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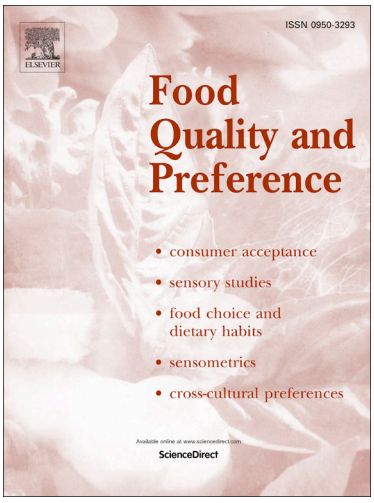

7204Label Copresence for Healthier Choices: How Sugar Content Per Daily Limit and Sugar Warning Labels Balance Out the Health Halos of Nutrient-Content Claim

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PII: S0950-3293(23)00047-2
DOI: https://doi.org/10.1016/j.foodqual.2023.104853
Reference: FQAP 104853

To appear in: *Food Quality and Preference*

Received Date: 31 August 2022
Revised Date: 14 March 2023
Accepted Date: 14 March 2023

Please cite this article as: Jindahra, P., Phumpradab, P., 7204Label Copresence for Healthier Choices: How Sugar Content Per Daily Limit and Sugar Warning Labels Balance Out the Health Halos of Nutrient-Content Claim, *Food Quality and Preference* (2023), doi: https://doi.org/10.1016/j.foodqual.2023.104853

Label Copresence for Healthier Choices: How Sugar Content Per Daily Limit and Sugar Warning Labels Balance Out the Health Halos of Nutrient-Content Claim

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Funding: This work was supported by Sasin School of Management Research Grant

Declaration of Interest: The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

Data availability statement: Access to study data can be provided by the corresponding author upon request.

Ethical statement: The study protocol was approved by the Institution Review Board of Chulalongkorn University (COA No. 019/2562) prior to the study. The Institution Review Board waived the requirement to obtain any informed consent for the study.

Highlights

- Nutrient-content claim is the most influential label on choice selection
- Observed and unobserved consumer heterogeneity clarify food labels' effectiveness
- Sugar warning importance varies across consumers more than nutrient-content claim importance
- Sugar content per daily limit and sugar warning can mitigate health halo effects

Label Copresence for Healthier Choices: How Sugar Content Per Daily Limit and Sugar Warning Labels Balance Out the Health Halos of Nutrient-Content Claim

Abstract

Excessive sugar consumption is a major cause of obesity and many non-communicable diseases (NCDs). Overconsumption of sugar has been associated with a higher number of NCD deaths. To curb sugar consumption, this study examined the label copresence effect of *sugar content per daily limit*, *sugar warning*, and *nutrient-content claim* on consumer choices, using the mixed logit model on conjoint choice data of orange juice among 390 college students in Thailand, illustrating that food labels affect consumer food choice decision. Results showed that nutrient-content claims are the most influential label on choice selection, followed by sugar content per daily limit, and sugar warning. Consumer characteristics and unobserved heterogeneity on label importance affect intermediary steps on choice decisions. Additionally, sugar content per daily limit labels significantly induced healthy choices whereas nutrient-content claims significantly encouraged any choice selection. Sugar warning label were found to be significantly influential among overweight people. The health halo effects of nutrient-content claims were found, swaying consumers toward unhealthy choices. This health halo effect can be alleviated by sugar content per daily limit and sugar warning labels. Evidently, male consumers prefer sweeter choices compared to female consumers, whereas healthy eaters prefer low sugar content. Unobserved heterogeneity in sugar warning importance was found to be more dispersed than that of nutrients-content claim, explaining why sugar warning label cannot override the positive health halo effects of nutrient-content claim. The optimal copresence label design for healthier choices was discussed. Further behavioral validation is essential before the insights can be applied.

Keywords healthy choice, sugar label, warning label, nutrient-content claim, health halo

1. Introduction

Obesity is a major risk factor for non-communicable diseases (NCDs) such as cardiovascular diseases, diabetes, hypertension, and stroke, which are the leading causes of death worldwide (WHO, 2021). High sugar consumption is one of the key causes of obesity. According to Euromonitor (n.d.), the worldwide average annual consumption of sugar and sweeteners in 2020 was 33 g sugar per day per person, which exceeds the WHO-recommended intake of 24 g (WHO, 2015). Limiting sugar intake from high-sugar-content food choices is critical to prevent obesity.

Sugar labeling can discourage the consumption of high sugar content foods and beverages (von Philipsborn et al., 2019; Weaver & Finke, 2003), influencing consumer understanding as well as the amount of sugar in consumers' choices. Scapin et al. (2021) reported that labels that present sugar content in grams combined with interpretive information—such as Percent Daily Values, colors, or "High in sugar" statement—are the most effective in increasing consumer understanding of the sugar content in packaged food; additionally, health warning messages are one of the most effective sugar label formats for reducing sugar consumption.

However, the commercialization of nutrient-content or health claims on food products entails positive effects on the consumers' perception and food choices; this is known as the health halo effect (Andrews et al., 2000; Centurión et al., 2019; Choi et al., 2013; Hall et al., 2020; Kozup et al., 2003; Sütterlin & Siegrist, 2015). This effect can induce a seemingly healthy image of unhealthy food choices (Chandon & Wansink, 2007; Choi et al., 2013; Hall et al., 2020; Schuldt et al., 2012), resulting in increased consumption of unhealthy foods (Schuldt et al., 2012).

Most previous studies have highlighted the individual effects of food labels on consumer food decisions although many labels are applied to food packages in tandem. Insights into food choices influences by the copresence of different labels are rather limited. Moreover, few studies have indicated that warnings may diminish the impact of nutrient content claims on consumer perception and intention. For example, consumers are more likely to correctly identify a product as high in nutrient content based on front-of-package labels when the warning and nutrient-content claim target different nutrients than when the warning and nutrient-content claim target the same nutrient (Acton & Hammond 2018). A text health warning weakens the effect of the claim, "100% Vitamin C," on perceptions of a fruit drink's healthiness and intention to purchase (Hall et al., 2020). Similarly, nutritional warnings on sugar and saturated fat diminish the effect of "source of fiber" claims on consumer perceptions of the product healthiness (Centurión et al., 2019). Warning labels indicating "high in calories" and/or "high in sugar" can mitigate, but not eliminate, the effects of "high in fiber" and "wholegrain" claims on consumer perception and intention (Mediano Stolze et al., 2021). However, to our best knowledge, the copresence of other effective sugar labels on curbing sugar consumption, such as sugar limit information, has not yet been clarified. It remains unclear which label would be dominant in consumer decision. Additionally, more evidence regarding consumer-level factors influencing the effectiveness of food labels in consumer behavior outcomes, especially from the Asia region, is notably required (An et al., 2021; Tallie et al., 2020).

This study contributes to the existing literature by determining how young consumers in Thailand differently trade off the sugar limit information, warning labels, and nutrient-content claims on their choices, and how consumer-level factors impact behavioral outcomes. We considered conjoint analysis (Green 1974) an appropriate methodology, as it can determine how consumers value different attribute labels that make up a product label. In this study, choice-based conjoint analysis (Louviere 1988) was used to gauge the importance of food labels on consumer decision-making. The choice experiments provide a better simulation of actual purchase decisions that replicated the tradeoff setting (*Asioli et al. 2016)*.

This study aimed to assess the effectiveness of label attributes on the copresence of sugar limit information (sugar content per daily limit) and warning labels, and that of nutrient-content claims on product (orange juice) demand.

2. Material and methods

This study particularly addresses the following questions: First, what are the individual and copresence impacts of sugar content per daily limit, health warnings, and nutrient-content claims on food choices? Second, does the provision of sugar content per daily limit and/or warning label alleviate the effects of a health claim on food choice? Third, how do consumer-level factors potentially influence the effectiveness of these labels? Fourth, which design of the three-label copresence would render healthier food choices?

2.1 Participants

A total of 390 college students at a university in Bangkok, Thailand, participated in the web-based conjoint choice study from March to April, 2019. Our sample represented a young Thai urban population with an obesity prevalence.

2.2 Experimental design

Orange juice was used as it has been successfully targeted at young consumers in Thailand who look for convenient ways to improve their health (Euromonitor, 2022). A 3 x 2 x 2 full-factorial orange juice labels were designed with three attributes: sugar content per daily limit, sugar warning, and nutrient-content claim. Specifically, sugar content per daily limit was proposed as an alternative sugar cue in this study. It combined the stronger WHO recommendation of 24 g or 6 tsp daily limit with interpretive information on Percent Daily Values, reflecting the amount of sugar in the orange juice package per serving size and as a percentage of the recommended daily limit of 24 g. This label format was confirmed to be an effective sugar label for increasing consumer understanding of the sugar content in foods (Scapin et al. 2021). Although this label has not yet been used in practice, it is expected to be potentially effective. The infographics in Fig. 1 illustrate the presentation of the three attribute levels of sugar content per daily limit.

(Insert Figure 1 about here)

Sugar warning was selected for its effectiveness in curbing sugar intake and its high prevalence in many countries. The sugar warning label (shown in Fig. 2)—adopted from the State of California's sugar warning label—alerts consumers to sugar-related health problems, such as that drinking beverages with added sugar(s) contributes to obesity, diabetes, and tooth decay. Health warning messages on beverages have not yet been regulated in Thailand. It may potentially be utilized in the future considering public health concerns. Nutrient-content claim, in contrast, was included, given its high prevalence in the orange juice market in Thailand. The claim of a high natural vitamin content often targets young consumers (Euromonitor, 2022). Therefore, a claim of "calcium and vitamin D" was used (see Fig. 3).

(Insert Figure 2 about here)

(Insert Figure 3 about here)

Based on the full factorial design of orange juice labels, four choice sets were created following an efficient experimental design using the sasmacros package (Warren 2010) in SAS 9.4. Each choice set comprised three orange juice profiles. Table 1 presents the design. Figure 4 displays an example of the web-based conjoint choice task for choice set 1 comprising orange juice profiles 1-3.

(Insert Table 1 about here)

(Insert Figure 4 about here)

2.3 Experimental procedure

The tasks were self-administered following the instructions provided by the researcher. The experimental procedure started with the choice conjoint task. The respondents were presented with four choice sets. For each choice set, the respondents were asked to look at the three labels and choose a preferred orange juice. The no choice alternative was not included for task simplicity. After completing the choice conjoint task, the respondents were asked to provide their sociodemographic information, namely, gender, age, weight, height, and eating type. Respondents self-reported their eating type as healthy eaters motivated by health benefits or non-healthy eaters driven by other factors, such as the pleasure of food and emotions. Body mass index (BMI) was then calculated by dividing the participant's weight in kilograms by the square of their height in meters (kg/m^2). The study protocol was approved by the Institution Review Board of Chulalongkorn University (COA No. 019/2562). The board waived the requirement to obtain informed consent.

2.4 Data analysis

All data were analyzed using the GAUSS 21 programming language. The significance level was set at 0.05 for all tests.

2.4.1 Choice-based conjoint analysis

The mixed logit model (McFadden and Train 2000) investigates the effects of the three label attributes: *sugar content per daily limit*, *sugar warning*, and *nutrient-content claims* on consumers' orange juice choice selection. Consumer-level factors are accounted for by unobserved and observed heterogeneity. To account for unobserved heterogeneity, a random effects model is applied to label importance across attribute levels, allowing consumers to respond to labels individually. The utility of orange juice profile *j* on choice occasion *t* for consumer *i* can be expressed as

$$U_{ijt} = \beta_{1li} Sugarcontentperdailylimit_{ijt} + \beta_{2li} Sugarwarning_{ijt} + \beta_{3li} Nutrientcontentclailm_{ijt} + \varepsilon_{ijt}. \quad (1)$$

β_{kli} are unknown importance of label attribute k at level l of consumer i. ε_{njt} is a random error component following a Type I extreme value distribution.

The model incorporates observed heterogeneity through the moderating effects of label attributes by individual characteristics. Moderators of gender, being overweight, and eating type are incorporated in the attribute importance through dummy variables. The *Male* dummy variable takes the value of 1 if a respondent is male, and 0 otherwise. If the individual BMI is greater than 25, then *the overweight* dummy variable is 1; otherwise, it is 0. If a respondent describes themselves as a health-conscious eater, the *healthy eater* dummy variable is 1; otherwise, it is 0. The model can then be expressed as

$$\begin{aligned} U_{ijt} = {} & (\gamma_{1li} + \gamma_1 male + \gamma_2 overweight + \gamma_3 heatlhy\ eater) \\ & Sugarcontentperdailylimit_{ijt} + \\ & (\gamma_{2li} + \gamma_4 male + \gamma_5 overweight + \gamma_6 heatlhy\ eater) Sugarwarning_{ijt} \\ & + (\gamma_{3li} + \gamma_7 male + \gamma_8 overweight + \gamma_9 heatlhy\ eater) \\ & Nutrientcontentclaim_{ijt} + \varepsilon_{ijt}. \end{aligned} \quad (2)$$

The random coefficients for the label attribute levels, γ_{kli}, is assumed to be normally distributed with mean $\overline{\gamma_{kl}}$ and standard deviation σ_{kl} as follows:

$$\gamma_{kli} \sim N(\overline{\gamma_{kl}}, \sigma_{kl}). \quad (3)$$

2.4.2 Policy experiments

The aggregate consumer response to changes in food label content is a crucial criterion for regulating food label formats. The percentage change in choice share reveals how label attribute changes influence choice decisions. To evaluate the aggregate consumer response to changes in label attributes, we estimated the distribution of the mean percentage change in the choice share for the mixed logit. We consider three label policy experiments: 1) enforce warning labels on high sugar content per daily limit, 2) enforce warning labels with nutrient-content claim usage, and 3) remove sugar content per daily limit label.

3. Results

3.1 Choice-based conjoint analysis

Summary statistics of respondent profiles are shown in Table 2. Table 3 reports parameter estimates of the mixed logit model. The sugar labels of sugar content per daily limit significantly induced healthy choice consumption whereas nutrient-content claims significantly encouraged any choice selection. Health warning label was significantly influential among overweight people. The presence of unobserved heterogeneity on label influences was found. As shown in Fig. 5, the nutrient-content claim had the highest mean value of relative importance in choosing orange juice label. Interestingly, sugar warning had considerably less influence on label choice than nutrient-content claim and sugar content per daily limit.

(Insert Table 2 about here)

(Insert Table 3 about here)

(Insert Figure 5 about here)

3.1.2 Label importance

All coefficients of sugar content per daily limit attribute levels were significant. Mean importance of low sugar content per daily limit was positive, whereas those of medium and high content per daily limit were negative. This indicated that a low sugar content per daily limit label was preferred over high and medium sugar content per daily limit, and that consumers do not like orange juice with higher sugar content. Moreover, the results suggested that individual characteristics affected label selection. The positive coefficients of male dummy variable on medium and high sugar content indicated that males preferred the orange juice with medium to high sugar content more than female counterparts. The negative coefficient of male dummy variable on low sugar content revealed that females preferred orange juice with low sugar content. As expected, health-conscious consumers preferred orange juice with low sugar content per daily limit, avoiding alternatives with medium and high sugar content per daily limit. Given the sugar content per daily limit label, overweight people preferred orange juice with lower sugar content per daily limit over that with a medium sugar content per daily limit.

The sugar warning importance mean was not significant at a 5% test threshold, but rather, significant at a 10% significant level. The effect was rather dispersed across respondents. However, sugar warning was significantly influential among overweight people. The negative coefficient overweight moderator indicated that sugar warning encouraged overweight participants to choose orange juice with healthier sugar content. In line with Mediano Stoltze et al. (2021), this study found that the health halo effects of a nutrient-content claim (calcium and vitamin D) outweighed the influence of the warning label. Moreover, the importance of nutrient-content claims, on average, was considerably greater than that of the sugar content per daily limit and warning labels combined.

3.1.2 Label effectiveness

The estimation of the distribution of label importance (see Fig. 6) provides insight into the effectiveness of labels across consumers. The tighter distribution of the importance of high sugar content per daily limit around the negative mean explains consumer preference for healthier options, favoring products with a low sugar content over those with high sugar content. The results indicated that 87% of consumers disliked high sugar content per daily limit products, whereas only 13% of consumers preferred high content sugar products. Moreover, 81% of consumers prefer products with low sugar content.

(Insert Figure 6 about here)

The effect of sugar warning across consumers was rather dispersed. The estimated normal distribution of sugar warning importance suggested that sugar warning was effective in reducing product preference for 56% consumers. The remaining consumers (44%) continued to exhibit a preference for the product with a sugar warning. Furthermore, the nutrient-content claim effects were less varied than the sugar warning effects. Of the total number of consumers, 86% were affected by the halo effect of the nutrient-content claim, whereas 14% did not respond positively to it. In effect, the nutrient-content claim had a larger mean value and lower standard deviation than the sugar warning, clarifying why a sugar warning label cannot override the positive health halo effects of nutrient-content claims in influencing consumer product selection.

3.2 Policy experiments

Table 4 presents the results of this study.

(Insert Table 4 about here)

3.2.1 Experiment 1: enforce warning label on high sugar content choice.

We added the sugar health warning label to the high-sugar-content orange juice profiles (profiles 5 and 8), which originally had no warning labels. When enforcing the sugar warning label, the mixed logit model suggests the distribution of the mean percentage changes in choice probability for profiles 5 and 8, with negative means (see Table 4). The sugar warning label decreases the choice probabilities of orange juice with high-sugar-content. This indicates the effectiveness of sugar warning labels on discouraging unhealthy choices.

3.2.2 Experiment 2: enforce warning label with nutrition claim label

We investigated the effect of warning labels on products with nutrient-content claims. Specifically, low (profile 3), medium (profile 11), and high (profile 8) sugar content per daily limit of orange juice were evaluated. These orange juice profiles originally had nutrient-content claims but not warning labels. Interestingly, the warning label has a higher impact on the choice of medium sugar content orange juice, followed by high, and low sugar content per daily limit alternatives, respectively (see Table 4). The study found that the health halo effect of the nutrient-content claim can be countered by regulating the sugar warning label.

3.2.3 Experiment 3: remove sugar content per daily limit label.

We removed the sugar content per daily limit label across orange juice profiles to evaluate the effect. When the label is removed, consumers are inclined toward unhealthy choices (see Table 4). These findings indicate that the daily sugar content per daily limit label influences consumers' healthy choice decisions and encourages mindful consumption.

4. Discussion

Our study highlights the problem of sugar overconsumption and demonstrates that orange juice selection can be forecasted based on the content of food labels. The intermediate steps influencing the effectiveness of food labels are observed and unobserved consumer-level factors, entailing different implications on food labeling.

4.1 Consumer-level factors and label effectiveness

Consumer-level factors provide evidence for intermediate steps on the path to choice change. The estimated distributions of label importance and the aggregate consumer response are crucial factors in explaining the label's effectiveness. This overcomes the disadvantage of the one-point estimate for label importance, which assumes that all consumers react similarly to a label. The present results indicate that, on average, nutrient-content claims have a stronger impact on choice selection than sugar warnings, and that consumer responses to nutrient-content claims are less dispersed than those to sugar warnings. This explains why the sugar warning cannot trump the halo effect of the nutrient-content claim. Sugar content per daily limit is an alternative sugar cue that has a greater impact on healthy consumption than sugar warnings. Therefore, policymakers should consider this alternative sugar label in addition to warning labels.

4.2 Copresence label and cooperation for healthier consumption

Consumers can be encouraged to choose products with a low sugar content by displaying the sugar content per limit cue alongside nutrient-content claims without a sugar warning. In this manner, the health halo effect of the nutrient-content claim is utilized to promote the consumption of healthier products. In curbing high sugar content orange juice, the following label design should be used: sugar content per daily limit, with sugar warning, and without nutrient-content claim. The prohibition of nutrient-content claims will prevent the halo effect on less healthy products. With the optimal combination of labels, consumers are expected to opt for healthier food products.

Cooperation between the government and manufacturers is required to curb sugar consumption. Policymakers need to encourage manufacturers to reduce the sugar content of processed food and nudge consumers to reduce sugar consumption. This study shows that healthy consumption does not harm the food industry, at least for orange juice. Consumers respond positively to healthy food choices (low sugar level) with the presence of sugar content per daily limit labels. This effect is stronger among overweight people. Manufacturers can, therefore, offer healthier choices available in the market. At the same time, consumers should be made aware of the dangers of sugar, making them more health-conscious.

4.3 Limitations

Several limitations should be noted. Data in this study were collected from 17-36 year old respondents in Bangkok, Thailand. The findings may not be generalizable to older consumers or those living in other countries. Moreover, this study examines healthy consumption from the perspective of sugar consumption of orange juice. These results may not be applicable for other product categories. Even though conjoint choice analysis helps analyze the tradeoff among labels on choice decision, our study focused only on sugar labels and nutrient-content claims. The real purchasing behavior remains susceptible to purchasing environment, marketing variables, and cultural factors. This study's findings can serve as a guideline; however, policymakers should cross-validate results prior to actual implementation in the field.

5. Conclusions

This research investigated how to promote healthier choices, especially high-sugar-content products, through the copresence of sugar content per daily limit, health warning, and nutrient-content claim labels. We suggest utilizing new sugar labels that include a daily limit for sugar content of 24 g with Percent Daily Values, which will influence most consumers to deviate from high to low sugar content, thus alleviating the health halo effects of nutrient-content claims. It is evident that the dispersed distribution of sugar warning importance clarifies why a sugar warning label cannot override the positive health halo effects of nutrient-content claims in influencing consumer product selection. Thus, nutrient-content claims on unhealthy products should be strictly prohibited to prevent health halo effects on unhealthy food choices. However, nutrient-content claims should be permitted on unquestionably healthy food items to utilize health halo effects on healthy consumption.

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Table 1. *Orange Juice Front-of-Package Design*

Profile	Sugar content per daily limit			Sugar warning	Nutrition claim
	Low	Medium	High		
Profile 1		√			
Profile 2			√	√	
Profile 3	√				√
Profile 4		√		√	
Profile 5			√		
Profile 6	√			√	√
Profile 7	√				
Profile 8			√		√
Profile 9		√		√	√
Profile 10			√	√	√
Profile 11		√			√
Profile 12	√			√	

Table 2. *Respondent Profiles (N = 390)*

Attribute	**Range**	**N**	**%**	**Mean**	***SD***
Gender	Male	139	35.64%		

	Female			251	64.36%	
Eating Habit	Healthy			156	40.00%	
	Non-Healthy			234	60.00%	
BMI	Underweight	BMI below 18.5		83	21.28%	
	Healthy Weight		BMI 18.5–24.9	240	61.54%	
	Overweight	BMI 25–30		52	13.33%	
	Obesity	BMI more than 30		15	3.85%	
	15.22–40.4					21.66 3.92
Age (years)	17–36					21.07 1.62

Table 3. *Estimated Parameters*

Predictor	*β*	*SE*	Wald z	95% CI (*β*)	*p*
Low Sugar Content	**1.06**	0.14	7.42***	[0.78, 1.34]	0.000
Std(Low Sugar Content)	**1.21**	0.14	8.64**	[0.93, 1.48]	0.000
Low Sugar Content × Male	**-0.61**	0.18	-3.38***	[-0.96, -0.26]	0.001
Low Sugar Content × Healthy Eater	**0.69**	0.18	3.87***	[0.34, 1.03]	0.000
Low Sugar Content × Overweight	**0.87**	0.25	3.43***	[0.37, 1.37]	0.001
Medium Sugar Content	**-0.59**	0.02	-27.32***	[-0.64, -0.55]	< .00001
Medium Sugar Content × Male	**0.32**	0.04	8.22***	[0.24, 0.39]	< .00001
Medium Sugar Content × Healthy Eater	**-0.43**	0.04	-11.39***	[-0.50, -0.36]	< .00001
Medium Sugar Content × Overweight	**-0.79**	0.09	-9.24***	[-0.95, -0.62]	< .00001
High Sugar Content	**-0.46**	0.10	-4.80***	[-0.65, -0.27]	0.000
Std(High Sugar Content)	**0.40**	0.13	2.99**	[0.14, 0.66]	0.003

High Sugar Content × Male	**0.29**	0.13	2.25**	[0.04, 0.55]	0.025
High Sugar Content × Healthy Eater	**-0.26**	0.13	-1.96**	[-0.51, 0.00]	0.050
High Sugar Content × Overweight	-0.08	0.18	-0.47	[-0.43, 0.26]	0.640
With Warning Label	*-0.21*	0.12	-1.80*	[-0.44, 0.02]	0.072
Std(With Warning Label)	**1.30**	0.12	10.50***	[1.05, 1.54]	0.000
With Warning Label × Male	-0.01	0.17	-0.03	[-0.33, 0.32]	0.975
With Warning Label × Healthy Eater	0.10	0.16	0.59	[-0.22, 0.41]	0.557
With Warning Label × Overweight	**-0.55**	0.23	-2.35**	[-1.00, -0.09]	0.019
Without Warning Label	*0.21*	0.12	-1.80*	[-0.44, 0.02]	0.072
Without Warning Label × Male	0.01	0.17	0.03	[-0.32, 0.33]	0.975
Without Warning Label × Healthy Eater	-0.10	0.16	-0.59	[-0.41, 0.22]	0.557
Without Warning Label × Overweight	**0.55**	0.23	2.35**	[0.09, 1.00]	0.019
With Nutrient-Content Claim	**0.86**	0.10	8.49***	[0.66, 1.06]	0.000
Std(With Nutrition Claim)	**0.79**	0.10	8.18***	[0.60, 0.98]	0.000
With Nutrition Claim × Male	-0.08	0.12	-0.70	[-0.32, 0.15]	0.485
With Nutrition Claim × Healthy Eater	-0.07	0.12	-0.57	[-0.30, 0.17]	0.571
With Nutrition Claim × Overweight	0.16	0.16	0.98	[-0.16, 0.47]	0.328
Without Nutrient-Content Claim	**-0.86**	0.10	-8.49***	[-1.06, -0.66]	0.000
Without Nutrition Claim × Male	0.08	0.12	0.70	[-0.15, 0.32]	0.485
Without Nutrition Claim × Healthy Eater	0.07	0.12	0.57	[-0.17, 0.30]	0.571
Without Nutrition Claim × Overweight	-0.16	0.16	-0.98	[-0.47, 0.16]	0.328

Note: *p < .1, **p < .05, ***p < .001

Table 4. *Distribution of Mean Percentage Change in Choice Probabilities*

Profile	Sugar Content Per Daily Limit	Percentage Change in Choice Probabilities		
		Mean	*SD*	CI 95% (Percentage Change in Choice Probability)
Experiment 1: Enforce Sugar Warning Label on High Sugar Content Per Daily Limit Choices				
profile 5	High	-63.88%	0.06	[-76.2%, -51.6%]
profile 8	High	-16.89%	0.05	[-27.2%, -6.6%]
Experiment 2: Enforce Sugar Warning Label with Nutrient-Content Claim				
profile 3	Low	-4.89%	0.03	[-11.70%, 1.93%]
profile 8	High	-16.89%	0.09	[-33.96%, 0.18%]
profile 11	Medium	-25.04%	0.07	[-38.19%, -11.88%]
Experiment 3: Remove Sugar Content Per Daily Limit Label				
profile 2	High	79.68%	0.17	[46.64%, 112.71%]
profile 5	High	69.67%	0.14	[43.20%, 96.14%]
profile 8	High	50.97%	0.11	[28.96%, 72.99%]
profile 10	High	43.68%	0.12	[20.63%, 66.73%]
profile 1	Medium	46.78%	0.29	[-9.30%, 102.86%]
profile 4	Medium	37.91%	0.27	[-15.25%, 91.08%]
profile 9	Medium	29.27%	0.10	[10.09%, 48.46%]
profile 11	Medium	29.13%	0.08	[14.20%, 44.07%]
profile 3	Low	-19.10%	0.03	[-25.94%, -12.26%]
profile 6	Low	-23.71%	0.04	[-31.09%, -16.34%]
profile 7	Low	-61.34%	0.05	[-70.89%, -51.79%]
profile 12	Low	-64.53%	0.05	[-74.16%, -54.89%]

Fig. 1. *Infographic on sugar content per daily limit*

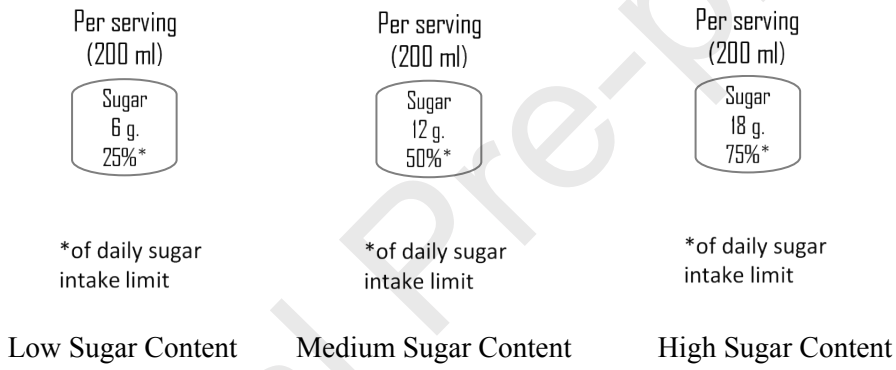


Fig. 2. *Sugar warning label*

Fig. 3. *Labels with and without nutrient-content claim*

Fig. 4. *Web-based conjoint task example – choice set 1*

Fig. 5. *Label relative importance mean*

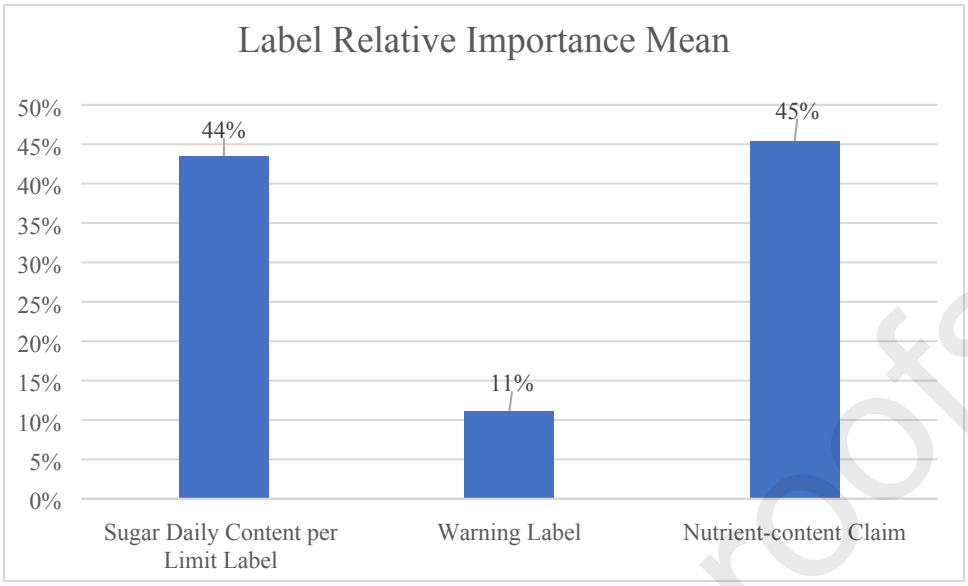
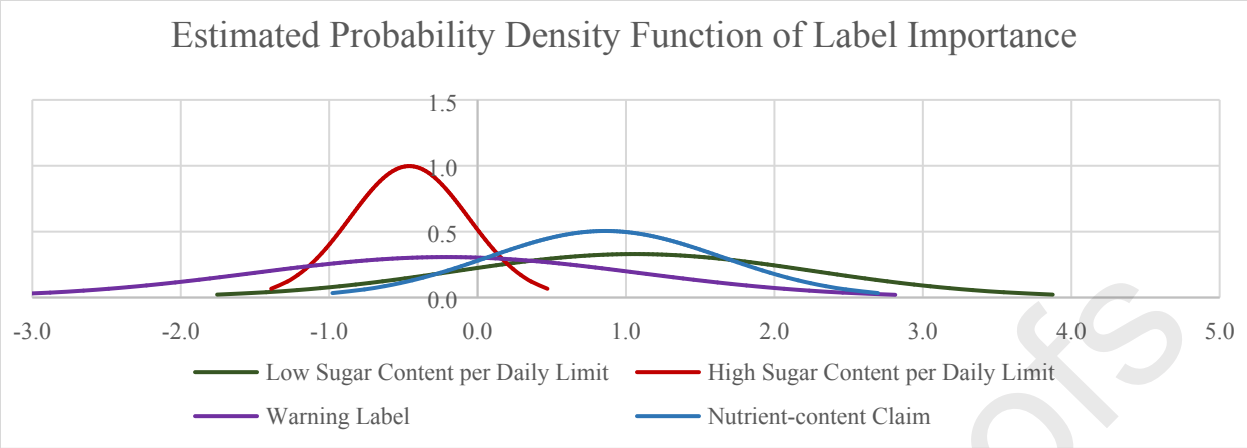


Fig. 6. *Estimated normal distribution of label importance*



Declaration of Interest: The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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WARNING: Drinking beverages with added sugar(s) contributes to obesity, diabetes, and tooth decay.