Complete Title: Visual Attention to Text and Pictorial Food Labels: An Eye Tracking Experiment
Short Title: Visual Attention to Text and Pictorial Food Labels: An Eye Tracking Experiment
Protocol Date: 6/24/2024
NCT #: NCT05958888

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Protocol Synopsis

Study Title	Visual Attention to Text and Pictorial Food Labels: An Eye Tracking Experiment
Funder	National Heart, Lung, and Blood Institute (NHLBI)
Clinical Phase	NA
Study Rationale	- Adults in the US consume excessive sodium, added sugars, and saturated fats, leading to high rates of hypertension, type 2 diabetes, and heart disease. - Structural factors like targeted marketing of unhealthy foods, price barriers, and low use of Nutrition Facts labels contribute to worse dietary outcomes among Latino populations. - Front-of-package (FOP) food labels, especially "high-in" labels (e.g., "High in sugar"), are a promising policy solution to reduce purchase of unhealthy foods. - Visual elements like icons and graphics in FOP labels may be more effective for Latino and limited English proficiency populations by improving noticeability and comprehension. - However, it's unknown how different types of FOP labels affect visual attention, message effectiveness, and understandability among Latino and limited English proficiency populations.
Study Objective(s)	The primary objective of this study is to examine attention elicited by different types of FOP sodium labels (i.e., FOP sodium label types) among adults identifying as Hispanic or Latino/a/é (hereinafter Latino). Primary - To evaluate whether intervention FOP sodium labels elicit higher dwell time on the FOP sodium label than control messages. Secondary - To evaluate whether intervention FOP sodium labels elicit higher levels of 3 secondary outcomes (fixation count on the FOP sodium label, self-reported attention to the FOP sodium label, and perceived message effectiveness of the FOP sodium label), compared to the control. - To evaluate whether (1) self-reported attention to the FOP sodium label, (2) perceived message effectiveness of the FOP sodium label, and (3) how understandable the FOP sodium label was differs by label type.
Study Design	Within-participants randomized experiment.
Subject Population key criteria for and Exclusion:	Inclusion Criteria 1. Age 18 and older 2. Self-identifies as Hispanic or Latino Exclusion Criteria

	3. Less than 18 years old
	4. Does not identify as Hispanic or Latino
	5. Has one of the following conditions: (Wears bifocals, glaucoma, permanently dilated pupils, eye implants [artificial lenses, not contact lenses], less than 2 eyes, or blindness)
Number of Subjects	~60
Study Duration	Each subject's participation will last approximately 30 minutes. The enrollment period is expected to last ~4 months.
Study Phases	There are two phases: (1) <u>Screening</u>: screening for eligibility and obtaining consent and (2) <u>Intervention</u>: study intervention/experimental treatment.
Efficacy Evaluations	The primary outcome is the amount of time spent looking at the FOP sodium label (i.e., dwell time). This outcome will be measured using eye tracking technology. The secondary eye tracking outcomes are 1) number of times looking at the FOP sodium label (i.e., fixation count), 2) time to first fixation on the FOP sodium label, and 3) dwell time on "natural" claim.

Other secondary outcomes include: 1) self-reported attention to the FOP sodium label, assessed with 1 item for each label type adapted from Nonnemaker et al. 2010, 2) perceived message effectiveness of the FOP sodium label, assess with 3 items for each label type, adapted from Baig et al. 2019, and 3) how understandable the FOP sodium label was, assessed with 1 item for each label type, adapted from Brewer et al. 2019. Response options for all measures will range from 1 (low values) to 5 (high values). |
| **Statistical and Analytic Plan** | We will evaluate the impact of FOP sodium label types on primary and secondary outcomes using separate mixed effects linear regression models for each outcome, accounting for repeated measures.

Primary outcome
- We will run a mixed effects linear regression model, regressing dwell time on an indicator variable for FOP sodium label type. The control label will serve as the reference group, and the intercept will be treated as random.

Secondary outcomes
- We will use pairwise comparisons to compare predicted means for the three intervention FOP sodium label types. The same modeling approach will be applied to secondary outcomes. We will correct for multiple tests using the Benjamini-Hochberg method, treating each outcome as a family of tests and controlling the false discovery rate at 0.05. |

Data and Safety Monitoring Plan	• The principal investigators are responsible for data quality management and ongoing assessment of safety.

Introduction

The primary objective of this study is to examine attention elicited by different types of front-of-package (FOP) sodium labels (i.e., FOP sodium label types) among adults identifying as Hispanic or Latino.

Study Protocol

Participants will complete a randomized experiment programmed using Tobii Lab Pro software and Qualtrics. After providing informed consent, participants will view images of cans of soup with 4 different labels (a text-only sodium label, an icon and text sodium label, a pictorial and text sodium label, and a control barcode label). Participants will view each label in a random order. An eye tracker will be used to measure amount of time spent looking at the front-of-package sodium label (i.e., dwell time) (primary outcome) and secondary outcomes: number of times looking at the front-of-package sodium label (i.e., fixation count), time to first fixation on the front-of-package sodium label, and dwell time on "Natural" claim. After viewing all labels, participants will use Qualtrics to rate each label for the remainder of secondary outcomes: self-reported attention to front-of-package sodium label, perceived message effectiveness of front-of-package sodium label, and understandability of front-of-package sodium label.

Statistical Considerations

General Principles

We will use a two-sided critical alpha of 0.05 to conduct all statistical tests. We will use complete case analysis to handle any missing data in analyses of the primary and secondary outcomes.

Primary Outcome

Primary outcome: Amount of time spent looking at the FOP sodium label (i.e., dwell time). This outcome will be measured using eye tracking technology.

Hypothesis 1. We predict that each of the three intervention FOP sodium label types will elicit higher dwell time on the FOP sodium label compared to the control. We predict that the pictorial FOP sodium label will elicit higher amounts of dwell time than the icon label, the icon label will elicit higher amounts than the text-only label, and the pictorial label will elicit higher amounts than the text-only label.

Secondary Outcomes

Eye tracking secondary outcomes: 1) number of times looking at the FOP sodium label (i.e., fixation count), 2) time to first fixation on the FOP sodium label, and 3) dwell time on "natural" claim.

Hypothesis 2. We predict that each of the three intervention FOP sodium label types will elicit higher levels of the 3 secondary eye-tracking outcomes (fixation count on the FOP sodium label, self-reported attention to the FOP sodium label, and perceived message effectiveness of the FOP sodium label), compared to the control. We predict that the pictorial FOP sodium label will elicit higher amounts of these outcomes than the icon label, the icon label will elicit higher amounts than the text-only label, and the pictorial label will elicit higher amounts than the text-only label.

Other secondary outcomes: 1) self-reported attention to the FOP sodium label, assessed with 1 item for each label type adapted from Nonnemaker et al. 2010, 2) perceived message effectiveness of the FOP sodium label, assess with 3 items for each label type, adapted from Baig et al. 2019, and 3) how understandable the FOP sodium label was, assessed with 1 item for each label type, adapted from Brewer et al. 2019. Response options for all measures will range from 1 (low values) to 5 (high values).

> *Hypothesis 3.* We predict that each of the three intervention FOP sodium label types will elicit lower levels of two outcomes (time to first fixation on the FOP sodium label and dwell time on the "natural" claim), compared to the control. We predict that the pictorial FOP sodium label will elicit lower amounts of these outcomes than the icon label, the icon label will lower amounts than the text-only label, and the pictorial label will elicit lower amounts than the text-only label.

Statistical Methods
We will assess the impact of FOP sodium label type on the primary and secondary outcomes using mixed effects linear regression models to account for repeated measures. We will use separate models for each outcome.

1. Analyses of the primary outcome:
   a. We will run a mixed effects linear regression model, regressing dwell time on an indicator variable for FOP sodium label type. The control label will be the reference group. The model will treat the intercept as random. We will use pairwise comparisons to compare predicted means for the three intervention FOP sodium label types to each other.

2. Analyses of the secondary outcomes:
   a. We will use the same modeling approach used in the primary outcome to examine the impact of FOP sodium label type on secondary outcomes.

For analyses of primary and secondary outcomes, will use the Benjamini-Hochberg method to correct for multiple tests. These analyses will treat each outcome as a family of tests, correcting for the six tests within each outcome and controlling the false discovery rate at 0.05.

Sample Size Needs
Respondents will be approximately 60 US adults ages 18+ who identify as Latino. We powered the study to detect an effect size of $d=0.27$ or larger, assuming 4 repeated measures, 80% power, a correlation among repeated measures of 0.60, and a nonsphericity correction of 1. This effect size is conservative given that our recent meta-analysis found a large effect size for the impact of pictorial (vs. text) warnings on dwell time ($d=1.74$) in eye tracking studies.

Exclusions and Outliers
We do not expect any outliers on survey measures because the Likert-style response options are constrained. We do not plan to exclude outliers for eye tracking outcomes, as is typical for eye tracking studies.