, consumers' educational background and varying attitudes toward aspects of food consumption might affect the (un)healthy=tasty intuition. Whereas the studies by Raghunathan et al. (2006) and Werle et al. (2013) were based on student samples and samples with an academic background, it is now important to study the perception of the healthiness-tastiness relationship with samples that include participants from various educational backgrounds exhibiting a wider range of individual attitudes related to food consumption.

To continue Raghunathan et al.'s (2006) and Werle et al.'s (2013) fruitful approaches while addressing the abovementioned shortcomings, we conducted two studies in which we examined the relationship between healthiness and tastiness judgments in which we (a) used real food products from two product categories available at a leading supermarket chain, (b) sampled these products randomly for each participant out of the set of all products offered in each respective category, (c) relied on consumers' subjective judgments of both product dimensions, (d) relied on real consumer samples of various educational backgrounds, (e) conducted studies in two different European countries (Germany and Austria), and (f) corrected for common method variance linked to experimental methodology and social desirability. Moreover, we studied the role of individual differences pertaining to subjective attitudes toward food consumption in the relationship between healthiness and tastiness.

1.1. Conceptual Background and Hypotheses

The goal of the present paper was to show that when judging usual products offered in supermarkets, consumers do not immediately apply the unhealthy=tasty heuristic, but by contrast, their initial judgments of healthiness and tastiness show an important positive correlation. On the basis of the studies by Werle et al. (2013), we assumed that in a European context, perceiving a food product as healthy does not necessarily lead to low expectations of tastiness. To the contrary, we propose that when consumers subjectively evaluate a product's healthiness and tastiness, these judgments are positively correlated. We suppose that the correlation between the perceived healthiness and tastiness of food stems from three sources: (a) an evolutionary mechanism by which perceived healthiness acts as a proxy for tastiness and vice versa, which allows consumers to base their judgments of healthiness and tastiness on the same visual cues, (b) personal experience in consuming foods that are considered simultaneously tasty and healthy, and (c) brand image and brand familiarity built up through marketing activities.

Visual cues as proxies for healthiness and tastiness. Presumably developed as an evolutionarily advantageous mechanism, an association is often drawn between a food's "edibleness" or nutritional value and the food's taste (Birch, 1999). Indeed, researchers have suggested that some food groups are functionally perceived as tastier specifically because they might offer a survival advantage (e.g., carbohydrates or fat; Drewnowski 1997; Smith 2004), whereas dangerous, poisonous foods are often associated with a foul taste (Birch, 1999). For the sake of illustration, imagine a fresh, ripe apple just picked from a tree and compare this apple with one that fell off the tree a couple of days ago, now lying in the grass not being fresh. The two apples certainly differ in taste but also in nutritional value. As the apple in the grass starts to become

less appealing, looking less fresh and old, this change indicates that it has past its prime so it will not taste good and it has lost its health-contributing qualities. Hence, it is functional that humans can easily distinguish fresh (healthy) apples from not so fresh (not healthy or even unhealthy) ones by their visual appeal.

Today, consumers rarely pick an apple from a tree. However, the visual cues that might signal healthiness and tastiness are similar. A visibly stale burger with a damp salad will be expected to taste worse and to be less of a wholesome meal than a burger just off the grill containing fresh ingredients. It is obvious and known by food retailers that consumers believe that food that looks fresh is tastier and healthier. For example in praxes, to emphasize the freshness of their food, supermarkets attempt to present their food under a certain kind of light ("Bring the most out of your fresh produce", 2018). Foods color and smell in particular were found to be important cues for the perception of products freshness (Fenko, Schifferstein, Huang, & Hekkert, 2009). Besides cues indicating freshness, visual cues related to naturalness (Dubé, Fatemi, Lu, & Hertzer, 2016) also signal good taste (Lunardo & Saintives, 2013) and are perceived to be in accordance with a healthy diet (Lunardo & Saintives, 2013; Magnusson, Arvola, Hursti, Åberg, & Sjöden, 2003; Rozin et al., 2004). An aspect that is directly related to the mentioned visual cues is attractiveness of food products. Numerous studies have shown, for example, that an attractive package design affects taste expectations (Becker, van Rompay, Schifferstein, & Galetzka, 2011; Mizutani, et al., 2010; Velasco, Salgado-Montejo, Marmolejo-Ramos, & Spence, 2014), and communicates a food's healthiness (Ares, Mawad, Giménez, & Maiche, 2014; Karnal, Machiels, Orth, & Mai, 2016; Visschers, Hess, & Siegrist, 2010). Thus, it is easy to conceive that visual cues that signal attractiveness, freshness, and naturalness (e.g.,

the color and texture of an apple or the packages of food products) help us differentiate food on the dimensions of both tastiness and healthiness.

Personal consumption experiences as determinants of health and taste judgments. We assume that personal consumption experiences are another source of the perception that healthiness and tastiness are positively related. With increases in both the health consciousness of society and the availability of food products that aim to satisfy consumers' health goals as well as their taste buds (Bublitz, Peracchio, & Block, 2010), consumers are motivated to eat well in terms of the healthfulness and palatability of food. For example, market research found that 80% of UK customers reported following a "healthy" diet (Leatherhead Food Research Institute, 2012). We suppose that regularly consuming foods that are subjectively considered both healthy and tasty (e.g., the majority of fruits, meat and dairy products, or starchy carbohydrates such as potatoes, bread, or pasta) further sustain the positive connection between the perceived healthiness and tastiness of food. For example, this idea is well captured by the food rhetoric of Jamie Oliver, popular chef and initiator of the "Feed Me Better" campaign. His cookbooks, which offer "exciting healthy eating," "nutritious, tasty meals," and "delicious, hearty food," are tremendously popular and made him the UK's fourth bestselling author in 2016.

Brand image and familiarity as determinants of health and taste judgments. Companies invest a lot of money in forming a positive brand image of their products (e.g., MoffettNathanson, 2016) and a positive brand image might extend to taste and health judgments of food products simply because all judgments associated with the brand might become more positive in general. Moreover, companies often address a food's taste and health characteristics indirectly in their marketing activities, and one

of their major goals is often to ensure that consumers perceive their food product as a tasty and a healthy one (e.g., Nestlé, 2018; Brand Finance, 2017). The findings on effects of brand images are consistent with this view. For instance, Cavanagh and Forestell (2013) found that brand labels affected the tastiness and healthiness perceptions of snacks in the same direction. Orquin (2014) observed that the familiarity of a brand was among the most important factors predicting the perceived healthfulness of a food product. In an experimental study, Underwood and Klein (2002) varied whether food products were labeled with a brand of high or low familiarity and observed positive effects of familiarity on both health and taste beliefs.

Hence, several visual cues depicted on product packages are likely to influence judgments of healthiness and tastiness in a related fashion, consumers might have personal experiences in consuming healthy food that is tasty, and finally marketing activities might contribute to a positive correlation between health and taste judgments of food products. It is important to emphasize that we do not conceptualize the healthiness and tastiness cues used by consumers as necessarily being “objective” or straightforward rational indicators for assessments of these characteristics, as is in line with many research findings on consumers decision-making strategies (e.g., Rozin et al., 1996; Oakes & Slotterback, 2001). Taken together, we assume there is an overlap in cues from multiple sources (visual, experiences, branding, familiarity) informing each of these judgments so that the same relevant cues partly cover the formation of both healthiness and tastiness judgments in the same way, hence their positive relationship.

We therefore predicted:

H1: The relationship between healthiness and tastiness judgments of food products will predominantly be a positive one.

Importantly, this is not to say that consumers would hold a belief that all healthy products are also tastier or that increase in healthiness would automatically lead to increase in expected tastiness of food products, as we are not examining the causal relationship between healthiness and tastiness.

We also expected the healthiness-tastiness relationship to vary between product categories, because unhealthy food is more dominant in some categories than in others, and consumers might be more likely to apply the unhealthy = tasty intuition in product categories dominated by unhealthy food products. Previous research also observed differing influence of health perception on taste evaluations across different categories of products (Lee, Shimizu, Kniffin, & Wansink, 2013).

Moreover, we presume that individual differences shape the connection between consumers' healthiness and tastiness inferences. In the current studies, we therefore sought to examine whether the relevant individual consumer characteristics such as the belief in the unhealthy-tasty intuition, a general interest in health, and a food pleasure orientation would affect consumers' associative link between a food product's attributes of healthiness and tastiness.

A plethora of research has demonstrated that consumers infer missing product attributes on the basis of lay theories, beliefs, and intuitions (e.g., Broniarczyk & Alba, 1994; Oakes & Slotterback, 2001a, 2001b; Rozin, Ashmore, & Markwith, 1996; Wansink & Chandon, 2014). Thus, consumers who strongly believe that a food's healthiness leads to costs in tastiness should be more likely to rely on this heuristic and should base their tastiness judgments on a more simplistic healthy versus

unhealthy food categorization. This should subsequently lead to a weaker positive relationship between healthiness and tastiness than for consumers who are less inclined to believe in the intuition. This assumption has been corroborated by previous research in which high levels of *belief in the unhealthy=tasty intuition* had a diminishing effect on the positive relationship between healthiness and tastiness (Werle et al., 2013).

On the other hand, lower levels of belief in the unhealthy=tasty relationship were linked to high levels of health consciousness (Mai & Hoffman, 2015). Consumers with a *general interest in health* and higher health-consciousness have been found to be more motivated to engage in healthy behaviors to improve or maintain their quality of life (Kraft & Goodell, 1993; Newsom, McFarland, Kaplan, Huguet, & Zani, 2005; Plank & Gould, 1990). They have also been found to be more aware and to have more knowledge of nutrition and fitness-related issues (Kraft & Goodell, 1993), and this knowledge in turn has been found to have a positive impact on their dietary choices (Moorman & Matulich, 1993). Thus, we expect consumers with a strong general interest in health to exhibit a stronger healthy=tasty intuition, either because they align their food perceptions with their goal maintenance or because they are more aware of the fact that healthy foods are not necessarily tasteless foods.

Moreover, in a study by Huang and Wu (2016), the hedonic approach to eating, gauged by consumers' high *food pleasure orientation*, diminished the unhealthy=tasty intuition and led to more positive perceptions of the relationship between a food's healthiness and tastiness. Similarly, we expect consumers who are high in pleasure orientation to perceive a stronger positive relationship between the

healthiness and tastiness of food than those who are low in pleasure orientation. It appears that individuals who focus more to derive pleasure from food (rather than focusing on stress related to food consumption for example, Rozin, Fischler, Imada, Sarubin, & Wrzesniewski, 1999) do not conceptualize this pleasure as excluding food's healthiness, but they also include factors that are related to a food's "goodness" such as the food's freshness or naturalness, which then have a positive influence on perceptions of pleasure, similar to the characteristics of hedonic consumption in French culture (Fischler & Masson, 2008; Rozin, Fischler, Shields, & Masson, 2006, Werle et al., 2013).

In summary, we hypothesized:

H2: The healthiness-tastiness relationship will be weaker in magnitude but will remain positive among consumers who have a strong belief in the unhealthy-tasty intuition (vs. a weak belief), a low level of interest in health (vs. high interest), and a low food pleasure orientation (vs. a high food pleasure orientation).

1.2 The Present Research

Our primary aim was to conduct ecologically valid studies to illustrate consumers' evaluations of the healthiness and tastiness of food products in a consumer-relevant context. Therefore, we conducted two studies employing a representative sample of food products from two relevant consumption categories offered by a well-established supermarket chain in its online store. We used two product categories in order to (a) increase the ecology of our design by including products that naturally vary in healthiness and tastiness characteristics and (b) show that our findings are generalizable across product types. Moreover, we designed Study

2 to strengthen the validity and reliability of our claims by addressing the potential problem that our studies could suffer from common method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), which is related to the employed experimental methodology and social desirability of participants. To further address the generalizability of our findings, we used consumer samples from two European countries, Austria (Studies 1 and 2) and Germany (Study 1), stratified by the demographic variables of age, gender, and educational background according to the population distributions in each country.

2. Study 1: Assessing the relationship between the healthiness and tastiness judgments of food products.

2.1 Methods

2.1.1 Participants

In Study 1, we used representative samples of consumers from Austria and Germany (stratified by the demographic variables of age, gender, and educational background) recruited through an access panel ("Talk Online Panel") who participated in the online study in exchange for 2.50 €. A total of 547 consumers (272 from Austria and 275 from Germany) participated in the survey, of which 36 were subsequently excluded because they did not complete the questionnaire (22) or visibly "clicked through" (6 participants showed minimal variance in the overall healthiness and tastiness ratings and 8 participants showed minimal variance in the healthiness and tastiness ratings of snacks, meaning that their responses had a standard deviation of 0, no correlations could be computed and were therefore excluded). The final sample then consisted of 511 participants (255 from Austria and 256 from Germany), was 50.9% women, with a mean age of 43.54 years (*SD* = 14.95) and a mean BMI of

25.98 (*SD* = 5.69). Participants' educational backgrounds were diverse: 15.3% of participants had completed high school, 16.2% had completed compulsory education ("Realschule" in German), 32.7% had a degree from a vocational school or training institute ("Fachschule," "berufsbildenden Schule" in German), and 15.7% had a university degree.

2.1.2 Design and procedure

We applied a 2 (Product category: snacks vs. drinks) x 2 (Country: Austria vs. Germany) mixed correlational design in which product category was a within-subject factor and country was a between-subject factor. We administered online questionnaires in Austria and Germany in which we presented participants with 40 products, which were randomly sampled for each participant out of all products offered by the supermarket chain in two food categories (i.e., snacks and drinks) and asked them to judge the products on healthiness and tastiness. Twenty of these 40 products were from the snack category, and 20 were from the drinks category.

We instructed participants to rate the healthiness and tastiness of these 40 products in two separate rating blocks, meaning that they saw each product twice. However, the order in which the products were presented was kept constant. The order of the evaluation type (healthiness or tastiness) was assigned to be random. Thus, some participants first evaluated healthiness and then tastiness, whereas others first evaluated tastiness and then healthiness. We asked participants to rate how healthy and how tasty they estimated the presented products would be, with response options ranging from 1 (*very unhealthy/not at all tasty*) to 10 (*very healthy/very tasty*). Afterwards, we asked about demographic variables (e.g., age and gender) and assessed individual characteristics such as the explicitness of participants' beliefs in

the unhealthy=tasty intuition (Raghunanthan et al., 2006), general interest in health (Roininen, Lätheenmäki, & Tuorila, 1999), and food pleasure orientation (Rozin et al., 1999). Table 1 presents descriptive statistics for these variables and Cronbach's alpha values for the scales.

--- insert Table 1 here ---

2.1.3 Materials

We used a representative sample of food products from two product categories that local consumers of both countries are familiar with and that they commonly encounter, make decisions about, and purchase during their shopping routines. The products were taken from the current products available from an online grocery store at the time of the survey. Out of the 40 presented products, 20 were snacks from the "Chips & Co." category (e.g., chips, nuts, and dried fruits) and were randomly sampled for each participant from a pool of 167 products; the remaining 20 products were drinks from the "Nonalcoholic drinks" category (e.g., juices, sodas, and smoothies) and were sampled from a pool of 262 products.

2.1.4 Data analysis

In our study, participants repeatedly evaluated multiple food products with varying characteristics. Thus, the evaluations were nested within participants and were intercorrelated. We therefore accounted for this issue by using a linear mixed effects model analysis (Gałecki & Burzykowski, 2013; Maxwell & Delaney, 2004) as a more stringent test of our hypotheses alongside a correlation analysis. A

significance level of $\alpha = .05$ was adopted for all of the following analyses. All analyses were performed with SPSS and R (R Core Team, 2016), specifically the packages lme4 (Bates, Maechler, Bolker, & Walker, 2015) and nlme (Pinheiro, Bates, DebRoy, Sarkar, and R Core Team, 2016).

2.1.5 Results

Considering all single-product judgments, we observed a significant positive correlation between healthiness and tastiness ratings: $r(20440) = .43$, $p < .001$. In addition, we calculated correlations between healthiness and tastiness ratings on the individual level. Looking at the interquartile range of the healthiness-tastiness correlation coefficients per participant, we found that the relationship was positive and varied from weak to strong in both product categories and both countries (Table 2).

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We further tested our hypotheses with a linear mixed effects model analysis. In the basic model, tastiness ratings were specified as the dependent variable, with healthiness ratings, product category, country, and their two-way and three-way interactions as predictors. We included a random intercept per participant to account for by-subject variation. We also included random slopes for the effects of healthiness, product category, and country to account for by-case variability in the effects of healthiness on tastiness. We centered continuous predictors on their grand

mean. The basic model was established as the result of systematic model fit testing in which we compared models that included random effects with models that excluded them. Parameters were estimated with a maximum likelihood estimator.

Again, the analysis revealed a positive association between healthiness and tastiness ratings across both countries (Table 3), and it is important to mention that this relationship depended on the type of product evaluated and to a smaller extent also on the country of the consumer.

--- insert Table 3 here ---

The effect of product category indicated that drinks were associated with greater tastiness than snacks. Deconstructing the significant interaction between healthiness and product category showed that the positive relationship between healthiness and tastiness was smaller in magnitude for snacks (b = .29, SE = .02), $t(9707) = 16.35$, $p < .001$, than for drinks (b = .49, SE = .02), $t(9707) = 32.66$, $p < .001$. The effect of country indicated that Austrian consumers (M = 6.26, SD = 2.56) generally evaluated food products as tastier than did German consumers (M = 6.07, SD = 2.53). No interaction effects with the country consumers came from were significant.

The results remained stable after we controlled for individual characteristics (belief in the unhealthy=tasty intuition, general interest in health, and food pleasure orientation). The results also remained consistent after we included the order of the healthiness and tastiness assessment in the model.

Next, to evaluate the effects of assessment order, we included the order in which participants assessed the healthiness and tastiness of food products in the basic model as well as its interaction with healthiness. There was no main effect and no interaction effect of the order in which the healthiness and tastiness assessments took place.

The reported basic linear mixed effects model accounted for approximately 40% to 50% of the variance in our data (conditional[1] R^2 = .47). In the next step, we examined the moderating effects of individual characteristics on the healthiness-tastiness relation (belief in the unhealthy=tasty intuition, general interest in health, and food pleasure orientation).

All moderation analyses focusing on the healthiness-tastiness relationship were conducted using the basic linear mixed effects model specified above, plus the moderating variable, its two-way interaction with healthiness, and an additional three-way interaction that also included country, while the main effects of the other two moderating variables were controlled for. Significant interactions with healthiness were found for belief in the unhealthy=tasty intuition (b = -.03, SE = .01), t(19919) = -5.33, p < .001, and general interest in health (b = .06, SE = .01), t(19921) = 5.12, p < .001, as well as food pleasure orientation (b = .03, SE = .01), t(19921) = 2.11, p = .03. None of the three-way interactions between the moderating variable, healthiness judgments, and consumers' country were significant.

We then used a spotlight analysis (Aiken & West, 1991) to inspect the nature of the healthiness-tastiness relationship at low (1 *SD* below the mean) and high (1 *SD*

[1] The conditional R^2 describes the proportion of variance explained by both the fixed and random effects.

above the mean) levels of the moderating variables. The analysis confirmed our expectations as can be seen in Figures 1, 2 and 3: The healthiness-tastiness relationship, while still remaining positive and significant, was lower in individuals who strongly believe that unhealthy food is tastier (b = .28, SE = .03), t(4011) = 9.02, p < .001, in comparison with those who believe in this intuition less (b = .52, SE = .03), t(3738) = 19.17, p < .001. Furthermore, the positive healthiness-tastiness association was weaker among individuals exhibiting a rather low general interest in health (b = .31, SE = .04), t(2880) = 7.64, p < .001, than among those with a greater interest in health (b = .50, SE = .03), t(3426) = 17.40, p < .001. In a similar fashion, those with high food pleasure orientation also showed a stronger relationship between healthiness and tastiness judgments (b = .44, SE = .03), t(2919) = 12.76, p < .001, than those with a lower food pleasure orientation (b = .34, SE = .04), t(3270) = 9.53, p < .001.

--- insert Figure 1 here ---

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2.1.6 Discussion (Study 1)

The relationship between consumer judgments of the healthiness and tastiness of food products was positive across both countries, varied to a certain extent across product categories, and was linked to individual differences in the belief in the

unhealthy=tasty intuition, general interest in health, and food pleasure orientation. Despite these individual differences in the relationship between healthiness and tastiness, the strength of the positive relationship seemed to prevail in most cases, and we found virtually no differences in the nature of the relationship between the two European countries.

However, the correlational nature of our data and the fact that we applied the same measurement method (i.e., self-reported judgments) for healthiness and tastiness with the same type of scale might have potentially inflated the estimated healthiness-tastiness relationship by means of common method variance (CMV; Podsakoff et al., 2003). Therefore, we addressed this issue in Study 2. CMV is defined as systematic variance in data resulting from the method of data collection, most often associated with self-reports, which can artificially inflate observed relationships between variables (Spector & Brannick, 2010). To strengthen the validity of our conclusions about the healthiness-tastiness relationship and to exclude alternative explanations, we identified that two out of the three previously suggested and most emphasized causes of CMV (i.e., individual tendencies linked to response styles and social desirability; Simmering, Fuller, Richardson, Ocal, & Atinc, 2015) might be of concern in our studies and attempted to correct for them in Study 2. Specifically, these are potential data biases stemming from a "common scale format" (using the same scale to assess healthiness and tastiness judgments). These occur when individuals systematically respond to items independently of the items' content and regardless of the individual's actual standing on the measured constructs (Baumgartner & Steenkamp, 2001; Podsakoff et al., 2003). Furthermore, we suspected that social desirability, the tendency to present oneself favorably, regardless

of the person's true position on the construct being measured (Crowne & Marlowe, 1964) would be another potential source of CMV. Indeed, participants might be aware of a social norm that people should consider healthy food as tasty, and answer in a corresponding way. Previous studies have documented a high likelihood of social desirability and social approval or similar biases in self-reports of behaviors and attitudes related to food consumption (e.g., Friedenreich, Slimani, & Riboli, 1992; Hebert et al., 1997; Thompson, Metzner, Lamphiear, & Hawthorne, 1990) or through findings that some foods are generally recognized in society as "good for you" or "bad for you" (Roering, Boush, & Shipp, 1986). Considering that, from a broader perspective, the investigated content of our studies is associated with consumers' actual consumption behavior, consumers' judgments might be likely to be influenced by their need to appear to be leading a "healthy" lifestyle or by a need to justify their food choices.

We tackled the two presumed causes of CMV, namely, a "common scale format" and "social desirability," primarily through study design modifications (different measures of the central concepts) and statistical control (assessment of individual social desirability) as suggested by Podsakoff et al. (2003).

3. Study 2: Correcting for common method variance in the relationship between consumers' judgments of healthiness and tastiness.

3.1 Methods

3.1.1 Participants

A representative sample of individuals recruited through an access panel ("Talk Online Panel") participated in the online study in exchange for 2.50 €. A total of 283 consumers from Austria took part in the survey, but 26 were subsequently

excluded because they did not complete the questionnaire (20) or visibly "clicked through" (1 participant showed minimal variance in the overall healthiness and tastiness ratings and 5 participants showed minimal variance in the healthiness and tastiness ratings of snacks, meaning that their responses had a standard deviation of 0, no correlations could be computed and were therefore excluded). The final sample then consisted of 257 participants (51.4% women), with a mean age of 47.79 years (*SD* = 16.41; three participants did not enter their age and were excluded from the descriptive analyses) and a mean BMI of 25.71 (*SD* = 4.76; two participants did not enter their BMI and were excluded from the descriptive analyses). A total of 52.1% of participants had graduated from a vocational school or training institute, 14.4% had finished high school, and 8.2% were university educated.

3.1.2 Design, procedure, and materials

In this study, we employed essentially the same design as Study 1 but with methodological modifications whose sole purpose was to eliminate potential effects of common method variance (CMV). Addressing the "common scale format" and following Podsakoff et al.'s (2003) recommendations for procedural remedies, we applied a methodological separation of the healthiness and tastiness measurements by employing two different scales formats to measure the two constructs of healthiness and tastiness judgments. The scale for measuring the tastiness judgments remained the same: "How tasty do you estimate the presented product to be?" with response options ranging from 1 (*not at all tasty*) to 10 (*very tasty*) in a horizontal Likert format. But the healthiness judgments were assessed with a staple scale format: "How healthy do you estimate the presented product to be?" with response options ranging from +5 to +1 (indicating healthiness) and -1 to -5 (indicating unhealthiness),

displayed vertically underneath each other without option labels. Participants were told, "+5 indicates very high estimate of a product's healthiness," and "-5 indicates very low estimate of a product's healthiness." For the sake of simplicity in the statistical analyses, the healthiness scores were subsequently recoded to reflect the same scale as the tastiness scores (*1 = very unhealthy* and *10 = very healthy*). We again randomized the order in which the healthiness and tastiness assessments were presented (resulting in two order types: healthiness or tastiness judgments first) to avoid memory and reference-point effects. We also randomized the order of the presented products in each assessment to decrease potential biases in effects of memory on product evaluations.

In order to apply a statistical correction for social desirability as a potential source of CMV during the analyses, we measured the individual tendency with the SES-17 (Soziale-Erwünschtheits-Skala-17; Stöber, 1999), consisting of 17 items (example item: *"I accept all other opinions, even when they do not correspond to my own"*), seven reverse-coded, with response options 1 (*correct*) and 0 (*incorrect*). The general level of social desirability was computed by summing the responses across the 17 items.

Otherwise, the procedure and materials, their random sampling, and the measured variables were identical to Study 1. Again, we measured the explicitness of participants' beliefs in the unhealthy=tasty intuition (Raghunanthan et al., 2006), general interest in health (Roininen et al., 1999), and food pleasure orientation (Rozin et al., 1999). Table 4 presents descriptive statistics for these variables and the scales' Cronbach's alpha values.

--- insert Table 4 here ---

3.1.3 Data analysis

The analysis strategy was similar to the one used in Study 1. Specifically, we focused on examining the relationship between healthiness and tastiness evaluations across participants and individual variables (belief in the unhealthy=tasty intuition, general interest in health, and food pleasure orientation). Whereas we were able to methodologically correct for the common scale format as a potential source of CMV in our data by separating the measurements of healthiness and tastiness judgments, we applied a statistical correction for social desirability, the second potential source of CMV. We followed Siemsen, Roth, and Olivera's (2010) and Simmering et al.'s (2015) procedural suggestion to include presumed CMV source variables in the regression equation to correct for their potential biasing effects. Whereas this procedure might produce a decrease in the estimates of the regression slopes, if the effects of the CMV source variables are not substantial, the equation should yield comparatively unbiased estimates of the assessed substantive relationships. Thus, in order to correct for any biases that were due to social desirability in our data, we included the social desirability variable in our basic statistical model and compared and estimated its effects and the two models separately. In addition, considering the premise that the causes of CMV might not only suppress true or expose spurious relationships but also moderate the substantive independent-dependent variable relationship (Ganster, Hennessey, & Luthans, 1983), we also assessed social desirability as a moderator of the relationship between healthiness and tastiness judgments.

3.1.4 Results

To further test our hypothesis that the positive healthiness-tastiness relationship is a rather reliable phenomenon and will thus not change under different measurement conditions and when social desirability is controlled for, we again applied a linear mixed effects model (LMM) analysis. We applied a similar basic model involving healthiness, product type, and their interaction as independent variables and tastiness as the dependent variable. The model included random effects of a random intercept and random slope for the healthiness and product type predictors. To statistically correct for social desirability as the presumed CMV source variable, in the second model, we added the social desirability variable as a fixed effect. All continuous variables were centered on their grand means.

Healthiness-tastiness relationship. Supporting our hypotheses once again, the analysis revealed a positive association between the healthiness and tastiness attribute evaluations as indicated by the main effect of healthiness (Table 5). Furthermore, the main effect of product type and the significant interaction between healthiness and product type replicated earlier findings, showing that drinks were regarded as tastier than snacks and that the healthiness-tastiness relationship varied between the two product categories. The relationship was still positive and significant but less strong for snacks ($b = .27$, $SE = .03$), $t(4882) = 10.05$, $p < .001$, than for drinks ($b = .43$, $SE = .02$), $t(4882) = 17.89$, $p < .001$. For additional descriptive analyses of the association between products healthiness and tastiness ratings on a product level, see the Supplementary Material.

The reported linear mixed effects model explained 45% of the variance in the data (conditional $R^2 = .45$). Again, including the additional variables in the model

(explicitness of belief in the unhealthy=tasty intuition, general interest in health, food pleasure orientation, and order of healthiness-tastiness assessments) did not alter the reported results. To evaluate the effect of assessment order alone, we included the order predictor in the basic model as well as its interaction with healthiness. The analyses revealed that the order of the assessment did not affect the tastiness ratings (p = .37), nor did it affect the strength of the healthiness-tastiness association (p = .15).

--- *insert Table 5 here* ---

Consistent with Study 1, the correlation analysis of the healthiness-tastiness association at the individual level revealed variability among participants across both product categories (see Table 6).

--- *insert Table 6 here* ---

Correcting for and assessing the presumed CMV source: social desirability.

The results of the second model including social desirability did not reveal any significant effect of social desirability on the tastiness ratings. Also, the significance levels and the valences of the estimates representing the healthiness-tastiness relationship did not change after we included the social desirability variable (see

Table 7).[2,3] A systematic comparison of the basic model and the model that included social desirability showed that the two models were not significantly different from one another (p = .60). The observed relationships did not change on a practical level after we corrected for the variance associated with social desirability, a potential source of CMV. In addition, we estimated the influence of individuals' social desirability on the association between healthiness and tastiness judgments with a moderation analysis by including the Healthiness x Social Desirability interaction, which was significant, b = .02 (SE = .01), t(10019) = 3.35, p < .001. The spotlight analyses further showed that individuals with more of a tendency to behave in a socially desirable manner also exhibited a stronger positive healthiness-tastiness relationship, b = .42 (SE = .04), t(2298) = 10.02, p < .001, than those with less of a tendency, b = .22 (SE = .05), t(1869) = 4.80, p < .001 (see Figure 4).

Moderation analyses. All moderator analyses were conducted using the basic linear mixed effects model outlined above, where each moderating variable (belief in the unhealthy=tasty intuition, general health interest, food pleasure orientation) and its interaction with the healthiness predictor were investigated separately (while the main effects of the other moderating variables were controlled for). The moderating variables were treated as fixed effects. Significant interactions were again further subjected to a spotlight analysis.

[2] Similarly, when estimating the healthiness-tastiness relationship in the opposite manner with tastiness serving as an independent variable and healthiness as the dependent variable, we found no changes in the significance levels or in the valence of the estimated effects after controlling for social desirability in the model (see Table 8).

[3] All effects also remained stable after we controlled for the additional variables (belief in the unhealthy-tasty intuition, general interest in health, food pleasure orientation) in the second model.

We found that whereas the healthiness-tastiness relationship was positive and significant for participants with relatively low levels of belief in the unhealthy=tasty intuition (b = .47, SE = .05), t(1791) = 9.14, p < .001; interaction (b = -.03, SE = .01), t(10019) = -2.97, p = .003, this positive relationship was weaker for the group of people with firm beliefs in the unhealthy=tasty intuition (b = .29, SE = .05), t(1635) = 6.24, p < .001 (see Figure 5). On the other hand, the positive healthiness-tastiness relationship was stronger for individuals with high levels of interest in health (b = .52, SE = .06), t(1557) = 8.83, p < .001, than for those reporting low levels of interest (b = .21, SE = .05), t(1596) = 4.17, p < .001; interaction (b = .09, SE = .02), t(10019) = 5.63, p < .001 (see Figure 6). A stronger or weaker food pleasure orientation also moderated the relationship, indicating that a high food pleasure orientation was related to a stronger healthiness-tastiness association (b = .44, SE = .05), t(1557) = 8.52, p < .001; interaction (b = .06, SE = .02), t(10019) = 3.33, p < .001, than a lower food pleasure orientation did (b = .23, SE = .05), t(1245) = 4.51, p < .001 (see Figure 7).

--- insert Figure 4 here ---

--- insert Figure 5 here ---

--- insert Figure 6 here ---

--- insert Figure 7 here ---

3.1.5 Discussion (Study 2)

In line with our hypotheses and the evidence from Study 1, we again found a positive association between healthiness and tastiness product judgments in Study 2. As in the previous study, the correlation coefficients representing the healthiness-tastiness association varied considerably between participants, showing the diversity in how healthiness and tastiness judgments are associated across individuals. Moreover, the findings on the moderation of this relationship by general health interest, the explicitly expressed belief that unhealthy food equals tasty food, and the moderation by food pleasure orientation corresponded to the findings from Study 1. It is important to mention that we found that statistically correcting for individuals' tendency to behave in a socially desirable manner did not change the nature of the observed relationship between subjective healthiness and tastiness judgments, although social desirability was found to moderate this relationship.

Taken together, these results suggest that common method variance, due to either specific response styles or social desirability, did not represent a substantial issue in our data.

4. General discussion

Previous research has delivered important evidence about how consumers perceive the taste of food that is explicitly portrayed as healthy or unhealthy. In the US, researchers have shown that consumers often form their taste expectations using the unhealthy=tasty heuristic (Raghunatham et al., 2006), whereas French consumers rely more on the opposite healthy=tasty heuristic (Werle et al., 2013). However, the food products consumers encounter daily in supermarkets are rarely labeled clearly as "healthy products" or "unhealthy products," and consumers have to assess the

healthiness of products subjectively. In the present research, we proposed that consumers construct such judgments of a food's healthiness in a manner that is very similar to how they construct judgments of the food's tastiness and that the two judgments are interrelated. We argue that there is a positive link between healthiness and tastiness judgments stemming from evolutionary development, further maintained in the modern environment by cues on product packages and supported by food marketing as well as by consumers' own accumulated consumption experiences.

We found consistent evidence (Studies 1 and 2) that in the majority of cases, when consumers regarded products as healthier, they also considered these products to be tastier, and vice versa. This association was of considerable strength, although large individual differences were present as well. Moreover, in Study 2, we were able to strengthen the validity of these findings by establishing that presumed sources of common method variance did not play a role in biasing the results. Finally, our data show that consumers do not apply an "unhealthy = tasty" heuristic in their subjective judgments of supermarket-available products we sampled from two complete product categories.

Our findings are in line with findings by Werle et al. (2013), who concluded that French consumers, in contrast with Americans, apply the healthy=tasty heuristic when evaluating healthy or unhealthy food products. Extending this research, we showed that the positive association between healthiness and tastiness in food products is robust across (a) consumers with different educational and socioeconomic backgrounds, (b) consumers from two different European countries, (c) different product categories, and (d) for random selections of real products without explicit health labels from a supermarket.

Previous studies have examined the relation between the healthiness and tastiness of products mainly in student samples or in samples of people with an academic background (e.g., Raghunathan et al., 2006; Werle et al., 2013). Studies with such samples however did not allow conclusions about this relation to be drawn for a broader range of consumers. Indeed, it would have been conceivable to find that the positive link found by Werle et al. (2013) between healthy food and the pleasure derived from consuming such food would be less pronounced among consumers with different demographic characteristics. In all our studies, we relied on real consumer samples with a broader range of demographic characteristics. Thus, our data better resembled population-level data.[4] For example, in contrast to the participants in Werle et al.'s (2013) Study 1 (France), participants in our Study 1 (from Austria) were middle-aged ($M_{ageStudy1}$ = 42.7 vs. $M_{ageWerleStudy1}$ = 19.6), had higher BMIs ($M_{BMIStudy1}$ = 26.16 vs. $M_{BMIWerleStudy1}$ = 21.16), and exhibited stronger beliefs in the unhealthy=tasty intuition ($M_{UTIStudy1}$ = 4.19 vs. $M_{UTIWerleStudy1}$ = 2.30). However, even despite these immense demographic differences, we consistently found a positive association between the perceived healthiness and tastiness of the presented food products.

In addition, our results suggest that the relationship between perceived healthiness and tastiness is not specific to one European country. Of course, Austria and Germany are countries comparable to some degree in terms of food consumption culture, but importantly this indicates generalizability and replication of our findings within samples of wider socioeconomic and geographical status. The latter appears even more pronounced when considering the wider context of the research by Werle

[4] According to the WHO's report on mean Body Mass Index trends in 2014, mean BMI was 25.3 in France, 26.4 in Germany, and 25.5 in Austria (WHO, 2014).

et al. (2013) in France, who also found evidence in line with a positive relationship between healthiness and tastiness judgments. Werle et al. (2013) focused on food pleasure orientation as an explanation for this relationship. The moderating role of the food pleasure orientation was confirmed by results of Huang and Wu (2016) and the present studies as well. However, it is unlikely that the food pleasure orientation alone explains the positive association between healthiness and tastiness, because food does not necessarily have the same importance and representations in Germany and Austria as it does in France (Askegaard & Madsen, 1995).

Whereas the observed association between healthiness and tastiness was robust across consumers with different demographic and geographic characteristics and not affected by consumers' social desirability, our results nevertheless illustrate the diversity of the relationship between the healthiness and tastiness of food products. Our findings revealed that the magnitude of this positive relationship varies across individuals to the point of zero and can even be reversed. Specifically, we observed that consumers' *belief in the unhealthy=tasty intuition* was associated with a decrease of the positive correlation between perceived healthiness and tastiness of food products, while consumers' level of *general interest in health* was associated with its increase. Our results are in line with research by Westcombe and Wardle (1997) on the relevance of health-related attitudes for taste judgments. The authors measured taste perceptions of products that varied in their fat content labeling. They found that consumers who were very concerned about making healthy food choices rated the "higher fat" foods as tasting the least pleasant, whereas consumers who were not concerned about making healthy food choices rated "higher fat" foods as tastier than "lower fat" foods. Similarly, Werle et al. (2013) found that the strength of this

belief was associated with less of a tendency to evaluate healthy products as tastier. We suppose that the diversity of the healthiness-tastiness relationship reflected in the effects of individual differences and differences in the individual-level correlations between the healthiness and tastiness of food products might result from differences in participants' actual experiences with healthy and tasty foods as mirrored by their differences in attitudes toward food.

In our studies, we randomly sampled products from two product categories from a real supermarket, and thus created a context that closely approximated a situation in which consumers are exposed to a large set of products in a real supermarket during their shopping. This random stimuli-sampling approach allowed us to partially avoid sampling biases (even though we still selected the product categories ourselves). Not employing the intuitive selection of stimuli by an experimenter, a procedure that can lead to the selected experimental stimuli being especially facilitative of the expected phenomenon (Fiedler, 2011), enabled us to show the broad generalizability of our findings.

Interestingly, we found that the positive association between healthiness and tastiness was lower in the food category of snacks compared with the drinks category. This finding shows that the positive association between healthiness and tastiness judgments varies between food categories, although it was not reversed completely. Indeed, we expected the unhealthy=tasty intuition to most likely appear in the unhealthy category of snacks[5]. Nevertheless, our findings show that there is space for variation in the association between perceived healthiness and tastiness, and further

[5] Healthiness scores in Study 1: $M_{snacks} = 3.89$ ($SD_{snacks} = 2.37$) vs. $M_{drinks} = 5.62$ ($SD_{drinks} = 2.69$) and Study 2: $M_{snacks} = 3.83$ ($SD_{snacks} = 2.33$) vs. $M_{drinks} = 5.48$ ($SD_{drinks} = 2.57$).

studies might show whether negative correlations can systematically occur in certain product categories.

We suppose that the positive covariation between perceptions of the healthiness and tastiness of food is also reasonable in light of marketing activities and brand management as well as consumers' own personal experiences with foods that are subjectively considered to be relatively healthy and tasty. However, as our studies did not experimentally manipulate these factors, we might speculate about certain alternative explanations. Considering that the presented foods were familiar and also very likely to be purchased frequently by our consumer samples, it makes sense to ask whether or not the positive correlation between the healthiness and tastiness judgments of these foods simply mirrors consumers' tendency to justify their own (previous) food choices. In other words, consumers might justify their food choices by downplaying the negative health aspects of a food or by boosting the positive taste aspect of a food in order to align the explicitly reported product evaluations with their stated consumption values and attitudes (Bublitz et al., 2010).

We suppose that the finding that individual differences moderated the strength of the healthiness-tastiness relationship at least partly reflects consumers' varying acquisition of consumption experiences pertaining to healthy and tasty foods. Due to differences in the internal or external characteristics of the environment (e.g., the proximity or salience of healthy and tasty foods), consumers might have accumulated unequal amounts of experiences with these foods. Therefore, it is plausible, for example, that consumers who do not have very strong beliefs in the unhealthy=tasty intuition might have accumulated more consumption experiences involving foods they consider to be both healthy and tasty than consumers who believe in the intuition

more strongly. This would be in line with the cognitive-ecological approach to judgment biases proposed by Fiedler (2000), suggesting that biases in individual experiences of certain phenomena carry over to subsequent judgments about these phenomena.

Although we found that consumers with strong tendencies to behave in a socially desirable manner show also stronger associations between healthiness and tastiness judgments, our analyses showed little to no evidence that social desirability would substantially modulate the observed healthiness-tastiness relationship. In addition, it is important to bear in mind that we observed the positive healthiness-tastiness association via explicit measures that are generally likely to be influenced by self-presentation effects (e.g., Nosek, 2005). Previous research that employed implicit measures showed that even consumers who explicitly stated low beliefs in the unhealthy=tasty intuition still demonstrated this intuition in an implicit association test (Raghunatham et al. 2016). However, it is important to note that consumption behavior is based on both impulsive and reflective processes and accordingly both implicit and explicit attitudes were found to reliably predict behavior within different situations and contexts (Florack, Friese, & Scarabis, 2010; Scarabis, Florack, & Gosejohann, 2006; Strack, Werth', & Deutsch, 2006). Nevertheless, further research is needed to examine whether the healthy=tasty perception observed in the present studies represents a more stable, possibly implicitly learned behavior, for example, through consumers' personal consumption experiences.

Finally, contexts involving sets of products from a real supermarket are obviously different from contexts involving products with explicit health labels or situations in which extreme products (e.g., burgers and broccoli) are compared. We

are convinced that consumers are much more likely to rely on cues signaling both healthiness and tastiness in comparison contexts that are like the ones we created in our studies and to exhibit halo effects from positive healthiness or tastiness judgments than they are when comparing explicitly labeled or very different products.

Before we come to the conclusion in this article, we would like to formulate a caveat about the interpretation of the results in the sense of causal effects, and a general comment. In the present studies, we found a robust positive correlation between judgments of healthiness and tastiness in two categories of food products. However, it is important to note that it was not the goal of the present research to test the causality between the healthiness and tastiness perceptions, and that the present studies do not allow conclusions about causal relationships. In particular, we did not test whether increasing healthiness of a product automatically leads to an increase in its perceived tastiness. If this truly were the case, the obesity epidemic could be easily resolved and the over-consumption of unhealthy food items would not be a problem. However, the present studies show that consumers do not regard healthiness and tastiness necessarily as opposites (as implied by the unhealthy=tasty heuristic). Hence, the goal of marketers and policy makers to communicate the healthiness of products does not have to harm the tastiness expectations of consumers. Indeed, even in the conditions in which we asked participants to rate healthiness first and in which healthiness was salient, we did not observe a negative correlation between healthiness and tastiness judgments. The order had no effect. It is a task for future research to disentangle the conditions under which perceived healthiness increases perceived tastiness (or vice versa).

Conclusion

Although the strength of the positive relationship consumers ascribe to the health and taste attributes of food products was found to vary across participants and product categories, our studies convincingly show that vastly different kinds of consumers do not generally use the unhealthy=tasty intuition when it comes to evaluating diverse, real, and familiar products. Instead, they perceive the healthiness-tastiness relationship in accordance with the healthy=tasty heuristic. Nevertheless, the healthiness=tastiness association is a complex phenomenon shaped by individual and contextual variables. This has important practical implications for policy makers and marketers. In order to reinforce the healthy=tasty intuition, policy makers could concentrate on increasing consumers' orientation toward health goals and on reducing consumers' beliefs that healthy food equals tasteless food. Marketers might want to invest in building the health image of their brands while also taking into account the multifunctional effects of some cues on perceived healthiness and tastiness.

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6. Author Contributions

Author A. Florack designed Study 1, and both authors conceptualized and designed Study 2. Both authors conducted all studies together. Author S. Haasova analyzed the data, whereas both authors were involved in data interpretation. Both authors wrote the first draft of the manuscript, and both authors contributed to and approved the final manuscript. Both authors had full access to the study data.

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8. Conflicts of Interest

The authors declare that they have no competing interests and that the present research was conducted in the absence of any commercial or financial relationships that could be construed as potential conflicts of interest.

9. Ethics Statements

The present studies were conducted in accordance with the Declaration of Helsinki (revised 1983) and local guidelines of the Faculty of Psychology, University of Vienna. In each study, participants were informed about the aim of the study and the confidentiality of the data collection, and they gave their consent to participate. Participants could also withdraw at any time during the studies.

According to the Austrian Universities Act 2002 UG2002 (Universities Act (UG) BGBl. I No. 120/2002), which was in place at the time the studies were carried out, only medical universities were required to appoint ethics committees for clinical tests, application of medical methods, and applied medical research. Consequently, no ethical approval for these specific studies was required.

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Table 1

Descriptive statistics and Cronbach's alpha coefficients for the scales in Study 1

Variable	Study 1	
	M (*SD*)	α
Belief in unhealthy=tasty intuition	4.43 (2.07)	.71
General health interest	4.24 (1.12)	.82
Food pleasure orientation	5.13 (1.05)	.71

Table 2

Range and median values for correlations between healthiness and tastiness ratings across product categories and for participants from Austria and Germany in Study 1

	Overall		Product category: snacks		Product category: drinks	
	Healthiness-tastiness correlation					
	Interquartile range* (*r*)	Median (*r*)	Interquartile range* (*r*)	Median (*r*)	Interquartile range* (*r*)	Median (*r*)
Overall (N=511)	.15 – .59	.35	Overall (N=511)	-.03 – .49	.23	Overall (N=511)	.25 – .73	.51
Austria (N=255)	.18 – .61	.39	Austria (N=255)	.03 – .50	.25	Austria (N=255)	.26 – .73	.50
Germany (N=256)	.13 – .56	.33	Germany (N=256)	-.05 – .46	.21	Germany (N=256)	.24 – .71	.53

Note. * Interquartile range = 25th – 75th percentile.

Table 3

Parameter estimates of the effects of healthiness, product category, and country on tastiness, using LMM in Study 1

Parameter	
Fixed effects	
Intercept	6.08*** (.05)
Healthiness	.39*** (.01)
Product category	-.30*** (.03)
Country	-.12* (.05)
Healthiness X Product Category	.10*** (.01)
Healthiness X Country	-.01 (.01)
Product category X Country	-.03 (.03)
Healthiness X Product Category X Country	.00 (.01)

Note. Values are parameter estimates predicting the tastiness ratings of products. Standard errors appear in parentheses. The continuous variable in the model, healthiness, is centered on its grand mean. Product category and country are dichotomous variables coded as follows: -1 = "snacks," 1 = "drinks"; -1 = "Austria," 1 = "Germany."
$^{+}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$.

Table 4

Descriptive statistics and Cronbach's alpha coefficients for the scales in Study 2

Variable		
	M (SD)	α
Belief in unhealthy=tasty intuition	4.03(2.11)	.79
General health interest	4.27 (1.14)	.82
Food pleasure orientation	5.09 (1.10)	.73
Social desirability	12.11 (2.79)	.66

Table 5

Parameter estimates of the effect of healthiness and product type on tastiness, using LMM, in Study 2

Parameter	
Fixed effects	
Intercept	6.12*** (.08)
Healthiness	.36*** (.02)
Product category	-.26*** (.04)
Healthiness X Product Category	.08*** (.01)

Note. Values are parameter estimates predicting the tastiness ratings of products. Standard errors appear in parentheses. The continuous variable in the model, healthiness, is centered on its grand mean, and product category is a dichotomous variable coded as follows: -1 = "snacks," 1 = "drinks."
$^{+}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$.

Table 6

Range and median values for correlations between healthiness and tastiness ratings across product categories for participants in Study 2

	Overall			Product category: snacks			Product category: drinks	
				Healthiness-tastiness correlation				
	Interquartile range* (*r*)	Median (*r*)		Interquartile range* (*r*)	Median (*r*)		Interquartile range* (*r*)	Median (*r*)
N=257	.13 – .53	.34	N=257	-.05 – .48	.23	N=257	.16 – .68	.42

Note. * Interquartile range = 25th – 75th percentile.

Table 7

Parameter estimates of the effect of healthiness and product type on tastiness, using LMM, in Study 2

Parameter	
Fixed effects	
Intercept	6.12*** (.08)
Healthiness	.36*** (.02)
Product category	-.26*** (.04)
Healthiness X Product Category	.08*** (.01)
Social desirability	-.01 (.03)

Note. Values are parameter estimates predicting the tastiness ratings of products. Standard errors appear in parentheses. The continuous variable in the model, healthiness, is centered on its grand mean, and product category is a dichotomous variable coded as follows: -1 = "snacks," 1 = "drinks."
$^{+}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$.

Table 8

Parameter estimates of the effect of tastiness and product type on healthiness, using LMM, in Study 2

Parameter	
Fixed effects	
Intercept	4.70*** (.06)
Tastiness	.33*** (.02)
Product category	.76*** (.04)
Tastiness X Product Category	.08*** (.01)
Social desirability	.03 (.02)

Note. Values are parameter estimates predicting the tastiness ratings of products. Standard errors appear in parentheses. The continuous variable in the model, healthiness, is centered on its grand mean, and product category is a dichotomous variable coded as follows: -1 = "snacks," 1 = "drinks."
$^{+}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$.

Practicing the (Un)Healthy=Tasty Intuition: Toward an Ecological View of the Relationship Between Health and Taste in Consumer Judgments

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Supplementary material

Descriptive analyses of food products healthiness and tastiness ratings

Descriptive analyses of the association between product's averaged healthiness and tastiness ratings on the product level in Study 2 – it is important to note that number of individual ratings per product is not equal due to random sampling of products from two product pools, snacks (N = 167) and drinks (N = 262) per each participant (20 from the category "Chips & Co." - snacks and 20 from the category "Nonalcoholic drinks" - drinks).

Table 1

Range and median of correlation coefficients between healthiness and tastiness ratings among the presented products across product categories (Study 2)

	Overall		Product category: snacks		Product category: drinks	
	Healthiness-tastiness correlation					
	Interquartile range* (r)	Median (r)	Interquartile range* (r)	Median (r)	Interquartile range* (r)	Median (r)
Overall (N=429)	.14 – .47	.30	Overall (N=167)	.10 – .34	.24	Overall (N=262)	.18 – .55	.34

Note: * Interquartile range = 25th – 75th percentile.

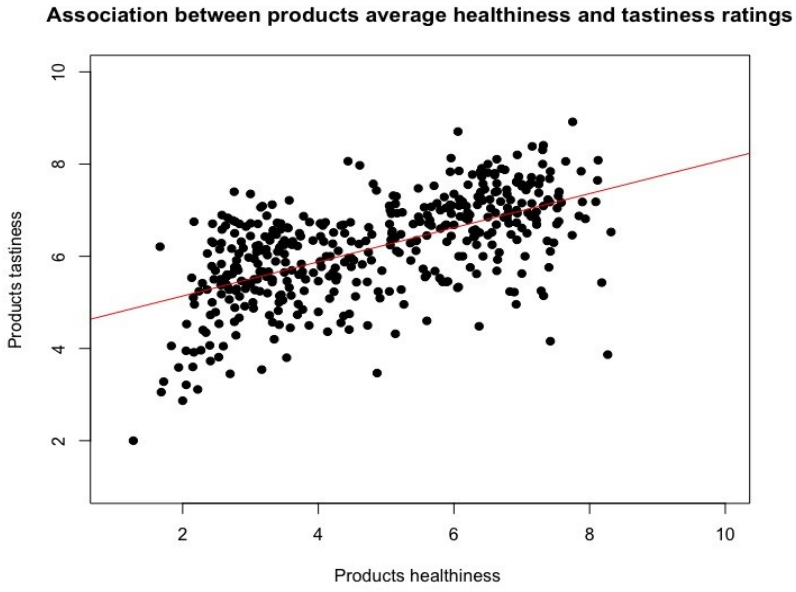

Figure 1. Scatterplot depicting the relationship between mean healthiness and tastiness ratings of all the presented products in Study 2.

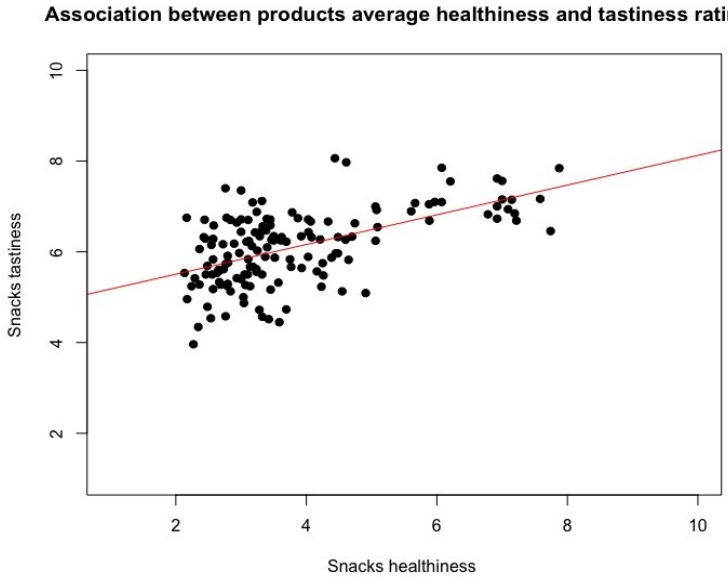

Figure 2. Scatterplot depicting the relationship between mean healthiness and tastiness ratings of all the presented *snacks* in Study 2.

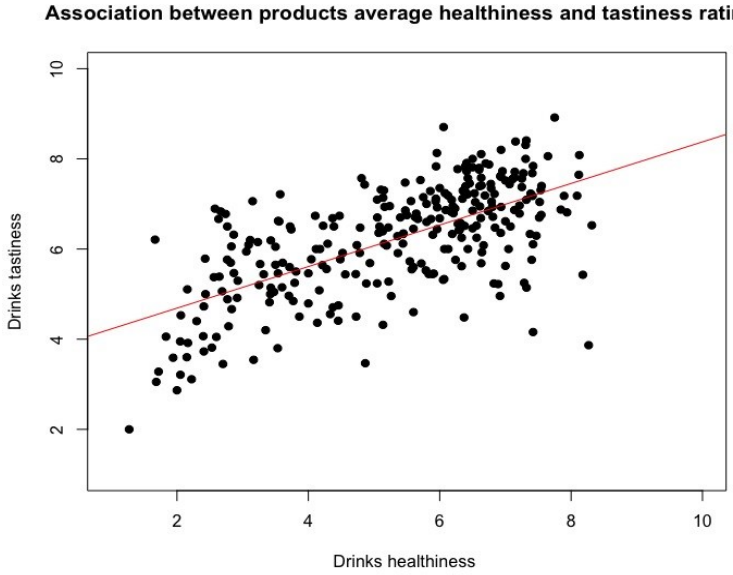

Figure 3. Scatterplot depicting the relationship between mean healthiness and tastiness ratings of all the presented *drinks* in Study 2.