Displaying the Short-term Consequences of an Unhealthy Diet in Gain and Loss Framed Messages to Encourage the Use and Success of Nutritional Warnings to Promote Healthier Food Choices in Young Adults.

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Undergraduate Thesis

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June 6th, 2024

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Abstract

The escalating global burden of non-communicable diseases (NCDs) needs effective public health strategies. Front-of-package (FOP) nutrition labeling emerges as a pivotal approach to empower consumers in making informed food choices and combating NCDs. This study explores the impact of short-term gain and loss-framed nutrition messages on attention to FOP warning labels and subsequent food choices among young adults. A between-subjects design with eye tracking methodology was employed, with data from 47 participants. Results indicate that exposure to short-term loss-framed messages led to reduced attention to FOP warning labels while gain-framed messaging had no significant effect on attention. Moreover, no significant differences in food choice were observed among the groups. Findings suggest a possible negative reaction toward loss-framed messages, which triggers visual avoidance as found in tobacco warning labels research. However, further research is necessary to delve into the mechanisms of this avoidance and its behavioral ramifications. Despite limitations in sample size and stimulus perception, this study underscores the need for nuanced approaches in public health messaging to foster healthier dietary behaviors, especially among young adults. Future investigations should delve into the efficacy of short-term framed nutrition messaging and its implications for public policy interventions aimed at promoting healthier eating habits and combating NCDs.

Introduction

Constant changes in the lifestyle of the worldwide population have led to an evident increase in the prevalence of conditions known as non-communicable diseases (NCDs), which tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behavioral factors (WHO, 2023). Examples of NCDs include cardiovascular disease, diabetes, chronic respiratory diseases and different types of cancer. According to the World Health Organization's report (2023) noncommunicable diseases kill 41 million people

each year, equivalent to 74% of all deaths globally. Therefore, each year, 17 million people die from a NCD before age 70. As a consequence, this has been an important focus which concerns global health (WHO, 2023).

Noncommunicable diseases share key behavioral risk factors including tobacco consumption, excessive use of alcohol, physical inactivity and an unhealthy diet (AlJawaldeh & Abbass, 2022). These also lead to nutritional risk factors including being overweight, obesity, raised blood pressure and high blood cholesterol. So, unhealthy dietary patterns are a key modifiable behavioral risk factor to combat NCDs as they contribute to the occurrence of a cluster of disorders (Olatona et al., 2018).

Consequently, healthy eating plays a critical role in preventing chronic and non-communicable diseases. For this reason, and facing the previous situation, public policies have been implemented with the purpose of regulating unhealthy food consumption and contributing to solve this public health problem. One of these public strategies has been the Front of Package (FOP) labeling, which is a regulatory action and a structural response toward supportive food environments (Hawkes et al., 2015). FOP nutrition labeling provides supplementary nutrition information by simple and visual information on the front of food packaging, with the aim of improving access to nutrition information. Various FOP nutrition labeling schemes have been developed and implemented worldwide, turning into a key pillar for empowering consumers to make informed food choices and nudge them toward healthier eating habits (Jones et al., 2019). FOP nutrition labeling can be classified according to the extent to which they assist consumers in making food decisions: nondirective schemes, such as the guideline daily amount system (numerical information about the nutrient content per serving); and semi-directive and directive schemes that provide interpretational elements on product healthfulness, either based on specific nutrients or the overall product (Hodgkins et al., 2012). The existing evidence base on the implementation of FOP labeling indicates success in capturing consumers' attention, aiding their comprehension of the nutritional information, and it has even been shown to influence industry practices via the reduction of sodium and trans fat content in food products (Shangguan et al., 2019).

Directive systems—and especially nutritional warnings—have been shown to be the most efficient in assisting consumers to appraise product healthfulness and to promote healthier food choices (Temple, 2020). They consist of signs located on the front of packages highlighting excessive quantities of certain nutrients like sugars, saturated fat and sodium, and use octagonal or triangular shapes with the aim of increasing the ability to rapidly convey the idea that products should be regarded as not healthful (Khandpur, 2018; Cabrera, 2017).

Findings suggest that attention to FOPs is essential and is linked to healthier food choices, yet it seems to be insufficient in itself to influence consumers' choice (Tórtora et al., 2018; Machín et al., 2023; Ballco et al., 2019). Ma and Zhua (2021) propose a two route model to explain the processing that occurs in between the exposure to FOP labels and food choice. Within the indirect attention route, attention and nutrition label processing are mediated by the interplay between the product, person, and context, then leading to the food choice. On the other hand, the direct heuristic route posits that, after exposure, the interplay between the product, person and context directly mediates the subsequent food choice. They advocate that the direct heuristic route may better describe consumer's food shopping experience as it explains the discrepancy between attention capture and food choice observed in the available literature. Thus in order to prompt healthier food choices, it would be pertinent to address the product, person and context for a synergistic approach that better predicts consumer food choices by increasing attention and the use of the indirect route.

As such, one way to influence the person variable is through education on nutrition label reading and interpretation. Education interventions have been found to increase the gaze duration (Pennings et al., 2014) and attention given to FOPs (Samant & Seo, 2016) promoting the use of the indirect attention route. They have also been shown to reduce the effort required to read FOPs (Soederberg et al., 2019) and have been associated with healthier food choices (Graham et al., 2016). Recent research has even investigated the effect of message framing, within this educational context, on attention, attitudes towards messages promoting the use of nutritional warnings, and food choice (Vidal et al., 2019).

Vidal et al.'s (2019) findings suggest that nutrition messages increase gaze fixation on nutrition labels and that loss-framed messages are effective at increasing gaze time. Additionally, healthier food choice was associated with receiving nutrition messages as opposed to not

receiving a message at all. However, these effects are modest at most. Therefore, while these results are promising and point towards the importance of complementing the current FOP policies with nutrition messages, a gap remains as the evidence is weak and there are no replications. Additionally, the messages presented only considered long-term effects of an unhealthy diet, thus an opportunity remains to explore whether short-term consequences have a bigger impact on the usefulness of FOP food warnings. This would be supported by the fact that showing short-term costs of unhealthy behaviors has been found to have a bigger impact on behavior change than showing long-term costs or no costs (Stillman & Woolley, 2023).

There are various short-term consequences of an unhealthy diet. For example, high sugar consumption has been linked to fatigue (Mantantzis et al., 2019), adult acne (Penso et al., 2020) and increased amount of acne lesions (Baldwin & Tan, 2021), and added sugars have been found to deplete nutrients from the body and impair energy generation (DiNicolantonio & Berger, 2016). Additionally, increased salt consumption is related to water retention and increase in body weight (Bankir et al., 2017), and a high consumption of saturated fats is linked to more interrupted, lighter, low-quality sleep (St-Onge, 2016). Therefore, it is relevant to study how loss and gain framed messages showing the short-term consequences of an unhealthy diet aid in the efficacy of FOP warning labels.

Method

Experimental Design

We implemented a between-subjects design with three groups of participants. Each group was exposed to either short term loss-framed nutrition messages, short term gain-framed nutrition messages or non-nutrition-related messages (control group). The dependent variables were attention and food choice. After evaluating messages, participants were asked to select a snack product on a screen that they would consume.

Participants

Participants were recruited by convenience sampling, with a sample of n=47. 19 participants in the loss-framed group, 13 in the gain-framed group, and 15 in the control group.

The inclusion criteria we used was people between 18 and 30 years old with normal or corrected vision and without diagnosis of eating disorders.

Instruments

We used a Gazepoint GP3HD eye tracker (150Hz) to measure fixations on nutrition warnings which are the designated areas of interest of this study. For this, the following variables were measured: time of first visit, revisits, total time of visualizations and fixations.

Stimuli

We developed six messages for each of the three conditions: neutral messages (control group), short term gain-framed messages, and short term loss-framed messages. The neutral messages consist of general interesting facts and messages about the human body that are unrelated to nutrition (e.g. “Did you know that the tongue is the strongest muscle in the body, in relation to its size?” or “The most common eye color in the world is brown”). In contrast the short term gain-framed and short term loss-framed messages directly address nutrition and its consequences. Gain-framed messages highlight the short-term benefits of abstaining from consuming a diet high in sugars, sodium, and saturated fats (e.g. “If you reduce your sugar consumption you are contributing to having healthy skin”). On the other hand, loss-framed messages depict the negative short-term consequences of consuming a high amount of these nutrients (e.g. “An hour after its consumption, high amounts of sugar are linked to a sensation of fatigue and reduced alertness”). All messages, except those for the control group, were shown in the same format of white text on a black background, an accompanying image, the logo of Colombia’s Ministry of Health, the phrase “now you can know what you are eating”, and an image of the nutritional warning labels that the current Colombian legislation prescribes (hexagonal in shape with a black background, white text, the phrase “excess of sodium”, “excess of sugars”, “excess of saturated fats”, or “contains sweeteners”, and the abbreviation for the Ministry of Health “Minsalud”).

Figure 1

Neutral message example

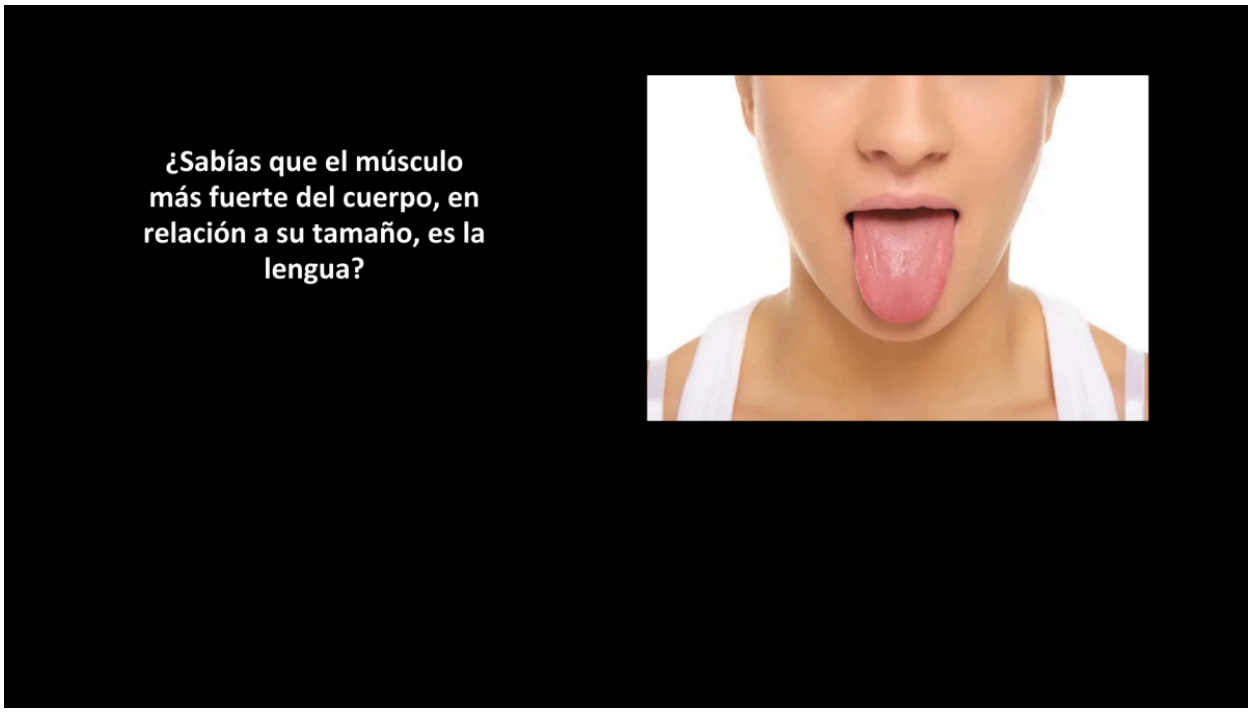


Figure 2

Gain-framed message example.

Figure 3

Loss-frame message example.

Lastly, we selected images of some of the most popular snacks in the country to present at the end of the study during the food choice task (Figure 4). The products included frequently consumed snack products in Colombia: a chocolate covered cake snack (Chocoramo), saltine crackers, yogurt with cereal toppings (BonYurt), fried plantain chips, a sugar free cereal bar, and a chip mix (De Todito). Four of these products had warning labels and two did not. In the eye tracker, these product images were coded into three areas of interest: 1) area of the products where the FOP warning labels were located, 2) products without FOP warning labels, 3) general packaging of the products that had an FOP warning label, excluding the latter from the area of interest. This was so that we could later determine whether differences in attention could be attributed to the FOP warning labels or not.

Figure 4

Image of most popular snacks, used in the choice task.

Procedure

Participants were randomly assigned into three experimental groups heeding the three types of messages: gain, loss, and non-nutrition related messages. The experiment was done in the laboratory of psychology at Universidad de Los Andes.

Participants were placed 65 cm away from the screen using the GP3 HD eye tracker. They were instructed to evaluate a series of messages that would be presented to them on the screen. These stimuli were the six messages given to each experimental group according to the type of framing. After each message, participants had to answer four questions with the corresponding response options:

- How would you classify the message? Positive/Negative/Neutral
- How credible do you think the message is? (Scale from 1 to 7, where 1= not credible at all, and 7=very credible)

- Would you be willing to follow the recommendation included in the message? (Scale from 1 to 7, where 1=definitely not, and 7= definitely yes). In the case of the non-nutrition-related messages, this question was replaced by 'Would you be willing to share this information with your friends? And was responded with the same scale.

After viewing these messages, all participants were shown one last image showing a series of products (Figure 4). Then they were asked to select one that they would consume and write their answer on a piece of paper.

Data Analysis

For data analysis we used one-way repeated measures ANOVA (also known as a within-subjects ANOVA) to determine the differences between the variables in the experimental groups. Demographic data was also analyzed for insight into the sample of participants.

Results

The initial sample consisted of 68 participants (n=68). However, upon further examination of the data set, we found that many of the participants had classified the messages they were shown incorrectly. When they were asked to classify each message as positive, negative or neutral (based on the message framing used in the message), most participants made at least one mistake, and many classified less than half of the messages they were shown correctly. Seeing as their perception of the messages was not as expected, we opted to filter the data and only use that of participants who correctly classified 3 or more (50% or more) of the stimuli in order to preserve internal validity. Under this criterion, the sample was reduced to 47 participants (n=47) distributed as follows: loss message-exposed group (n=19); control group (n=15) and gain message-exposed group (n=13).

In this sample, 46.8% of the participants were female, and 53.2% were male. On average, they were positioned at 7.26 on a scale from 1 to 10 in terms of socioeconomic status, where 10 represents the best social condition. In addition, out of the 47 participants, only 19.8% of them stated they were in charge of household shopping, while 70.2% confirmed they were not.

The results, obtained with the ANOVA, showed that individuals exposed to loss-framed messages paid less attention to the FOP nutrition warnings compared to those in the control group. Only two of the four eye-tracker measures showed significant differences: the total gaze time in seconds and the number of fixations made. On average, as seen in Table 2 and Figure 5, participants exposed to loss-framed messages gazed at the FOP warning labels for 0.499 seconds less than participants in the control group (p=0.04) and fixated on them 1.498 times less (p=0.034). No significant differences were found for those exposed to gain-framed messages. Similarly, regarding the choice task, no significant results were found. In addition, it is worth mentioning that the only significant differences found concerned the FOP warning labels as the area of interest. In other words, the packaging of the products was in no way a determinant in the changes in attention, only differences in attention towards the FOP labels was observed.

Table 1.

Mean attention markers for FOP warning signs

				Confidence Interval 95%	
Dependent Variable		Mean	Typical Error	Lower Limit	Upper Limit
Revisit_1	Loss frame	1.724	.372	.974	2.473
	Control	2.867	.418	2.023	3.710
	Gain frame	1.981	.449	1.075	2.887
TimeFirst_1	Loss frame	12.051	1.253	9.525	14.577
	Control	8.225	1.411	5.382	11.068
	Gain frame	9.640	1.515	6.586	12.694
TimeTotal_1	Loss frame	.514	.130	.251	.777
	Control	1.012	.147	.717	1.308
	Gain frame	.560	.158	.242	.878
Fixations_1	Loss frame	1.868	.377	1.109	2.628
	Control	3.367	.424	2.512	4.221
	Gain frame	2.212	.455	1.294	3.129

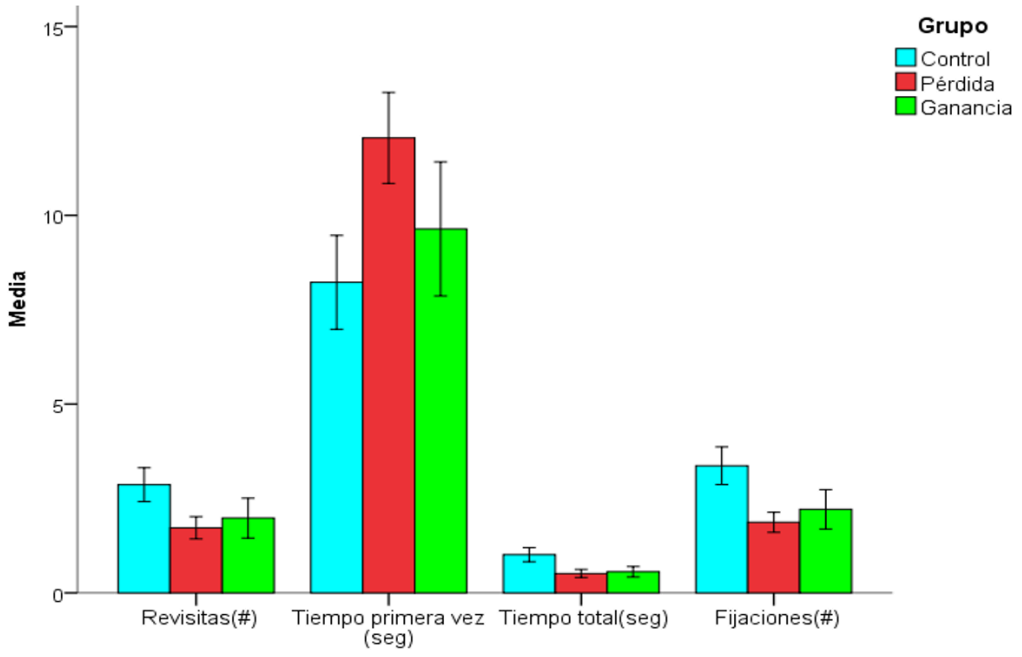
Table 2:

ANOVA pairwise comparison for attention towards FOP warning signs within groups

Dependent Variable			Mean Difference	Typical Error	Sig.[b]	Confidence Interval at 95% for the difference[b]	
						Lower Limit	Upper Limit
Revisit_1	Loss frame	Control	-1.143	.560	.141	-2.536	.250
		Gain frame	-.257	.583	1.000	-1.709	1.195
	Control	Loss frame	1.143	.560	.141	-.250	2.536
		Gain frame	.886	.614	.468	-.642	2.414
	Gain frame	Loss frame	.257	.583	1.000	-1.195	1.709
		Control	-.886	.614	.468	-2.414	.642
TimeFirst_1	Loss frame	Control	3.826	1.887	.146	-.871	8.523
		Gain frame	2.411	1.966	.680	-2.483	7.306
	Control	Loss frame	-3.826	1.887	.146	-8.523	.871
		Gain frame	-1.415	2.070	1.000	-6.567	3.738
	Gain frame	Loss frame	-2.411	1.966	.680	-7.306	2.483
		Control	1.415	2.070	1.000	-3.738	6.567
TimeTotal_1	Loss frame	Control	-,499*	.196	.044	-.987	-.010
		Gain frame	-.046	.205	1.000	-.555	.463
	Control	Loss frame	,499*	.196	.044	.010	.987
		Gain frame	.452	.215	.124	-.084	.989
	Gain frame	Loss frame	.046	.205	1.000	-.463	.555
		Control	-.452	.215	.124	-.989	.084
Fixations_1	Loss frame	Control	-1,498*	.567	.034	-2.910	-.087
		Gain frame	-.343	.591	1.000	-1.814	1.128
	Control	Loss frame	1,498*	.567	.034	.087	2.910
		Gain frame	1.155	.622	.210	-.394	2.704
	Gain frame	Loss frame	.343	.591	1.000	-1.128	1.814
		Control	-1.155	.622	.210	-2.704	.394

Figure 5:

Box Plots of visual attention towards FOP Warnings



Discussion

The current research showed that exposure to short-term loss-framed nutrition messaging reduced the attention given to FOP labels in food packaging, while short-term gain-framed nutrition messaging had no significant effect on attention. Likewise, regarding food choice, there were no significant effects within groups that could be associated with the messages to which they were exposed. This is surprising considering results from previous research, which suggest that loss-framed messaging could be the most effective at increasing attention to FOP (Vidal et al., 2019) and that young people tend to respond more to the short-term consequences of diet (Stillman & Woolley, 2023).

One interpretation of our general results could be that short-term nutrition messaging is not effective enough for policies and strategies aimed at increasing people's attention to FOPs and/or at guiding subsequent healthy food choices. One might even contemplate that short-term loss-framed nutrition messaging could be harmful by decreasing attention towards FOPs. This, however, contradicts all the literature on the topic of nutrition labeling within our reach, making us question whether it is really the case.

After widening our search within the literature, we suggest that our results may indicate a possible negative reaction towards messages framed in loss which leads to the visual avoidance of the FOP warning labels with the aim of negating the consequences they highlight. This is consistent with findings concerning visual attention to warnings on tobacco packaging which indicate that there may be an immediate voluntary disengagement from the unpleasant stimulus (Sillero‐Rejon et al., 2020). In Sillero-Rejon et al. 's study this held especially true for smokers who were contemplating quitting, as they visually attended the warnings less than non-smokers and also reported greater avoidance and reactance towards these warnings. This could suggest that the participants found the loss-framed messaging threatening, eliciting visual—and perhaps cognitive—avoidance. It is also likely that some participants had preconceived notions and goals on the subject of healthy eating, increasing the perception of threat as in the case of smokers in Sillero-Rejon et al. 's study. However this goes beyond the scope of this investigation as no questions about avoidance or affect were included in this study. Therefore, further research is needed to properly support this conclusion. Furthermore, it would be necessary to address the

effect of this visual avoidance on behavior to inform public policies, seeing as it has not been studied yet. In other words, a study aimed at understanding this avoidance and the impact it has on subsequent behavior (i.e. healthy food choice) would be essential within future research for it to be applicable.

Still, this study is useful in that it deepens the current understanding of attention given to FOP warning labels. It is a stepping stone for future literature in this field. Additionally, it investigated the effects of short-term framing combined with loss and gain based framing which had not been done before. It also looks at a sample of young adults who are not yet in charge of food shopping for their homes, thus a group that is worth aiming policies at so that they develop healthy habits early on.

Notwithstanding, there are important limitations to this study that must be taken into account. Firstly, the sample size is modest and is not representative of the population. This compromises the study's reliability and limits how much the results can be generalized. Secondly, the erroneous perception of the stimuli presented poses a problem with the phrasing or content used. For this problem we propose two solutions, the first being filtering the data base as we did, including only those participants who had a success rate of 50% or more when classifying the messages into "positive", "negative" and "neutral". This, however, does not account for mistakes in the production of the messages; it assumes that the participants were at fault when interpreting them which may not have been the case. Therefore, our second proposition is to rigorously test the messages in a pilot study before collecting the main data. This would be useful in future investigations to prevent the issue altogether. While we did carry out a pilot study, the sample was extremely limited (n=6) and there was no evidence of this issue before the main collection of data. Regarding the food choice task, it is likely that participants chose a snack due to personal preference for that product, rather than for health considerations. This is something that is difficult to account for as even self-reported measures would presumably be limited because of participants' subjectivity and social desirability effects. For future studies we propose that multiple choice task images are used, showing different products in different orders to mitigate this effect.

To conclude, taking into account the results of this study and its scope, it is important to propose future research that can confirm the possible effect of visual avoidance caused by messages framed in loss. This is essential to deepen our understanding on the effectiveness of FOP warning labels and the implementation of warning messages or other strategies that aim to promote healthier eating. This is of paramount importance for informing future public policies so that they are effective at combating the NCDs epidemic we are currently facing.

References

Al-Jawaldeh, A., & Abbass, M. (2022). Unhealthy dietary habits and obesity: the major risk factors beyond non-communicable diseases in the eastern mediterranean region. *Frontiers in Nutrition*, 9, 817808.

Baldwin, H., & Tan, J. (2021). Effects of Diet on Acne and Its Response to Treatment. In *American Journal of Clinical Dermatology* (Vol. 22, Issue 1, pp. 55–65). Adis. https://doi.org/10.1007/s40257-020-00542-y

Ballco, P., de-Magistris, T., & Caputo, V. (2019). Consumer preferences for nutritional claims: An exploration of attention and choice based on an eye-tracking choice experiment. *Food Research International*, *116*, 37–48. https://doi.org/10.1016/j.foodres.2018.12.031

Bankir, L., Perucca, J., Norsk, P., Bouby, N., & Damgaard, M. (2017). Relationship between Sodium Intake and Water Intake: The False and the True. *Annals of nutrition & metabolism, 70*(1), 51–61. https://doi.org/10.1159/000463831

Cabrera, M., Machín, L., Arrúa, A., Antúnez, L., Curutchet, M. R., Giménez, A., & Ares, G. (2017). Nutrition warnings as front-of-pack labels: influence of design features on healthfulness perception and attentional capture. *Public health nutrition, 20*(18), 3360-3371.

Dinicolantonio, J. J., & Berger, A. (2016). Added sugars drive nutrient and energy deficit in obesity: a new paradigm. *Open Heart*, *3*, 469. https://doi.org/10.1136/openhrt-2016

Graham, D. J., Lucas-Thompson, R. G., Mueller, M. P., Jaeb, M., & Harnack, L. (2017). Impact of explained v. unexplained front-of-package nutrition labels on parent and child food choices: A randomized trial. *Public Health Nutrition*, *20*(5), 774–785. https://doi.org/10.1017/S1368980016002676

Hawkes, C., Smith, T. G., Jewell, J., Wardle, J., Hammond, R. A., Friel, S., & Kain, J. (2015). Smart food policies for obesity prevention. *The lancet*, *385*(9985), 2410-2421.

Hodgkins, C., Barnett, J., Wasowicz-Kirylo, G., Stysko-Kunkowska, M., Gulcan, Y., Kustepeli, Y.,& Raats, M. (2012). Understanding how consumers categorise nutritional labels: a consumer derived typology for front-of-pack nutrition labelling. *Appetite*, *59*(3), 806-817.

Jones, A., Neal, B., Reeve, B., Mhurchu, C. N., & Thow, A. M. (2019). Front-of-pack nutrition labelling to promote healthier diets: current practice and opportunities to strengthen regulation worldwide. *BMJ global health, 4*(6), e001882.

Khandpur, N., Swinburn, B., & Monteiro, C. A. (2018). Nutrient‐based warning labels may help in the pursuit of healthy diets. *Obesity*, 26(11), 1670-1671.

Ma, G., & Zhuang, X. (2021). Nutrition label processing in the past 10 years: Contributions from eye tracking approach. In *Appetite* (Vol. 156). Academic Press. https://doi.org/10.1016/j.appet.2020.104859

Machín, L., Alcaire, F., Antúnez, L., Giménez, A., Curutchet, M. R., & Ares, G. (2023). Use of nutritional warning labels at the point of purchase: An exploratory study using self-reported measures and eye-tracking. *Appetite*, *188*. https://doi.org/10.1016/j.appet.2023.106634

Mantantzis, K., Schlaghecken, F., Sünram-Lea, S. I., & Maylor, E. A. (2019). Sugar rush or sugar crash? A meta-analysis of carbohydrate effects on mood. *Neuroscience and Biobehavioral Reviews, 101*, 45–67. https://doi.org/10.1016/j.neubiorev.2019.03.016

Olatona, F., Onabanjo, O., Ugbaja, R., Nnoaham, K, & Adelekan, D. (2018). Dietary habits and metabolic risk factors for non-communicable diseases in a university undergraduate population. *Journal of health, population, and nutrition*, *37*(1), 21. https://doi.org/10.1186/s41043-018-0152-2

Pennings, M. C., Striano, T., & Oliverio, S. (2014). A picture tells a thousand words: Impact of an educational nutrition booklet on nutrition label gazing. *Marketing Letters*, *25*(4), 355–360. https://doi.org/10.1007/s11002-013-9259-9

Penso, L., Touvier, M., Deschasaux, M., Szabo De Edelenyi, F., Hercberg, S., Ezzedine, K., & Sbidian, E. (2020). Association between Adult Acne and Dietary Behaviors: Findings

from the NutriNet-Santé Prospective Cohort Study. *JAMA Dermatology*, *156*(8), 854–862. https://doi.org/10.1001/jamadermatol.2020.1602

Samant, S. S., & Seo, H. S. (2016). Effects of label understanding level on consumers' visual attention toward sustainability and process-related label claims found on chicken meat products. *Food Quality and Preference*, *50*, 48–56. https://doi.org/10.1016/j.foodqual.2016.01.002

Shangguan, S., Afshin, A., Shulkin, M., Ma, W., Marsden, D., Smith, J., Saheb-Kashaf, M., Shi, P., Micha, R., Imamura, F., & Mozaffarian, D. (2019). A Meta-Analysis of Food Labeling Effects on Consumer Diet Behaviors and Industry Practices. In *American Journal of Preventive Medicine* (Vol. 56, Issue 2, pp. 300–314). Elsevier Inc. https://doi.org/10.1016/j.amepre.2018.09.024

Sillero‐Rejon, C., Leonards, U., Munafò, M. R., Hedge, C., Hoek, J., Toll, B., Grove, H., Willis, I., Barry, R., Robinson, A., & Maynard, O. M. (2020). Avoidance of tobacco health warnings? An eye‐tracking approach. *Addiction*. doi:10.1111/add.15148

Soederberg Miller, L. M., Sutter, C., Wilson, M. D., Bergman, J. J., Beckett, L. A., & Gibson, T. N. (2019). Assessment of an e-training tool for college students to improve accuracy and reduce effort associated with reading nutrition labels. *Journal of American College Health*, *67*(5), 441–448. https://doi.org/10.1080/07448481.2018.1484369

St-Onge, M. P., Roberts, A., Shechter, A., & Choudhury, A. R. (2016). Fiber and Saturated Fat Are Associated with Sleep Arousals and Slow Wave Sleep. Journal of clinical sleep medicine : JCSM : official publication of the American Academy of Sleep Medicine, 12(1), 19–24. https://doi.org/10.5664/jcsm.5384

Stillman, P. E., & Woolley, K. (2023). Undermining Desire: Reducing Unhealthy Choices by Highlighting Short-Term (vs. Long-Term) Costs. *Journal of Consumer Research*, *50*(3), 554–575. https://doi.org/10.1093/jcr/ucad004

Temple, N. J. (2020). Front-of-package food labels: A narrative review. *Appetite*, 144, 104485.

Tórtora, G., Machín, L., & Ares, G. (2019). Influence of nutritional warnings and other label features on consumers' choice: Results from an eye-tracking study. *Food Research International*, *119*, 605–611. https://doi.org/10.1016/j.foodres.2018.10.038

Vidal, G., MacHín, L., Aschemann-Witzel, J., & Ares, G. (2019). Does message framing matter for promoting the use of nutritional warnings in decision making? *Public Health Nutrition*, *22*(16), 3025–3034. https://doi.org/10.1017/S1368980019002507

World Health Organization. (2023). *Noncommunicable diseases.* https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases

World Health Organization. (2023). World health statistics 2023: monitoring health for the SDGs, *Sustainable Development Goals*.