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Food packaging and the color red: how negative cognitive associations influence feelings of guilt

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Abstract

The color red widely appears on food packages. However, understanding of the effects of this color on consumers in the context of food packages remains limited. In particular, the literature stresses the need for a better grasp of the underlying mechanisms that explain the effects of this color when used on food packages. Building on the psychological literature on colors and emotions, this research argues that because the color red carries negative meanings related to transgression, it may prompt consumers to feel some guilt about their consumption. Three studies demonstrate the indirect effect of the color red (versus green or blue) on guilt and eventually on choice through the mediating role of negative cognitive associations. The results also highlight the moderating role of perception of the food product as unhealthy, with the color red leading to stronger negative associations and guilt for unhealthy (vs. healthy) products.

Keywords: color; guilt; negative associations; healthiness; food packaging.

1. Introduction

Color can be found on almost every package of food products. The color information on those products serves both aesthetic (Schloss & Palmer, 2011) and symbolic (Adams & Osgood, 1973; Chebat & Morrin, 2007) functions for consumers. In terms of food symbolism, the color red is, for instance, often associated with sugar (Spence et al., 2015). For this reason, companies frequently use color as a tool for easy identification (Grimes & Doole, 1998), for example, Coca-Cola, which is associated with the color red. Within the product mix, a wide array of tools—including the product itself, its packaging, or the brand logo—can use color to help cement product and brand identification (Garber, Hyaat, & Starr, 2000) and shape consumer responses (Bottomley & Doyle, 2006).

Previous research supports this notion of color as a powerful cue, showing that it influences many aspects of consumer behavior (Aslam, 2006), including emotional responses (Babin, Hardesty, & Suter, 2003; Bellizzi & Hite, 1992; Valdez & Mehrabian, 1994), brand evaluation (Labrecque & Milne, 2012), price perception (Babin et al., 2003), and purchase intentions (e.g., Gorn, Chattopadhyay, Yi, & Dahl, 1997; Labrecque, Patrick, & Milne, 2013). To this regard, research has recognized two patterns of responses that consumers exhibit in response to color exposure: emotions and cognitions. Colors prompt specific emotional states (Hanada, 2018; Valdez & Mehrabian 1994), with, for example, the color red being preferred by individuals in search of high levels of stimulation and blue being preferred by seekers of low stimulation (Nelson et al., 1984). Research also emphasizes the role of cognition in people's responses to color exposure. Early research from Schiller (1935), which ranked the appropriateness of 20 color combinations for five products and five associations, revealed that the green-yellow color combination was most strongly associated with the functional benefits of being economical and cleanliness and thus considered it to be the best color combination for functional products such as breakfast foods and soap. Similarly, a silver-black

combination was most strongly associated with dignity and luxury (or sensory-social benefits) and thus was thought to be an appropriate combination for perfume, a sensory-social product. In the hospitality domain, more recent research shows that using the color gold can help restaurants prompt status-related associations (Lee, Noble, & Biswas, 2018).

Following color exposure, it may be that such consumers' cognitive associations with color explain the mixed evidence found for one particular color: red. This color often carries positive meanings, because it is associated with love, passion, strength, and energy, but it also has negative associations, priming, for example, the notions of danger, mistakes, banning, transgression, blood, war, or fire (e.g., Elliot, Maier, Moller, Friedman, & Meinhardt, 2007; Fetterman, Robinson, & Meier, 2012). Thus, although research has depicted red as detrimental for brands aiming to be positioned as competent (Labrecque & Milne, 2012), the color is appropriate for those seeking an active or exciting positioning (Hanss, Böhm, & Pfister, 2012). Surprisingly, however, no research to date has examined how the negative associations with the color red might negatively affect emotions and behavior toward food products. Thus, this research relies on recent studies highlighting the importance of color for food products (Madzharov, Ramanathan, & Block, 2016; Mead & Richerson, 2018; Reutner, Genschow, & Wänke, 2015; Spence, 2018) to examine the effect of the color red on consumer responses to food packages. That is, because of its negative meanings and specifically its association with mistakes (Mehta & Zhu, 2009), the color red may prompt negative feelings that are closely linked to transgression, more specifically, guilt, an emotion that results from the transgression of moral or social standards (Lazarus, 1991). Further, building on the notion of self-signaling (Prelec & Bodner, 2003), we suggest and test the notion that red (versus green and blue) leads to stronger negative associations when used for unhealthy products (or what is also referred to in the literature as vice products; Chernev & Gal, 2010; Mishra & Mishra, 2011), subsequently having a stronger effect on guilt.

To test this notion, this research builds on the psychological literature on color and guilt to provide theoretically based hypotheses about the relationships among red, negative cognitive associations, and guilt. The research then tests the hypotheses in three studies. Because of the historical opposition between red and green (Fehrman & Fehrman, 2004; Nakshian, 1964; Rohr et al., 2015; Wilson, 1966), this research examines the effect of the color red versus green on guilt. Specifically, Study 1 tests in a real setting – and provides evidence for – the role of negative cognitive associations as a mediator of the relationship between the color red and guilt. Then, Study 2 manipulates the unhealthy (vs. healthy) perception of the food product and tests its moderating role in the effect of the color red on negative cognitive associations and indirectly on guilt and intentions. Study 3 then uses blue in addition to green as a color in opposition to red (Mehta & Zhu, 2009) and replicates the moderating effect of the unhealthy (vs. healthy) perception of the product.

The findings make theoretical contributions and provide new insights for public policy and managerial practices. According to our research, using the color red on unhealthy (versus neutral) products induce negative cognitive associations and subsequently prompt guilt feelings, whereas such effect is not observed for neutral products. Thus, this research demonstrates the importance of investigating package color considerations in food marketing and public policy. Although marketing researchers have increasingly investigated the effects of the color red in other domains than that of food package (Mehta & Zhu, 2009; De Bock, Pandelaere, & Van Kenhove, 2013), or the effects of other package visual cues than that of the red color (Mai, Symmank, & Seeberg-Elverfeldt, 2016; Chen et al., 2020), the interplay between red color and food package has been left unexamined. In this context, we contend and demonstrate that because the red color can prompt negative cognitions and the emotion of guilt – indirectly leading to lower preferences –, this research provides some guidance either for food marketers or for policy makers interested in influencing food choice.

The next section provides a review of the literature on consumers' responses to color exposure, the emotion of guilt, followed by our hypotheses. Then, we present three studies that examine negative cognitive associations and guilt as responses to red color on food package. Finally, the theoretical, practical and public policy implications of the research are discussed.

2. Theoretical background and hypotheses development

2.1. Individuals' responses to color exposure

Color is a fundamental aspect of human perception (Mehta & Zhu, 2009) because people are surrounded by colors in their everyday lives (Bagchi & Cheema, 2013). When shopping or browsing—online or offline—people are faced with colors on products, logos, commercials, or in the environment. Research agrees on the notion that such colors can lead people to form cognitive and emotional responses that then influence their behavior (Donovan & Rossiter, 1982). One cognition of interest for understanding the effect of colors is inference, a process whereby the stimulus itself causes individuals to develop specific evaluations and beliefs (Kardes, Posavac, & Cronley, 2004). Because color can act as a stimulus, an inference process may occur on its exposure, leading people to form beliefs and judgments about the source of that particular color (e.g., a product or logo). Given the ability of colors to affect judgment, research has investigated the role of color as a marketing tool in advertising (Gorn et al., 1997; Kareklas, Brunel, & Coulter, 2014), on websites (Gorn, Chattopadhyay, Sengupta, & Tripathi, 2004), and in branding (Labrecque & Milne, 2012).

Among the different colors, red has received the most attention, probably because of the wide range of responses it can prompt. Beyond physiological responses, such as increased arousal (Crowley, 1993; Wilson, 1966), perceptual responses can also occur, with, for example, color saturation affecting the perceptions of product size (Hagtvedt & Brasel, 2017),

price (Kim, Spence, & Marshall, 2018), and food healthfulness (Mai et al., 2016; Mead & Richerson, 2018). Another set of responses to color exposure relates to behavioral outcomes, with colors having the ability to affect willingness to pay (Bagchi & Cheema, 2013).

Although the aforementioned effects of red can be considered positive, research has also identified negative effects of this color, with red (versus blue) retail environments inducing fewer purchases, greater purchase postponements, and a weaker inclination to shop and browse (Bellizzi & Hite, 1992).

A potential explanation for the mixed and also negative effects of the color red lies in the inferences that individuals make when exposed to this particular color. Colors carry specific meanings (Labrecque & Milne, 2012; Lichtenfeld et al., 2012), and the color red carries not only positive symbolic meanings, such as love or the perception of being up-to-date (Bellizzi, Crowley, & Hasty, 1983), but also negative meanings, such as being associated with the negative notions of transgression (e.g., red traffic lights and stop signs) and mistakes (e.g., teachers often use red to highlight students' mistakes; Elliot et al., 2007). Therefore, because of these potential negative meanings, being exposed to the color red on a specific source (e.g., a product, logo, or packaging) may lead people to make negative inferences about this source.

2.2. Guilt feelings as a predicted response to red color exposure

Given the negative meanings associated with red, this color makes people more vigilant and leads to a change in more conscious attitudes (Crowley, 1993). Because guilt is a negative and self-conscious emotion generated in response to transgression (Baumeister, Stillwell, & Heatherton, 1994), exposure to the color red may lead consumers to be more aware of their misbehavior (De Bock et al., 2013) and to exhibit guilt feelings. This prediction builds on the definition of guilt itself, an unpleasant and self-conscious emotion that arises when

individuals think they have violated an internal moral, societal, or ethical standard (Cotte, Coulter, & Moore, 2005; Kugler & Jones, 1992) or acknowledge such a transgression (Burnett & Lunsford, 1994).

Although previous research has focused on indulgence and lack of self-control as antecedents of guilt feelings (Giner-Sorolla, 2001; Kivetz & Keinan, 2006; Kivetz & Simonson, 2002; Ramanathan & Williams, 2007), other conditions can also lead people to feel guilt. Among the many guilt-eliciting conditions that will be explored, this research proposes the color red as an environmental stimulus. We propose that because red is associated with transgression (Elliot et al., 2007), it will cause people to experience or anticipate more guilt from the consumption of the colored stimulus, leading to negative behavioral responses. This prediction builds on the notion that colors carry specific meanings, with the mere perception of a color having the capability of activating its paired cognitive associations and influencing emotions accordingly (Elliot et al., 2007). Thus, when consumers are exposed to red products, the color may prompt specific negative associations (Labrecque & Milne, 2012) that consequently affect emotions and behaviors. For example, research indicates that because the color red functions as a subtle stop signal, it reduces incidental food and drink intake, leading people to drink less from a red-labeled cup than from a blue-labeled cup and to eat less snack food from a red plate than from a blue or white plate (Genschow, Reutner, & Wänke, 2012).

Therefore, in light of (1) the negative associations of mistakes and failure that people perceive when exposed to red (Elliot et al., 2007; Mehta & Zhu, 2009) and (2) the notion that guilt results from such negative cognitions (Kugler & Jones, 1992), the negative associations that derive from red exposure may prime the notion of transgression, thus leading to an increase in experienced or anticipated guilt. Importantly, what precedes suggests that the color red does not always have a direct effect of guilt and that its effect on guilt might occur

when negative cognitions following red color exposure are formed. This effect may occur when red is contrasted with green, which is most widely considered the opposite of red (De Bock et al., 2013; Nakshian, 1964; Schloss & Palmer, 2011; Wilson, 1966), even though red has sometimes been contrasted with blue (Labrecque & Milne, 2012; Mehta & Zhu, 2009). The color green varies in meanings, many positive, whereas the meanings of red are mostly negative. For example, green can symbolize concepts related to sustainability, growth, life, and hope (Lichtenfeld et al., 2012). As such, green may not lead to the same increase in guilt as red. Hence, we propose the following indirect effect of the red color of food packages on guilt:

H1: The (imagined) consumption of food in a red (vs. green) package leads to increased feelings of guilt.

H2: This effect is mediated by the negative cognitive associations triggered by the exposure to the color red.

The question remains whether the indirect effect of the color red (versus green) on guilt through negative cognitive associations occurs for any type of food product's package. For example, does drinking from a red-colored bottle lead to stronger guilt than drinking from a green-colored bottle? One may argue that it may not be likely. In this case, it is more likely that the type of drink matters—a highly caloric soda might lead to more guilt than another type of drink, regardless of the color of the bottle. In this regard, in many marketing domains, and especially with regard to food, people categorize products according to a good/bad dichotomy of virtues and vices (Chernev & Gal, 2010; van Doorn & Verhoef, 2011). Given the characterization of vice versus virtue products based on their alignment with individuals' self-control (Chernev & Gal, 2010), an impressive body of research in the food domain views vice food products as unhealthy and virtue products as healthy, or neutral (e.g., Davis &

Burton, 2019; Dhar & Wertenbroch, 2012; Mishra & Mishra, 2011; Sela, Berger, & Liu, 2009).

Building on the notion of self-signaling (Prelec & Bodner, 2003), Dhar and Wertenbroch (2012) provided evidence that the consumption of unhealthy products can lead consumers to believe that they possess certain undesirable traits, notably a lack of ability to resist temptation, and thus that consuming unhealthy products can be costly. With these negative meanings carried by unhealthy products and also because the color red makes people more vigilant (Elliot et al., 2007) and conscious (Crowley, 1993), unhealthy products may reinforce the negative cognitions that people associate with such products. To this regard, prior research shows that the color red (compared to green) prompts automatic avoidance reactions to unhealthy food (Rohr et al., 2015), suggesting that the color red may act as a signal that makes people be even more conscious about the negative associations often made with that particular color. Hence, the more consumers view a food product as unhealthy, the more the color red (versus green) may increase such negative cognitions.

Such a notion appears consistent with cue-consistency theory (Maheswaran & Chaiken, 1991), which posits that when people face multiple sources of information, congruent (vs. incongruent) information is more useful and likely to be mobilized (Miyazaki, Grewal, & Goodstein, 2005). Following this view, and because the red color may be congruent when featured on an unhealthy food product (Temple et al., 2011), consumers who face the red color on an unhealthy food package may react to such congruent cue by relying on this color heavily for their decision-making process. Hence, the red color may become of greater influence for unhealthy (versus neutral) food products. Prior research provides support for this notion and shows that when consumers face red (versus green) labels, they exhibit a decrease in their consumption of red-labeled food options due to the association of the red color with unhealthiness (Temple et al., 2011). From what precedes, one may argue that when

people consider the consumption of a red-colored (versus green-colored) unhealthy product, they may be more likely to exhibit the negative emotion of guilt, thus leading to the next hypothesis:

H3: The food product unhealthiness perception moderates the effect of red packaging on negative product associations, and, in turn, the effect on feelings of guilt.

Extant literature on guilt has provided evidence on how this negative emotion precludes people from engaging in the consumption of what causes the guilt (Duhachek, Agrawal, & Han, 2012; Matherly, Ghosh, & Joshi, 2019), suggesting that the effect of the color red on guilt observed so far could decrease behavioral intentions, especially for unhealthy products. Thus, the next hypothesis is proposed:

H4: The food product unhealthiness perception moderates the serially mediated indirect effect of the color red (versus green) on behavioral intentions through negative cognitive associations and guilt. Specifically, for unhealthy (versus neutral) products, red indirectly leads to lower behavioral intentions through the mediating effect of negative cognitive associations and guilt feelings.

These hypotheses lead to the following theoretical model (Figure 1).

[Insert Figure 1 here]

3. Study 1

Study 1 aims to test H1–H2 and the notion that the color red indirectly increases guilt feelings through the mediating effect of negative cognitive associations. Study 1 also tests the effect of exposure to red colored food packaging on consumption volume.

3.1. Procedure and sample

This experiment manipulated the red versus green color of a food packaging. The packaging here consisted of an 18 cm × 18 cm box that a researcher covered with either red or green paper. The red and green sheets of paper used to cover the box were purchased in a store. The researcher took care when selecting the sheets so that they differed in hue (red versus green) but—as much as possible—not in saturation and value, because changing other components of color (i.e., saturation and value) could have confounded the results (Hagtvedt & Brasel, 2017; see Appendix). By doing so, the effects of saturation and lightness were thus controlled for.

The experiment took place over two morning master-level classes (from 8:00 to 11:00) in a French business school in December 2019. At the beginning of the class, students were exposed to one of the red and green boxes that was placed on a table in the classroom. The boxes had been filled with pieces of chocolate. Importantly, those chocolates were not wrapped individually so that the color of the box was the only difference in color across conditions. Also, chocolates were all of the same shape, size, taste, and brown color to avoid any bias. Students were told that they were allowed to approach the box one after the other to pick between one and five chocolates. Importantly, students were asked to choose chocolates that they should completely consume. By doing so, the number of chocolates chosen could be considered a proxy for chocolate consumption.

At the end of the class—or approximately 3 hours after having picked some chocolates from the red or green box—students were asked to answer to a questionnaire. The choice of providing the students with a questionnaire after they had taken the chocolates was made to avoid participants reading the questions about guilt and being potentially biased in their choice of chocolates. Also, by asking them to answer the questionnaire 3 hours after having taken some chocolates, we were able to measure the actual guilt felt by respondents

about having eaten the chocolates. Two students did not agree to participate and the final sample was thus composed of 97 individuals (55.7% female, ages ranging from 21 to 28), among which none was color-blind.

Turning to the measures, to avoid common method bias (Podsakoff et al., 2003), and because one goal of the experiment was to seek evidence for lower amounts of food chosen – and thus, consumed – from red (versus green) packages, participants were first asked to indicate the number of chocolates they had picked from the box. They then rated the degree of guilt they felt after having eaten the chocolates they had chosen on a three-item (*guilty/culpable/remorseful*; $\alpha = .84$) seven-point Likert scale adapted from prior research (Agrawal & Duhachek, 2010; Dahl, Honea, & Manchanda, 2003). Then, to measure negative cognitive associations, participants rated on a seven-point scale, anchored by *not at all* and *very much*, the degree to which they associated the color of the boxes with two words (*transgression* and *forbidden*; $\alpha = .70$). These words were selected from prior literature showing that they are highly associated with red (Elliott et al., 2007; Mehta & Zhu, 2009; Moller et al., 2009). In order to rule out the alternative explanation that it is actually the color green that negatively affects guilt because of its positive meaning in the food domain (Mai et al., 2016), the positive cognitive association of “freshness” was also included.

Further, because the experiment took place during the morning, there was a need to control for the idea that students could choose fewer chocolates not because of their guilt feelings but simply because they had breakfast before participating in the study. Another potential reason for students to choose fewer chocolates was because of some diet habits. Therefore, one question that asked if participants had breakfast before the study was added (coded 0 = No, 1 = Yes), as well as a four-item measure of diet habits (e.g., “How often do you moderate your sugar intake?”; Mohr et al., 2012; $\alpha = .82$). Also, because prior research on cross-modal correspondence indicates that the color red is associated with sugar tastes (Harrar

et al., 2011; Koch & Koch, 2003; Spence et al., 2015), an item was added asking to what extent participants associated the color red with sugar tastes (1 = “Not at all” to 7 = “Very much”) to rule out the notion that the lower number of chocolates picked by participants could not be due to such associations. Finally, participants were asked to indicate on two mono-item scales their attitude toward the color of the box and chocolates in general (“To what extent do you like the red/green color? Chocolates?”; 1 = “Not at all” to 7 = “Very much”). These variables were included as covariates in further analyses.

Of note, the average variance extracted for each of the multi-item constructs was higher than the squared correlation between these constructs and any other construct, providing support for the discriminant validity of the measures (Fornell & Larcker, 1981; Table 1).

[Insert Table 1 here]

3.2. Results

An ANCOVA was performed to test H1. Specifically, the color condition (0 = Green, 1 = Red) was included as the fixed factor and guilt as the dependent variable. The aforementioned variables measuring whether participants had breakfast, their diet habits, associations of red with sugar tastes, attitudes toward chocolate and the package color, age, and gender served as covariates to control for their effects. Bringing support to H1, results revealed a significantly higher mean of guilt in the red condition ($M = 2.59$) than in the green condition ($M = 1.74$, $F(1, 88) = 8.21$, $p = .005$; see Table 2 for univariate statistics). Among the covariates, only gender had a significant impact ($\beta = .81$, $t = 2.95$, $p = .004$), indicating that women were more likely than men to exhibit guilt, a result consistent with prior research (Benetti-McQuoid & Bursik, 2005). Of note, a one-way ANOVA yielded the same significant impact of the red versus green color on guilt when the covariates were not included ($F(1, 96) = 10.21$, $p = .002$).

[Insert Table 2 here]

Then, H2 was tested using a mediation analysis (Process, Model 4, 5,000 bootstraps). The color condition was included as the independent variable, negative cognitive associations as the mediating variable, and guilt as the dependent variable. The same covariates as previously used were included in the analysis. Results revealed a significant indirect effect of the color red versus green on guilt ($\beta = .54, SE = .27, 95\% CI = .070, 1.170$). Specifically, the color red increases negative cognitive associations ($\beta = 2.05, t = 7.51, p = .000$), which in turn positively affects guilt ($\beta = .26, t = 2.28, p = .025$). Among the covariates, only gender had a significant effect, with women marginally experiencing more guilt than men ($\beta = .55, t = 1.93, p = .056$). Of note, this indirect effect of color on guilt was replicated without the covariates ($\beta = .59, SE = .24, 95\% CI = .183, 1.126$), and no direct effect was observed ($p > .05$). Overall, these results support H2. Importantly, the alternative explanation that green could exert a negative effect on guilt due to the positive meaning associated with this color was ruled out, the indirect effect in this mediation analysis being non-significant ($\beta = -.08, SE = .13, 95\% CI = -.392, .154$).

Finally, and although no hypothesis was stated about an effect of the color red on choice, a serial mediation analysis was performed to observe if the red (versus green) color of packaging could affect the number of chocolates consumed by participants due to the negative cognitive associations and subsequent guilt. Interestingly, results revealed a significant serial mediation ($\beta = -.11, SE = .08, 95\% CI = -.315, -.005$), indicating that the positive indirect effect of the color red on guilt through negative cognitive associations is followed by a decrease in the number of chocolates consumed ($\beta = -.21, t = -2.32, p = .022$). Even though the red color had no significant main effect on the number of chocolates consumed ($M_{Red} = 1.86$) and green ($M_{Green} = 1.96, F(1, 88) = .850, p = .359$), this significant serial mediation indicates that that the red (versus green) package color still indirectly affects the number of

chocolates consumed due to the mediating role of negative cognitive associations and guilt. In other words, it is because exposure to red color prompts negative cognitive associations and guilt that people end up consuming less of such product. These results highlight the important role of negative cognitive associations and guilt as underlying mechanisms explaining the effects of the red package color on consumption.

3.3. Discussion

Study 1 demonstrates that the red (versus green) color of a package affects guilt through the mediating effect of the negative cognitive associations that people make with the color red. Interestingly, the results of the serial mediation also show that exposure to a red versus green package ultimately leads to less consumption. Although the direct effect of the red versus green color on intentions (here, operationalized as choice) was non-significant, an indirect effect through guilt was still observed, suggesting full mediation (Zhao, Lynch and Chen 2010). This indirect effect indicates that it is because the red color evokes transgression that people feel more guilt consuming some foods from a red versus green package. Subsequently, such guilt following color exposure leads people to consume less of a food product from a red versus green package.

In spite of these results, Study 1 did not examine H3–H4 and the predicted moderating role of the unhealthy characteristic of the colored food packaging. The aim of Study 2 is to tackle this limitation and, more specifically, to manipulate the product unhealthiness perception for a product whose packaging is predominantly red or green.

4. Study 2

Study 2 aims to test the moderating effect of food product unhealthiness perception on the red color–guilt relationships. Another goal of Study 2 is to test if the guilt that is anticipated when

exposed to red food packages and arises from negative cognitive associations can affect intentions.

4.1. Procedure

Two hundred forty English individuals were recruited to participate in this study online through a panelist. The observations of seven people who reported being color-blind were removed, which left a final sample of 233 observations (53.2% male; $M_{Age} = 30.35$, $SD = 9.53$). The experiment employed a 2 (predominant food product color: red versus green) \times 2 (food product unhealthiness perception: unhealthy versus neutral) between-subjects design. Participants were randomly assigned to one of the four conditions. Specifically, they read a short scenario that asked them to imagine being at home in the middle of the morning, getting hungry, and finding a cereal bar in a kitchen cupboard. The cereal bar served as the focal product because, depending on its components and calories, it can lead to both healthy and unhealthy perception. Following previous research (Mishra & Mishra, 2011; Sela et al., 2009; van Doorn & Verhoef, 2011), participants in the unhealthy condition were exposed to a picture of the cereal bar online, and its packaging was either predominantly red or green and displayed claims about the calories of the bar (“maxi calories for energy,” “ultra-rich in sugar,” “high calorie,” “made from peanut butter,” and “nutri-grain”). By contrast, in the neutral condition, the claims were about the naturalness of the product and its potential healthfulness (“Fiber one,” “pure and simple,” “100% natural,” “no genetically engineered ingredients,” “5 super grains,” and “healthy grains”). The stimuli appear in Appendix.

After exposure to the stimuli, participants were asked to complete a series of measures. As in Study 1, to inhibit response bias (Podsakoff et al., 2003), participants were first asked to rate their consumption intentions, using the item “To what extent would you like to eat this crunchy bar?” (1 = “not at all” and 7 = “very much”). They then rated their guilt feelings ($\alpha =$

.87) and their negative cognitive associations ($\alpha = .80$) using the same measures as previously used. For manipulation check purposes, participants rated how unhealthy the cereal bar was, from 1 (“not at all unhealthy”) to 7 (“very unhealthy”). Finally, the realism of the scenario was also assessed, from 1 (“could not happen at all in real life”) to 7 (“could definitely happen in real life”).

4.2. Manipulation checks

Participants perceived the cereal bar in the unhealthy condition as significantly healthier ($M = 4.08$) than those in the neutral condition ($M = 2.32$; $F(1, 232) = 73.53, p = .000$), indicating that the manipulation of healthiness perception was successful. Further, a two-way ANOVA that employed the color conditions and the healthiness conditions as fixed factors, and healthiness perception as the dependent variable, showed no main effect of color on the dependent variable ($p > .20$), indicating that healthiness perception did not vary with color. Furthermore, participants rated the scenario as significantly more realistic than the median value of scenario realism ($M = 5.55$; $t = 15.80, p = .000$).

4.3. Hypotheses testing

A first ANOVA checked whether the results showing a positive effect of the color red (versus green) on guilt replicate in the current case. The results provide marginal support for H1 and a positive effect of the red color on guilt, showing that guilt was greater when the package was red ($M = 3.39$) rather than green ($M = 3.03$; $F(1, 232) = 3.17, p = .076$). To test the indirect effect of the color red on guilt feelings through negative cognitive associations, a mediation analysis was performed, with gender included as a covariate due to its significant impact in Study 1. Results revealed a significant indirect effect ($\beta = .24, SE = .11, 95\% CI = .035, .483$). Specifically, as in Study 1, the results indicated that the color red (versus green) prompted

negative cognitive associations ($\beta = .33, t = 2.18, p = .030$), which in turn increased guilt feelings ($\beta = .76, t = 10.28, p = .000$). No direct effect of red versus green on guilt was observed ($p > .05$). Combined, these results bring further support to H1 and H2.

Next, a moderated-mediation analysis (Model 7, because no prediction was made on a potential moderation of the red color-guilt relationship; 5,000 bootstraps) tested H3 and the moderating role of the food unhealthiness perception. The color condition served as the independent variable, anticipated guilt as the dependent variable, negative cognitive associations as the mediating variable, and the unhealthiness manipulation as the moderator. The results revealed a significant interaction of color and unhealthiness perception on negative cognitive associations ($\beta = .72, t = 2.48, p = .011$) and no main effects of color and unhealthiness condition (p 's $> .05$; Figure 2). To probe this interaction further, an independent samples t -test was performed in each unhealthiness condition. As expected, and lending further support to H3, the results revealed no significant mean difference of negative cognitive associations across colors in the neutral condition ($t = .852, p > .05$) but a significant difference in the unhealthy condition ($M_{\text{Green}} = 1.98, M_{\text{Red}} = 2.68; t = -3.06, p = .003$).

[Insert Figure 2 here]

Furthermore, the analysis revealed a significant index of moderated mediation ($\beta = .54, SE = .22, 95\% \text{ CI} = .118, .990$), such that negative cognitive associations mediated the effects of the color red on guilt feelings in the unhealthy product condition ($95\% \text{ CI} = .193, .865$) but not in the neutral condition ($95\% \text{ CI} = -.298, .233$; Figure 3). These results provide support for H3, showing that the color red causes people to more strongly associate consumption with the notions of transgression when the product is unhealthy, leading them to feel more guilt about this consumption.

[Insert Figure 3 here]

Finally, a moderated serial mediation analysis was performed to test whether the indirect effect of the red (versus green) color on anticipated guilt could (1) subsequently affect intentions and (2) differently affect such intentions depending on the unhealthiness of the food. Because our framework suggests that the moderating effect takes place on the relationship between the red color and negative cognitive associations, this analysis was performed using the Process macro (5,000 bootstraps), and more specifically its model 83, which tests for the interaction between the independent variable (color condition) and the first mediator (negative cognitive associations). This analysis used the same variables as in the moderated mediation analysis but also included the measure of behavioral intentions as the dependent variable; thus, guilt entered the analysis as the second mediator. The results revealed a significant index of moderated serial mediation ($\beta = -.17$, $SE = .09$, 95% CI = $-.313, -.015$) and more specifically a serially mediated effect of the color red on intentions only in the unhealthy condition (95% CI = $-.428, -.047$) and not in the neutral condition (95% CI = $-.054, .087$). In the unhealthy condition, the serial mediation is such that the color red increases negative cognitions ($\beta = .69$, $t = 3.06$, $p = .002$), which then increase anticipated guilt ($\beta = .70$, $t = 7.38$, $p = .000$), which decreases behavioral intentions ($\beta = -.39$, $t = -3.44$, $p = .000$). Of note, the main effect of color on intentions was not significant ($p > .10$). Overall, these results indicate that it is when the food is unhealthy that the red color of food packages can affect negative cognitive associations and guilt feelings but also, and ultimately, consumption intentions. More specifically, the color red (versus green) has a stronger positive effect on negative cognitions and anticipated guilt, which consequently leads to a stronger decrease in behavioral intentions.

4.4. Discussion

Study 2 supports the predictions and previous results by showing that the color red leads to stronger anticipated guilt feelings than the color green because people associate consuming a food product whose packaging is predominantly red with negative meanings. In line with Reutner et al. (2015), who found that food healthfulness moderates the effect of the color red on consumption, Study 2 also shows that red has stronger effects on negative cognitive associations and anticipated guilt feelings when the product is unhealthy. Finally, Study 2 shows that the guilt feelings induced by the color red can ultimately decrease consumption intentions. Overall, Study 2 provides additional evidence for the theoretical model of the effects of the red color of unhealthy food packages on guilt feelings through the meanings that people assign to that particular color.

Nevertheless, one might argue that the color red has often been opposed not to the color green but to blue. Therefore, in the next study, we aim to replicate the current findings when opposing a red food package to green and blue food packages.

5. Study 3

The goal of Study 3 is to replicate the moderating effect food unhealthiness on the red color–guilt relationship in another context. Further, Study 3 examines the respective effects of red when compared not only to green but also to blue, a color that also has been widely opposed to red (Bagchi & Cheema, 2013; Mehta & Zhu, 2009; Mehta et al., 2017).

5.1. Procedure

This experiment was completed online by 500 English individuals in exchange for a small amount of monetary compensation. After removing 14 observations from individuals who did not pass an attention check (i.e., did not answer “strongly disagree” to a question that

specifically asked for that response) and 5 observations from people who were color-blind, the final data set was composed of 481 observations (67.4% female, $M_{Age} = 36.03$, $SD = 12.18$). Unlike in Study 2, color here was manipulated at three levels (red versus green versus blue). Specifically, a professional designer helped design three packages of chips that differed in their red, green, or blue hue, without changing their saturation or value (see Appendix). In order to manipulate the unhealthiness of the food, the flavor of the chips was either “cheese and bacon” (unhealthy condition) or “veggie” (neutral condition). Participants were randomly assigned to one of the six conditions and, as in Study 2, read a short scenario that asked them to imagine being at home in the middle of the morning, getting hungry, and finding a package of chips in a kitchen cupboard.

After exposure to the stimuli and the scenario, participants completed a measure of consumption intentions (“To what extent would you like to eat this pack of chips? 1: “Not at all” to 7: “Very much”). Then, they completed the same measures of guilt feelings ($\alpha = .81$) and negative cognitive associations ($\alpha = .68$) as in Studies 1 and 2. For manipulation check purposes, they rated how unhealthy the package of chips was using the same item as in Study 2. Finally, the realism of the scenario was assessed the same way as in Study 2.

5.2. Manipulation checks

Participants in the unhealthy condition perceived the package of chips as significantly healthier ($M = 5.39$) than those in the neutral condition ($M = 4.26$; $F(1, 479) = 79.52$, $p = .000$), making the manipulation of unhealthiness successful. As in Study 2, unhealthiness perception did not vary with color ($p > .60$). Further, participants rated the scenario as significantly more realistic than the median value of scenario realism ($M = 5.16$; $t = 15.73$, $p = .001$).

5.3. Hypotheses testing

The first analysis was performed to see if the emergence of stronger guilt feelings following red (versus green or blue) exposure replicated. Unlike what was found in studies 1 and 2, the results of an ANOVA revealed no significant difference of guilt across colors ($F(2, 478) = .521, p = .594; M_{Red} = 2.83, M_{Green} = 2.67, M_{Blue} = 2.69$). Although not significant ($F(2, 240) = 2.305, p = .102$), planned contrasts performed to examine more deeply the levels of guilt feelings in the unhealthy food condition revealed significant differences of guilt across red and green conditions ($M_{Red} = 3.27, M_{Green} = 2.78, t = 2.08, p = .038$), but quite surprisingly not across red and blue conditions ($M_{Blue} = 3.13, t = .587, p = .557$). A different pattern emerged in the neutral product condition ($F(2, 235) = 1.076, p = .343$), with guilt not being different across red and green conditions ($M_{Red} = 2.36, M_{Green} = 2.56, t = -.928, p = .354$), or across red and blue conditions ($M_{Blue} = 2.25, t = .510, p = .611$).

In order to see if here again the effect of color on guilt is mediated by negative cognitive associations, two distinct mediation analyses were conducted to test the indirect effect of the color red on anticipated guilt feelings through negative cognitive associations. The first analysis included the red (coded 1) versus green (coded 0) color condition as the independent variable, and the second included the red (coded 1) versus blue (coded 0) color condition. Given the results obtained in our prior studies, gender was included as a covariate. Replicating our prior results regarding red as opposed to green and supporting H2, Study 3's results revealed a significant indirect effect ($\beta = .24, SE = .08, 95\% CI = .074, .417$) of red on guilt feelings through negative associations. Specifically, as in previous studies, the results indicated that the color red (versus green) prompted negative cognitive associations ($\beta = .39, t = 2.81, p = .002$), which in turn increased guilt feelings ($\beta = .61, t = 10.30, p = .000$). A similar, though weaker, indirect effect of the color red on guilt was observed when opposed to blue ($\beta = .07, SE = .04, 95\% CI = .003, .172$). In both mediations – and as in previous studies

– the direct effect of color on guilt was not significant (p 's > .10). Overall, these results support H2.

The next analysis pertained to H3 and the predicted moderating role of food unhealthiness. Two similar moderated-mediation analyses as in Study 2 were performed, again opposing the color red to the color green first and then to the color blue. When opposing the red and green conditions, results first revealed a significant interaction between the color red (versus green) and food unhealthiness ($\beta = .56, t = 2.09, p = .04$). More specifically and supporting H3, two independent samples t -tests performed respectively in each of the product unhealthiness conditions showed no significant mean difference of negative cognitive associations in the neutral condition ($t = .73, p = .462$) but a significant difference across colors in the unhealthy condition ($M_{\text{Green}} = 2.01, M_{\text{Red}} = 2.70; t = -3.48, p = .001$; Figure 4).

[Insert Figure 4 about here]

Following this interaction, results also revealed a significant index of moderated mediation ($\beta = .34, SE = .16, 95\% \text{ CI} = .022, .684$), with more specifically an indirect effect of the color red on guilt in the unhealthy condition ($95\% \text{ CI} = .170, .662$) but not in the neutral condition ($95\% \text{ CI} = -.159, .292$; Figure 5), further supporting H3.

[Insert Figure 5 about here]

Turning to the second moderating-mediation analysis—which opposed the colors red and blue—the results revealed only a marginally significant interaction between the red versus blue color and the food product unhealthiness ($\beta = .23, p = .09$). This marginal interaction leads to a non-significant index of moderated mediation ($\beta = .14, SE = .08, 95\% \text{ CI} = -.016, .312$), although the indirect effect of the color red was significant in the unhealthy product condition ($95\% \text{ CI} = .005, .245$) but not in the neutral product condition ($95\% \text{ CI} =$

-.0120, .091). This result indicates that the unhealthiness of a food product's packaging does not significantly change the indirect effect of the color red on guilt feelings when such color is opposed to blue, even though for a vice product the color red leads to more guilt than the color blue.

Finally, and now focusing on intentions, H4 was tested using a similar moderated serial mediation analysis as in Study 2 was conducted. When opposing the red package to the green package, the results revealed a significant index of moderated serial mediation ($\beta = -.09$, $SE = .05$, $95\% CI = -.211, -.002$). Precisely, a significant serially mediated effect of the color red on intentions was observed in the unhealthy condition ($95\% CI = -.222, -.015$). Following Zhao et al. (2010), this indirect effect was observed even though the direct effect of the red package ($M_{Red} = 3.81$, $M_{Green} = 4.11$, $p > .05$). The serial mediation was not observed in the neutral condition ($95\% CI = -.088, .039$), and a non-significant direct effect of color on intentions was here again observed ($M_{Red} = 4.33$, $M_{Green} = 4.24$, $p > .05$). These results indicate that when the food product is seen as unhealthy, the red (versus green) package color leads to lower consumption intentions due to the negative cognitive associations and subsequent guilt.

Turning now to the opposition of the red and blue colors, no moderated serial mediation was observed ($95\% CI = -.064, .007$). No direct effect was observed, both in the unhealthy condition ($M_{Red} = 3.81$, $M_{Green} = 4.15$, $p > .05$) and the neutral condition ($M_{Red} = 4.33$, $M_{Green} = 4.28$, $p > .05$). These results suggest that whatever the level of perceived food healthiness, red and blue packages do not lead to different effects on consumption intentions because of the negative cognitive associations and guilt feelings that arise from such colors.

6. General discussion

Building on psychological literature, this research began by arguing that the mere exposure to the color red on food packages may lead to an increase in experienced or anticipated guilt because of the negative cognitive associations drawn by individuals when exposed to this particular color. Providing evidence for such an indirect effect, this research thus contributes to the recent stream of literature on the influence of food package color (Madzharov et al., 2016; Mai et al., 2016; Mead & Richerson, 2018) by showing that merely being exposed to the color red on food packaging can heighten negative cognitions and subsequently the particular emotion of guilt.

This research also extends the literature on guilt, which to date has focused on indulgence (Goldsmith, Cho, & Dhar, 2012; Matherly et al., 2019) and lack of self-control (Werthenbroch, 1998) as the main antecedents of this negative emotion, leaving unexplored how other cues may affect this emotion. This research proposed that the color red could represent such a cue. Specifically, given a long tradition of comparing red with green in light of their chromatic properties and the meanings these colors carry (e.g., Nakshian, 1964), this research predominantly contrasted red with green (and blue in Study 3) and investigated whether and why consuming products whose predominant package color is red leads to stronger guilt feelings. The three studies show that experiencing (Study 1) or anticipating (Studies 2-3) the consumption of red-packaged products leads people to feel guiltier than the consumption of green-packaged products. In addition, this effect occurs because the color red carries negative meanings of transgression. Importantly, evidence shows that the increase in guilt as a response to red is not due to the positive meanings conveyed by the color green. Results provide additional insights into how the color red increases negative cognitive associations and subsequent guilt feelings and show that this effect is even stronger for unhealthy (versus neutral) food products. We discuss the implications of these results in the next section.

6.1. Theoretical implications

This research's theoretical contributions are fourfold. First, this study adds to the literature on guilt and color by identifying the color red as an indirect antecedent of guilt and its effect on consumption intentions. Research on guilt has received much attention but has focused mainly on the consequences of this negative affect (Goldsmith, Cho, & Dhar, 2012; Saintives & Lunardo, 2016), leaving less examined the identification of its antecedents (Kivetz & Keinan, 2006; Kivetz & Simonson, 2002; Ramanathan & Williams, 2007). The current research adds to this stream of literature by showing that the mere exposure to the red (versus green) color of a food packaging can indirectly lead to guilt. Although in each of the three studies the effect of the red color on guilt is indirect (versus direct; for a review see Zhao et al., 2010), this research thus appears to be the first to identify a sensory cue—here, the color red—as an indirect antecedent of guilt feelings.

Second, and consequently, this research contributes to the large literature on sensory marketing (e.g., Krishna, 2012) and the effects of color (e.g., Bellizzi & Hite, 1992; Gorn et al., 2004; Labrecque & Milne, 2012) by identifying guilt as an emotion that emerges as a response to the exposure to the red color. Specifically, we find that for unhealthy products, the red color indirectly prompts the negative emotion of guilt. This result is worthy of attention because it highlights guilt as an emotion that complements the set of emotions – including pleasure, arousal and dominance (Bellizzi & Hite, 1992; Valdez & Mehrabian, 1994), and relaxation and excitement (Gorn et al., 1997) – that was already identified in prior sensory marketing literature as affective responses to color exposure. This finding thus extends previous marketing literature that narrowly focused on the positive emotions that derive from color exposure, and indicates that not only positive but also negative emotions can emerge from exposure to colors, especially red.

Third, and importantly, this research adds to the increasing literature on the meaning of colors (Labrecque & Milne, 2012) and the link between red and avoidance (Rohr et al., 2015), by showing that the reason for the effect of the color red on guilt lies in the widespread negative meanings associated with red (e.g., transgression, mistakes). By evoking such meanings, red primes the notion of transgression, which prompts guilt feelings, especially in the case of unhealthy products. Although not significant differences in guilt were observed across the red and blue color conditions in Study 3, what our results nevertheless show is that this mediating effect occurs not only when red is contrasted with green, but also when red is contrasted with blue, a color that is usually seen as being opposed to red (Mehta & Zhu, 2009). Therefore, these results indicate that red is a particular color that—whatever the color it is opposed to—prompts guilt feelings because of its meanings associated with the notion of transgression. Interestingly, the results of the serial mediation show that for unhealthy food products, the color red ultimately leads to lower preferences, and identifies negative cognitive associations and guilt as the underlying mechanisms that explain this effect. Therefore, the current research contributes to the literature by showing that merely being exposed to a red food packaging can prime the notion of transgression, which explain why consumers can anticipate feeling guilty about consuming the product and consequently not engaging in buying behavior.

Further, this research also contributes to the literature on the categorization of food products as unhealthy or healthy – or respectively vices or virtues (Chernev & Gal, 2010; Wertenbroch, 1998) –, a stream of research that recently gained attention in food consumer research (Mai et al., 2016; Mishra & Mishra, 2011). What the current research shows is that the more people perceive a product as unhealthy – or, a vice –, the stronger the effect is of a red-colored package on negative cognitive associations and subsequent guilt feelings. Though obtained in the context of food packages, the results are thus consistent with prior research on

food labeling (Temple et al., 2011), which found that using red labels to denote unhealthy options helps decrease consumption of red-labeled foods and increase consumption of green-labeled options.

6.2. Managerial and public policy implications

Color is an important source of information for consumers because approximately 62% to 90% of a consumer's initial assessment of products is based on colors alone (Singh, 2006). Color attracts consumers and helps shape their perceptions. From a managerial standpoint, marketers should thus be cautious and use color knowledge when deciding about what color to assign to packaging, advertisements, and websites. Specifically, the results suggest that firms should carefully manage the use of the color red because it may evoke guilt feelings and indirectly negatively affect intentions. That is, when exposed to red-colored packages, consumers may associate feelings of transgression when consuming the product and thus experience guilt, leading not to consume the product. This self-conscious emotion is difficult to deal with and often leads consumers to avoid adopting in the future the behavior that made such guilt arise (Antonetti, Baines, & Jain, 2018). In other words, consumers are likely to avoid consuming the products they associate with guilt feelings again. Our results are consistent with this notion and show that consumers exposed to a red-packaged unhealthy food product are more likely than those exposed to a green package not to consume the product in the future. Therefore, when using colors, such as red, that are likely to prompt guilt feelings, marketers should pay particular attention to their potential negative effects.

However, this research also indicates that the role and the importance of the color red may differ by product category. The results show that red (versus green) will generate stronger guilt feelings in the case of unhealthy products than in the case of healthier products. In the case of healthier products, red exerts a lesser impact on guilt. This difference in the

effects of the red color suggests that marketing managers can gain by using red for unhealthy food product packages that aim to generate guilt feelings. However, marketing managers who sell unhealthy products but do not aim to have their products associated with guilt feelings might gain in avoiding using red for their products.

Nevertheless, in some cases red may be of great interest to marketers, even if or because of inducing guilt. Marketing managers who aim to have guilt be a core component of their unhealthy products may want to use the color red to evoke their positioning. The large extent to which brands selling unhealthy products (e.g., chips and soft drinks) use the color red may find support in the results. That is, the use of red for their packaging is not surprising when considering that this color induces the emotion of guilt, an emotion that prior research has shown is positively correlated with pleasure (Goldsmith et al., 2012), which might be exactly the emotion that consumers seek when consuming such indulging products.

From a public policy perspective, it has recently been suggested that public health policy may benefit from incorporating the results of emotion research (Ferrer et al., 2014). We believe that our results showing that the emotion of guilt—and subsequently consumption intentions—can be affected by the exposure to the color red and can be of interest for public policy makers who aim to help people consume healthy food and warn them against eating unhealthy products. Hence, public policy makers might find an interest in seeing red as a potential mandatory color for unhealthy product packages, as such color may help people experience or anticipate more guilt and reconsider their food purchases habits.

6.3. Limitations and further research

This study raises several issues for future investigations. One important topic pertains to examining other boundary conditions for the effects of the color red. The results highlight the moderating role of food unhealthiness – or the vice/virtue categorization of products –, but

other variables might moderate the effects of the color red and deserve to be investigated. More specifically, cultural differences could serve as a boundary condition for the effect of the color red on guilt. Although some authors argue that red has similar meanings across countries (Madden, Hewett, & Roth, 2000), others suggest that there are some cultural differences in terms of the meaning of red. According to Aslam (2000), although the color red is associated with negative feelings in Anglo-Saxon and Germanic cultures, it means love, luck, and ambition in Asian cultures. Futures studies could thus investigate the effect of red on guilt in different cultures.

Another interesting avenue for further research lies in the investigation of the guilt-inducing effects of other properties than the mere hue of the red color. Prior research (Madzharov et al., 2016; Mai et al., 2016) presents evidence that lighter (versus darker) colors have an impact on unhealthy consumption, whereby lighter colors reduce food unhealthiness perceptions. Thus, one may wonder if when the color red is made lighter, its indirect effect of guilt decreases. Further research on such aspects of the color red would help obtain a deeper knowledge on the effect of this particular color.

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Figure 1 The theoretical model

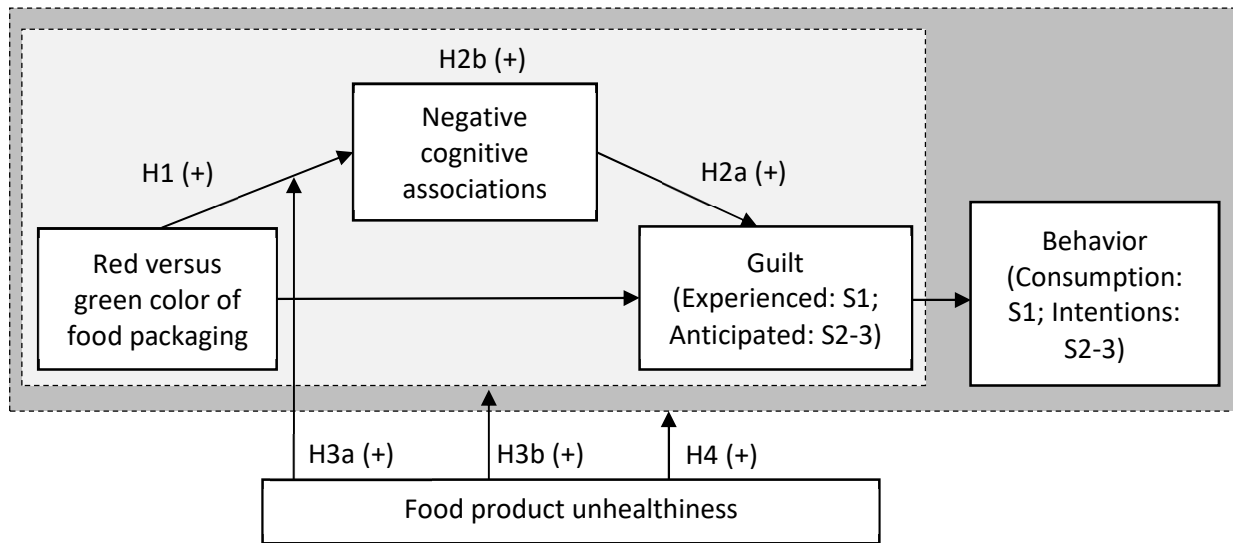
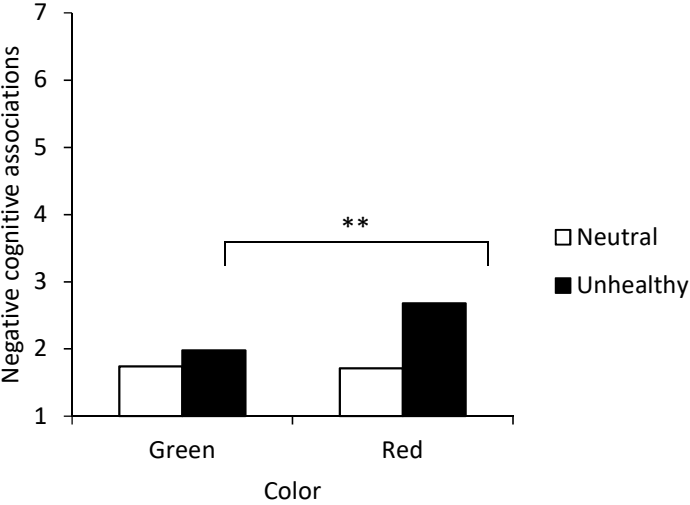
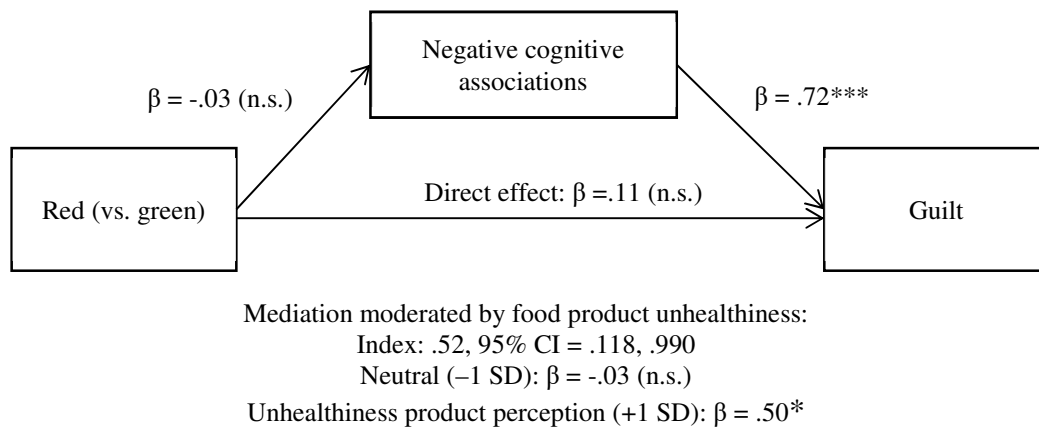


Figure 2 Study 2: Negative cognitive associations as a function of the color red versus green and unhealthiness product perception



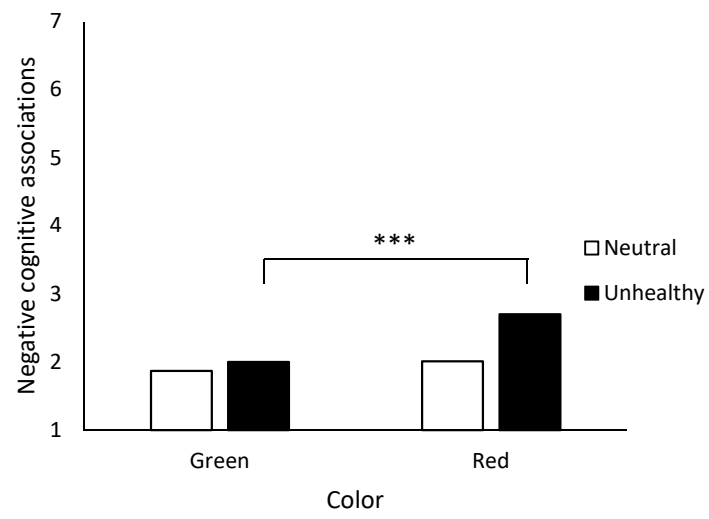
Note: **: $p < .01$

Figure 3 Study 2: Unhealthiness product perception as a moderator of the mediating effect of negative cognitive associations on the red color–guilt relationship



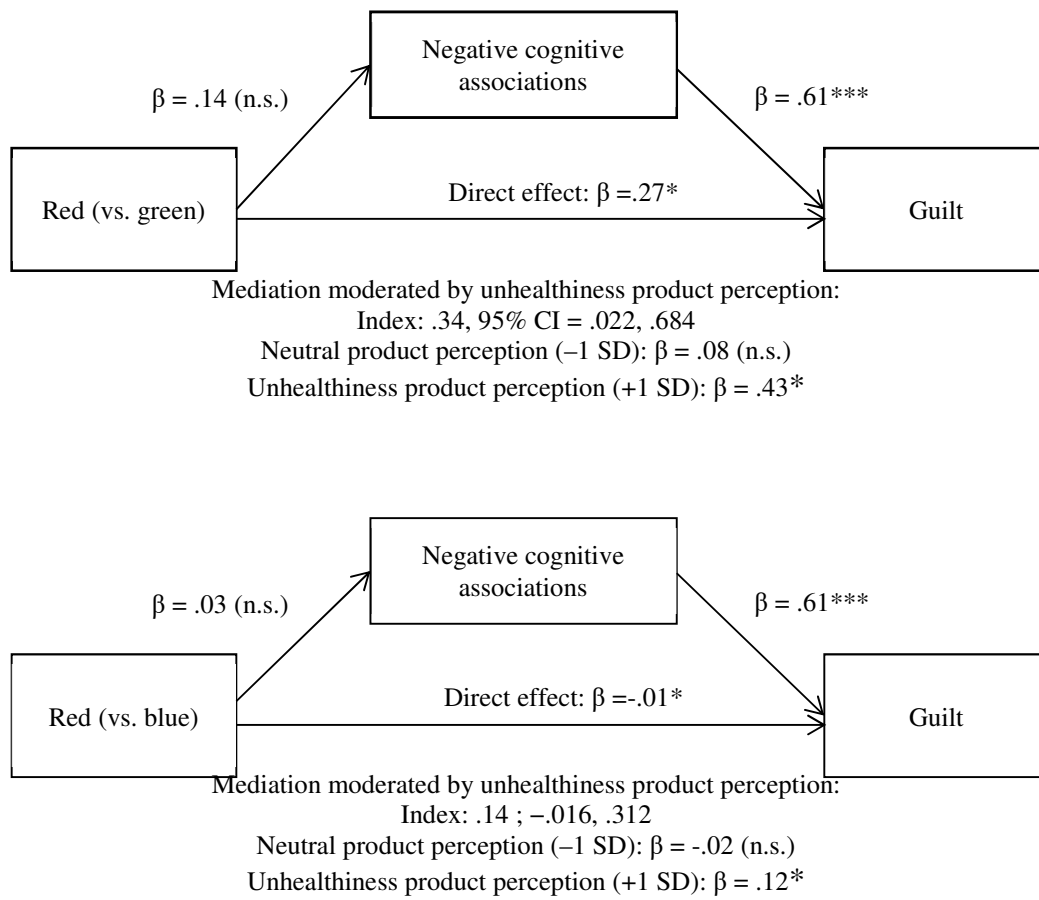
Note: ***: $p < .001$; *: $p < .05$; n.s.: non-significant.

Figure 4 Study 3: Negative cognitive associations as a function of the color red versus green and unhealthiness product perception



Note: ***: $p < .001$

Figure 5 Study 3: Unhealthiness perception as a moderator of the mediating effect of negative cognitive associations on the red (versus green and blue) color–guilt relationship



Note: ***: $p < .001$; *: $p < .05$; n.s.: non-significant.

Table 1 Discriminant validity of the measures

Measures	1	2	3	4
Study 1				
1. Consumption	-			
2. Guilt feelings	.02	.76		
3. Negative cognitive associations	.01	.16	.77	
4. Unhealthiness perception	-	-	-	-
Study 2				
1. Intentions	-			
2. Guilt feelings	.17	.81		
3. Negative cognitive associations	.14	.32	.83	
4. Unhealthiness perception	.20	.29	.14	-
Study 3				
1. Intentions	-			
2. Guilt feelings	.03	.74		
3. Negative cognitive associations	.03	.27	.73	
4. Unhealthiness perception	.01	.20	.06	-

Note: The diagonals show the average variance extracted for each construct. The cells below the diagonal show the squared correlations between constructs

** $p < .01$.

Table 2 Descriptive statistics across color conditions (means and standard deviations)

	Study 1 (Chocolates)		Study 2 (Cereal bars)				Study 3 (Chips)					
	Green (N=59)	Red (N=51)	Neutral product		Unhealthy product		Neutral product			Unhealthy product		
			Green (N=58)	Red (N=58)	Green (N=58)	Red (N=59)	Green (N=78)	Red (N=78)	Blue (N=79)	Green (N=80)	Red (N=80)	Blue (N=79)
Intentions	1.96 (1.17)	1.86 (1.08)	4.20 (1.42)	4.12 (1.34)	3.78 (1.56)	3.56 (1.71)	4.24 (1.77)	4.33 (1.56)	4.28 (1.61)	4.11 (1.86)	3.81 (2.17)	4.15 (2.12)
Guilt feelings	1.74 (1.25)	2.59 (1.33)	2.64 (1.31)	2.66 (1.20)	3.42 (1.46)	4.10 (1.59)	2.56 (1.39)	2.36 (1.29)	2.25 (1.31)	2.78 (1.54)	3.27 (1.59)	3.13 (1.40)
Negative cognit. associations	1.31 (.65)	3.32 (1.51)	1.74 (1.02)	1.71 (.97)	1.98 (1.05)	2.68 (1.37)	1.87 (1.15)	2.01 (1.21)	1.83 (1.02)	2.01 (1.23)	2.70 (1.31)	2.29 (1.35)
Unhealthiness perception	-	-	2.28 (1.32)	2.36 (1.42)	3.88 (1.70)	4.27 (1.76)	4.28 (1.44)	4.46 (1.51)	4.06 (1.55)	5.41 (1.10)	5.35 (1.48)	5.41 (1.12)

Note : In study 1, “intentions” refer to consumption, or more specifically the number of chocolates chosen (and thus consumed).