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## Designing warnings for sugary drinks: A randomized experiment with Latino parents and non-Latino parents

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### Abstract

Sugary drink warnings are a promising policy for reducing sugary drink consumption, but it remains unknown how to design warnings to maximize their impact overall and among diverse population groups, including parents of Latino ethnicity and parents with low English use. In 2019, we randomized US parents of children ages 2-12 ( $n=1,078$ , 48% Latino ethnicity, 13% low English use) to one topic (one of four warnings, or a neutral control), which they viewed on three designs (text-only, icon, and graphic) to assess reactions to the various warnings on sugary drinks. All warning topics were perceived as more effective than the control (average differential effect [ADE] ranged from 1.77 to 1.84 [5-point Likert scale], all  $p<.001$ ). All warning topics also led to greater thinking about harms of sugary drinks (all  $p<.001$ ) and lower purchase intentions (all  $p<.01$ ). Compared to text-only warnings, icon (ADE=.18) and graphic warnings (ADE=.30) elicited higher perceived message effectiveness, as well as greater thinking about the harms of sugary drinks, lower perceived healthfulness, and lower purchase intentions (all  $p<.001$ ). The impact of icon warnings (vs. text warnings) was stronger for parents with low English

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use, compared to those with high English use ( $p=.024$ ). Similarly, the impact of icon (vs. text warnings) was stronger for Latino parents than non-Latino parents ( $p=.034$ ). This experimental study indicates that many warning topics hold promise for behavior change and including images with warnings could increase warning efficacy, particularly among Latino parents and parents with low English use.

### Keywords

obesity; health policy; Latino/a health; Hispanic; warning labels; sugar-sweetened beverages

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## INTRODUCTION

Consumption of drinks with added sugar (“sugary drinks”) among US children and adults remains well above recommended levels, with 63% of children and 49% of adults consuming sugary drinks on a given day.<sup>1–3</sup> Compared with non-Latino white populations, Latino children and adults consume more sugary drinks.<sup>4–6</sup> Sugary drink consumption contributes to obesity, dental caries, type 2 diabetes, and heart disease.<sup>7–10</sup> Policy solutions that impact parents’ sugary drink purchasing behaviors could benefit both parents and children, since the vast majority of children’s total energy intake from sugary drinks comes from store-bought sugary drinks (rather than from school and other sources),<sup>11</sup> and parental sugary drink consumption is positively associated with children’s sugary drink consumption.<sup>12,13</sup>

One possible policy solution to reduce parents’ purchases of sugary drinks for themselves and their children is requiring warnings on sugary drink containers and advertisements. Sugary drink warnings proposed or implemented have focused on a variety of different *topics* and *designs*. Topics include *nutrient warnings* that inform consumers that sugary drinks are high in sugar (per laws passed in countries including Brazil, Chile, Uruguay, Peru, Israel, and Mexico<sup>14</sup>), and *health warnings* which indicate that sugary drinks increase disease risk (per legislation passed in San Francisco and introduced in seven US states<sup>15</sup>). Designs include *text-only warnings* (used in all proposed US policies), *icon warnings* with symbolic depictions of nutrients or health harms (used on products in Israel and on menus in New York City), and *graphic warnings* with photographic depictions (not yet proposed for sugary drinks, but used in cigarette warnings in over 100 countries).<sup>16</sup> Warning policies also have used a variety of shapes, such as octagon-shaped warnings in Chile, Peru, Mexico, and Uruguay, versus rectangular labels used for US warnings on cigarettes and alcohol.

Despite the varied sugary drink warning approaches taken by governments, few studies have compared sugary drink warning features head-to-head. A handful of studies suggest that graphic sugary drink warnings are likely to be more effective than text warnings,<sup>17–19</sup> but experiments have not examined sugary drink warnings with icons. Moreover, studies about sugary drink warnings have not focused on warnings’ potential impact on Latinos in the US, nor has research examined individuals with high English use compared to those with low English use. Evaluating impact across English language use is important to ensure sugary

drink warnings that appear in English would not exacerbate disparities in sugary drink consumption<sup>4</sup> and associated noncommunicable diseases.<sup>20–15</sup>

This study examined the impact of warning topic, warning design, and warning shape on reactions to warnings and perceptions of sugary drinks among non-Latino parents and Latino parents with high English language use and low English language use. Informed by health behavior change theories and messaging frameworks,<sup>21–23</sup> we examined key predictors of behavior change, including perceived message effectiveness, thinking about harms of sugary drinks, perceived healthfulness, and purchase intentions. We explored whether the impact of warning topic and design varied by level of English language use and Latino ethnicity.

## METHODS

### Participants

In October 2019, we recruited an online convenience sample to participate in an experiment. Recruitment occurred through CloudResearch Prime Panels, a survey research platform. Inclusion criteria were currently residing in the US, being at least 18 years old, and having at least one child between the ages of 2 and 12. Prior to participating in the study, participants provided electronic consent. Prime Panels used quota-based sampling when advertising to existing panel members, such that the sample comprised about half Latino and half non-Latino participants. Online convenience samples can yield highly generalizable findings for experiments, meaning that the direction and statistical significance of effects observed in experiments are very similar in convenience samples and nationally representative samples.<sup>24</sup> Upon completing the study, participants received previously agreed upon incentives (e.g., redeemable points) from Prime Panels.

### Stimuli development

The final warnings appear in eFigure 1. We created messages about five different *topics*: one nutrient warning about added sugar (based on nutrition labeling policies passed in countries including Chile, Peru, Uruguay, and Israel), three health warnings about outcomes that the epidemiological literature suggests may result from overconsumption of sugary drinks (heart damage, type 2 diabetes, and weight gain<sup>9,10,25</sup>), and one control message about littering (in line with previous labeling studies<sup>26,27</sup>). To create the warning messages, we modeled the language and sentence structure after the sugary drink warning ordinance passed in San Francisco.<sup>28</sup> We included the marker word “WARNING” and stronger causal language (e.g., “contributes to” instead of “may contribute to”) given research highlighting that inclusion of these components could heighten the effectiveness of warnings.<sup>29,30</sup> All messages were in English to mimic US state-level sugary drink product policies.

Next, we created three different warning *designs*: text-only warnings, icon warnings, and graphic warnings. Text-only warnings consisted of the warning message in white font, centered in a black square background. To create the graphic warnings, a professional designer identified stock photographs representing each of the topics. After vetting an initial set of warning topics and photographs with a stakeholder advisory board (comprised of nutrition epidemiologists, a weight stigma expert, a public health lawyer, and leaders from

Latino health organizations), we conducted two rounds of quantitative image pre-testing using convenience samples of US adults recruited through Amazon Mechanical Turk (total  $n=861$ ). For each warning topic, we selected the photograph rated as most discouraging participants from wanting to consume sugary drinks and created graphic warnings using those photographs. We selected the control image internally. To create the icon warnings, the professional designer created computer illustrations to match the photographs selected for each topic.

In addition to the main experimental factors described above (warning topic and design), we also created text-only warnings shown on octagon-shaped labels (octagon warnings) for all warning topics (but not for the neutral control). The octagon warnings looked identical to the text-only warnings except displayed in an octagon instead of a square, allowing us to examine the impact of label shape on participant reactions. We did not examine an octagon-shaped label for the control topic because we anticipated that the octagon shape might inherently convey warning-related information, and therefore would not be appropriate as a true control.

## Procedures

We registered the study on [AsPredicted.org](http://aspredicted.org): <http://aspredicted.org/blind.php?x=sv6h6p> before data collection and [ClinicalTrials.gov](https://clinicaltrials.gov) after data collection (NCT04382599). Participants completed an online survey programmed using Qualtrics survey software. The experiment used a between-within subjects design. The survey automatically randomized participants (with simple allocation ratio) to one of the warning *topics* (i.e., added sugar, heart damage, type 2 diabetes, weight gain) or the control topic (littering) (see Figure 1 for CONSORT diagram). Then, participants viewed the three warning *designs* (text-only, icon, and graphic) for their one randomized topic presented on square labels in a random order within subjects. Participants in the warning conditions additionally viewed the text-only octagon warning for their assigned topic (this warning was presented randomly within the set of warnings these participants viewed).

## Measures

Participants rated each warning using measures adapted from English-language surveys in previous studies. All items used Likert-style response options (ranging from 1-5) with a lower score indicating lower levels of the construct and a higher score indicating greater levels of the construct. The primary outcome was perceived message effectiveness,<sup>31</sup> measured using three items: “This message makes me concerned about the health effects of drinking beverages with added sugar”; “This message makes drinking beverages with added sugar seem unpleasant to me”; and, “This message discourages me from wanting to drink beverages with added sugar.” We then averaged responses for the three items to create an average perceived message effectiveness scale (Cronbach’s  $\alpha$  for all warning designs >.85). Perceived message effectiveness is sensitive to differences between warnings in online studies and is predictive of actual behavior change.<sup>32</sup> Secondary outcomes, measured with single items, included thinking about the harms of sugary drink consumption (i.e., thinking about the harms),<sup>23</sup> perceived healthfulness of sugary drinks for their child (i.e., perceived healthfulness),<sup>33,34</sup> and intentions to purchase sugary drinks for their child (i.e., purchase

intentions).<sup>35</sup> After rating each warning, participants viewed all the warning designs in their assigned condition and were asked, “Which of these messages would discourage you most from wanting to drink beverages with added sugar?”

Participants chose to take the survey in either English or Spanish. A professional translation company translated survey items from English to Spanish. To ensure the items were well understood by Spanish-speaking participants, we conducted ten in-person cognitive interviews with native Spanish speakers in June 2019. These interviews were conducted in Spanish by a native Spanish-speaking team member, in the Research Triangle area of North Carolina. Exact item wording and response scales in both languages appear in eTable 1. Latino ethnicity was measured by asking participants if they were “of Hispanic, Latino, or Spanish origin”.<sup>36</sup> We measured English language use with the item, “In general, what language(s) do you read and speak?”<sup>37</sup> with responses “more Spanish than English” and “Only Spanish” coded as low English language use and responses “only English,” “more English than Spanish,” and “both equally” coded as high English language use.

## Analysis

Analyses used Stata/SE version 16 with two-tailed tests, a critical alpha of 0.05, and listwise deletion for missing data. We powered the study based on effect sizes from a meta-analysis estimating the impact of warnings on our primary outcome.<sup>38</sup> We first examined whether randomization created equivalent groups using chi-squared tests for categorical variables and one-way ANOVA F-tests for continuous variables, examining all variables in Table 1. We predicted that, compared to a control, all warning topics would lead to greater perceived message effectiveness, more thinking about the harms, lower perceived healthfulness of sugary drinks, and lower purchase intentions. We also examined the predictions that, compared to text-only warnings, icon warnings and graphic warnings would lead to greater perceived message effectiveness, more thinking about the harms, lower perceived healthfulness, and lower purchase intentions.

For the analysis of each of the outcomes, we used a mixed effects linear model, treating the intercept as a random effect, to assess the relationship between experimental factors and the outcome. Predictors were warning design (within subjects, Level 1), topic (between subjects, Level 2), and the interaction between these two factors. If the interaction term was not significant, we presented the model without the interaction as our main model. In the main models, the control topic (littering) was the reference group for topic and text-only was the reference group for design. We used Wald tests to compare the remaining topics and designs to each other. We report average differential effects of each experimental factor on the outcomes as generated by the final models. We also report Cohen’s *d* statistic<sup>39</sup> to put effect sizes into a common metric.

Next, we compared perceived message effectiveness ratings of the octagon text-only warning with the square text-only warning using a paired *t*-test, separately for each warning topic, to understand differences in outcomes based on warning shape. For each warning topic, we calculated the proportion of participants selecting each warning design as the design that most discouraged them from wanting to consume sugary drinks, using independent samples *z*-tests to compare the proportions.

Finally, in exploratory analyses (not pre-specified), we examined whether English language use and Latino ethnicity moderated the impact of warning topic and warning design on perceived message effectiveness. To test these interactions, we ran two separate models, one for each moderator; these models included a two-way interaction between topic and design, as well the three-way interaction between the moderator, topic, and design. We then computed and compared the average marginal effects of each topic and design (relative to the littering and text-only controls, respectively) at each level of the moderator.

## RESULTS

### Participant characteristics

Participants had a mean age of 35.3 years (Table 1). Most participants were women (58%) and white (74%), with almost half of the sample identifying as Latino (48%). About half of participants had a high school degree or less (48%) and about half reported an annual household income below \$50,000 (47%). Most participants (87%) had high English language use and consumed sugary beverages at least once per week (74%). Participant characteristics were equivalent across experimental arms (all  $p > .37$ ).

### Impact of warning topic

All nutrient and health warning topics (added sugar, heart damage, type 2 diabetes, and weight gain) were perceived as more effective than the control (average differential effect [ADE] ranged from 1.77 to 1.84, all  $p < .001$ ; Table 2; raw means and SDs appear in eTable 2; Cohen's  $d$ 's appear in eTable 3). All warning topics also led parents to think more about the harms of sugary drinks compared to the control (ADE ranged from 1.29 to 1.42, all  $p < .001$ ). Added sugar was the only warning topic that led to lower perceived healthfulness of one's child drinking sugary drinks daily (ADE =  $-.33$ ,  $p = .003$ ). All warning topics led to lower intentions to purchase sugary drinks for one's child in the next four weeks (ADE ranged from  $-.47$  to  $-.35$ , all  $p < .01$ ). The nutrient and health warning topics did not differ from each other on any outcomes (all Wald test  $p > .229$ ). English language use and Latino ethnicity did not moderate the impact of warning topic on perceived message effectiveness (all  $p > .05$ ).

### Impact of warning design

Icon and graphic warnings led to greater perceived message effectiveness than text-only warnings (ADE =  $.18$  and  $.30$  for icon and graphic, respectively, both  $p < .001$ ; Table 2). Compared to text-only warnings, icon and graphic warnings also led to greater thinking about the health harms of sugary drinks (ADE =  $.16$  and  $.35$ , both  $p < .001$ ), lower perceived healthfulness of one's child drinking sugary drinks daily (ADE =  $-.10$  and  $-.18$ , both  $p < .001$ ), and lower intentions to purchase sugary drinks for one's child in the next four weeks (ADE =  $-.11$  and  $-.16$ , both  $p < .001$ ). Graphic warnings elicited reactions that were stronger in magnitude than icon warnings for all outcomes (Wald test  $p < .05$ ).

Moderation analyses revealed the impact of icon warnings (vs. text-only warnings) was stronger for participants with low English use compared to those with high English use (difference in average effect of icon relative to text for low vs. high English use participants,

0.182,  $p=.024$ ; Figure 2, **Panel A**; eTable 4). These analyses also highlighted higher perceived message effectiveness among people with low English use compared to those with high English use (Figure 2, **Panel A**). Latino ethnicity also moderated the impact of warning design on perceived message effectiveness, following the same pattern as low English use (difference in average effect of icon relative to text for Latino vs. non-Latino participants, 0.116,  $p=.034$ ; Figure 2, **Panel B**).

Participants assigned to the nutrient or health warning topics also rated a text-only octagon warning on perceived message effectiveness. The text-only octagon warning did not differ from the text-only square warning for added sugar, heart damage, or weight gain (all  $p>.219$ ). For the type 2 diabetes warning topic, participants perceived the octagon warning as more effective than the text-only square warning (mean=3.94 vs. 3.79,  $p=.007$ ). When asked which warning most discouraged them from wanting to consume sugary drinks, a majority of participants selected the graphic warnings (range, 56% for added sugar to 82% for type 2 diabetes; eFigure 2).

## DISCUSSION

In a large, sample of Latino and non-Latino US parents, we found that parents perceived all sugary drink warning topics, including added sugar, heart damage, type 2 diabetes, and weight gain, to be more effective than a control message. All warning topics also led parents to think more about the health effects of sugary drinks for their child and led to lower intentions to purchase sugary drinks for their child. This study adds to evidence from a recent meta-analysis of experiments finding that sugary drink warnings led to reductions in both hypothetical and real-stakes sugary drink purchase and consumption behavior.<sup>40</sup> Moreover, warning topics performed equally well for Latino parents and non-Latino parents, as well as for people with varying levels of English language use. These findings add to a growing body of research suggesting that warnings work well across diverse populations.<sup>41-44</sup> Taken together, these findings are very promising for sugary drink warning policies.

We found that warnings about both a nutrient (i.e., added sugar) and health problems were similarly effective, which suggests that policymakers and regulatory agencies have several potentially effective options to consider when crafting warning messages. Our finding that nutrient and health warnings led to similar reductions in purchase intentions contrasts with a meta-analysis that found that health warnings were more effective than nutrient warnings at reducing hypothetical sugary drink purchases. One possible explanation for the difference between our study and the meta-analysis is that many previous studies have tested health warnings that describe multiple health harms,<sup>29,35,45</sup> which could heighten their impact relative to nutrient warnings. More research is needed to understand differences in consumer responses to nutrient and health warnings, as well as the effects of a wider variety of possible warning topics (e.g., sugary drinks' link with dental caries). While our study only included one health topic per warning, future studies should examine the ideal number of topics to include in warnings, given studies of cigarette warnings suggesting that including multiple health effects in messages could increase their impact.<sup>46</sup> We also found that most warning topics (except "added sugar") did not change perceived healthfulness of sugary

drinks, in contrast with the meta-analysis,<sup>40</sup> which found that warnings lowered perceived product healthfulness. One possible explanation is that, in contrast with our study, other studies have shown warnings mocked up on a variety of products. Warnings could possibly have a stronger impact on perceived healthfulness of sugary drink types that are marketed to appear healthful, such as fruit drinks.<sup>47–49</sup>

Our experiment revealed that images enhanced warnings' effectiveness. Compared to text-only warnings, icon and graphic warnings led to greater perceived message effectiveness, thinking about the risks of sugary drinks for one's child, lower perceived healthfulness of sugary drinks, and lower purchase intentions (a key mediator of behavior change in the Theory of Planned Behavior and the Theory of Reasoned Action).<sup>21,50</sup> Additionally, graphic warnings out-performed icon warnings on all of the outcomes. These findings add to evidence from the tobacco literature demonstrating the effectiveness of graphic warnings<sup>26,38,51–53</sup> and build on studies highlighting the promise of graphic sugary drink warnings.<sup>17,18,54</sup> One previous study found that graphic warnings including an image depicting obesity led to greater weight-related stigma.<sup>55</sup> Thus, policymakers may choose to avoid images that could potentially be stigmatizing given that there appear to be a wide range of effective warning options. The octagon shape and square shape performed similarly, with the exception of the type 2 diabetes warning, for which the octagon shape out-performed the square shape. This builds on prior research suggesting that octagons may be slightly more effective than text but that the difference is small in magnitude.<sup>29</sup>

The impact of icon warnings (versus text-only) was stronger for parents with lower English use, suggesting that the images helped to communicate information in place of the text. Warnings on products are unlikely to appear in multiple languages due to space constraints (although laws could more feasibly require warnings on *advertisements* to appear in the primary language of the advertisement, as required in San Francisco's ordinance). We observed the same pattern for parents identifying as Latino, in which the benefits of icon (versus text) warnings were larger for Latino parents than non-Latino parents. Including icons, symbols, or other images in product warnings could be an important step for increasing access to information among people with low English language use and Latino populations. It is possible that the moderation by Latino ethnicity is explained entirely by English use, although we were not able to explicitly test this due to the high correlation between these variables in our study. The magnitude of the moderation effects appear relatively small. However, even small effects could be quite meaningful when extrapolated to the full population, especially among often-repeated behaviors and since warnings would be universally applied to sugary drinks. Indeed, a recent simulation modeling study suggested that small differences in warning efficacy can lead to large differences in warnings' impacts on health outcomes like obesity when extrapolated to the population level.<sup>44</sup> Regardless of warning design, perceived message effectiveness ratings were higher among Latino parents and people with low English use. Future research could more deeply explore how language, acculturation, and ethnicity affect reactions to sugary drink warnings in larger samples and through qualitative work. Future studies should also continue exploring a wider range of potential moderators of warnings' impact.



Strengths of this study include recruitment of many Latino parents and the use of a multi-stage, empirically-driven stimuli development process. Limitations include the brief exposure to the warnings online, the inability to measure the warnings' impact on actual consumption of sugary drinks, and potentially limited power for exploratory moderation analyses. Future studies should measure behavioral outcomes (e.g., actual purchasing), the impact of warnings on other populations including children, teens, and the general population of adults, and potential unintended consequences such as weight-related stigma.<sup>55,56</sup> Moreover, the use of a convenience sample means the generalizability of results remains to be established. However, online convenience samples tend to provide valid results for experiments.<sup>57-59</sup>

## CONCLUSIONS

Our study found that multiple warning topics had beneficial effects on key predictors of behavior change. Icon and graphic warnings elicited stronger effects than text-only warnings, suggesting that including images in warnings could improve their effectiveness. Our results suggest that warnings with images may be a particularly promising tool for discouraging sugary drink consumption among Latino populations and populations with low English use. Policymakers should consider implementing sugary drink warnings as an obesity prevention policy strategy.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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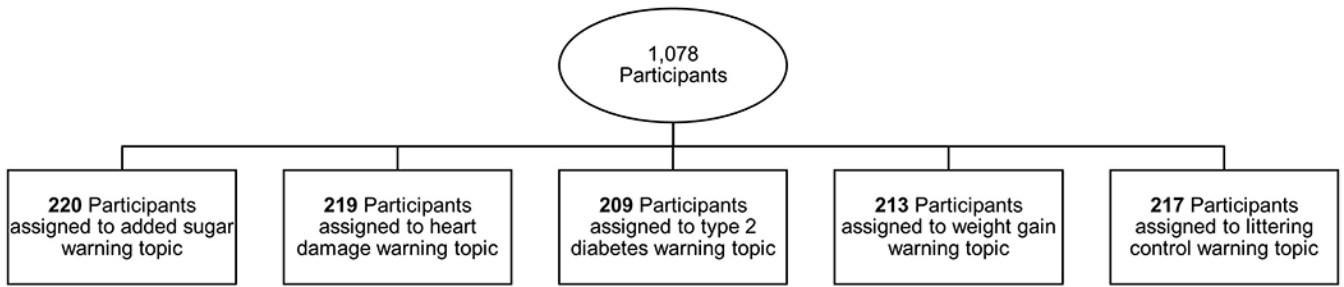
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**Figure 1.**  
CONSORT diagram

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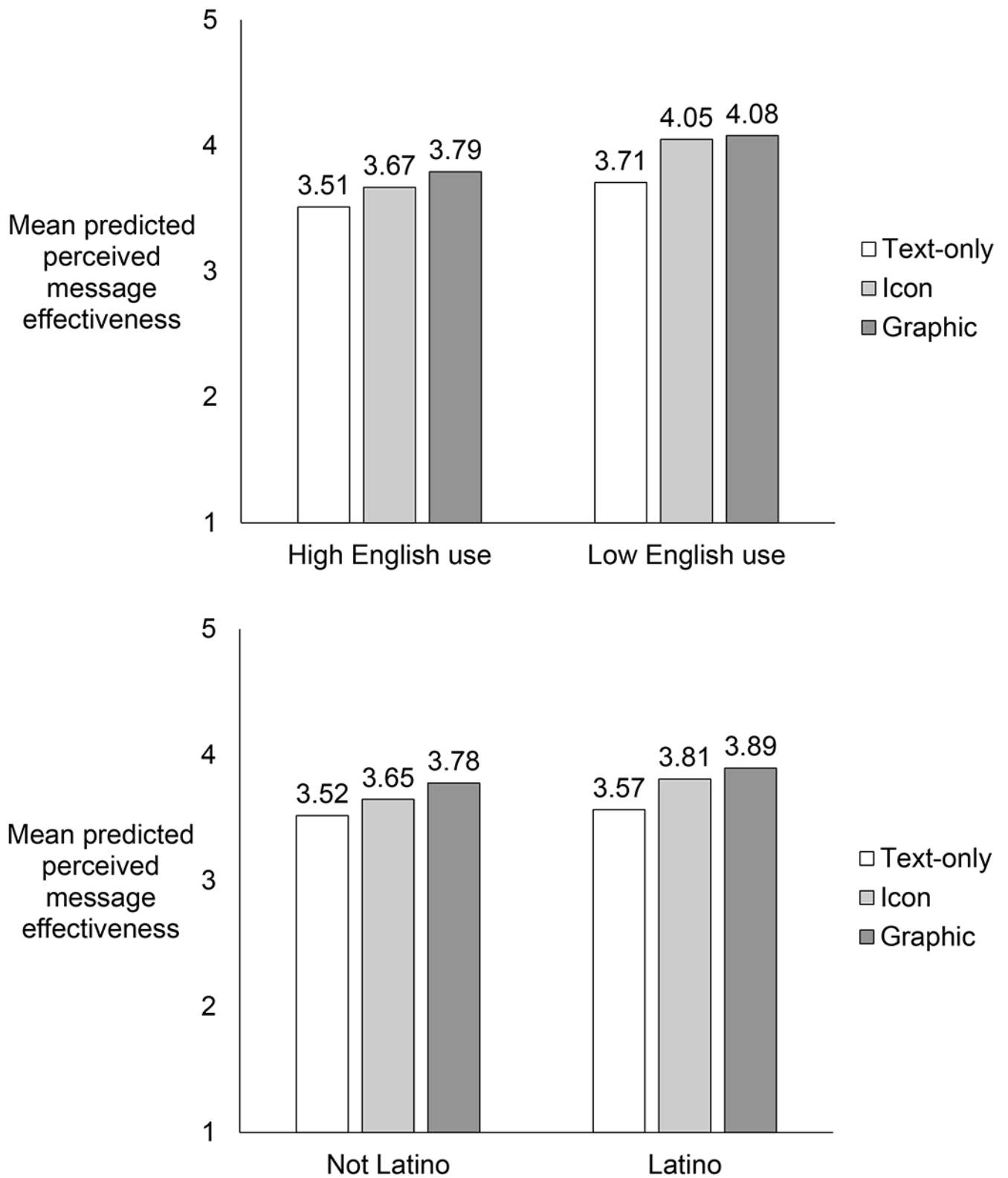


Figure 2.

Effects of graphic and icon warnings relative to text-only by English language use (Panel A),  $p=.024$  for moderation of icon vs. text-only warnings,  $p=.233$  for moderation of graphic vs. text-only warnings; and by Latino ethnicity (Panel B),  $p=.034$  for moderation of icon vs. text-only warnings,  $p=.19$  for moderation of graphic vs. text-only warnings.

**Table 1.**Participant characteristics (*n*=1,078)

Characteristic	<i>n</i>	%
Age		
18-29 years	238	22%
30-39 years	563	52%
40-54 years	259	24%
55+ years	15	1%
Mean in years (SD)	35.3	7.4
Gender		
Man	445	41%
Woman	628	58%
Transgender or other	5	0%
Sexual orientation		
Straight or heterosexual	994	92%
Gay or lesbian	24	2%
Bisexual	49	5%
Other	11	1%
Latino ethnicity	514	48%
Race		
White	796	74%
Black or African American	135	13%
Asian	23	2%
Other/multiracial	121	11%
American Indian or Alaskan Native	1	0%
Pacific Islander	2	0%
English language use		
Low	141	13%
High	937	87%
Education		
Less than a high school degree	39	4%
High school degree	473	44%
Four-year college degree	428	40%
Graduate degree	138	13%
Financial situation		
Difficulty paying the bills no matter what	144	13%
Have to cut back on things to pay the bills	128	12%
Enough to pay bills, but little spare money to buy extra or special things	425	39%
After paying bills, enough money for special things	380	35%
Household income, annual		
\$0-\$24,999	213	20%
\$25,000-\$49,999	288	27%



Characteristic	<i>n</i>	%
\$50,000-\$74,999	202	19%
\$75,000+	375	35%
Number of children in household (0-18)		
1	381	35%
2	416	39%
3	184	17%
4 or more	97	9%
Used SNAP in the last year	344	32%
History of disordered eating	156	14%
Body mass index (BMI, kg/m <sup>2</sup> )		
Underweight (< 18.5)	37	3%
Healthy Weight (18.5-24.9)	384	36%
Overweight (25.0-29.9)	327	31%
Has obesity (30 or above)	314	30%
Mean BMI (SD)	28.0	7.7
Frequency of sugary drink consumption		
0 to 1 times per week	279	26%
>1 to <7 times per week	370	34%
1 to 2 times per day	205	19%
More than 2 times per day	224	21%
Child's frequency of sugary drink consumption <sup>1</sup>		
0 to 1 times per week	300	28%
>1 to <7 times per week	425	39%
1 to 2 times per day	189	18%
More than 2 times per day	164	15%
Language of survey administration		
English	924	86%
Spanish	154	14%

<sup>1</sup> Asked about one child ages 2-12 with the most recent birthday.

*Note.* Characteristics did not differ by between-subjects experimental arms. Missing demographic data ranged from 0% to 1.5%.

Table 2.

Effects of warning topic and warning design on study outcomes,  $r=1,078$ .

Warning topic	Perceived message effectiveness			Thinking about the harms of sugary drinks for child			Perceived healthfulness of sugary drinks for child			Intentions to purchase sugary drinks for child		
	ADE	SE	p	ADE	SE	p	ADE	SE	p	ADE	SE	p
Control (reference)												
Added sugar	1.84	0.09	<0.001	1.42	0.10	<0.001	-0.33	0.11	0.003	-0.42	0.11	<0.001
Heart damage	1.77	0.09	<0.001	1.29	0.10	<0.001	-0.14	0.11	0.196	-0.35	0.11	0.001
Type 2 diabetes	1.77	0.09	<0.001	1.34	0.10	<0.001	-0.21	0.11	0.059	-0.47	0.11	<0.001
Weight gain	1.81	0.09	<0.001	1.38	0.10	<0.001	-0.12	0.11	0.274	-0.35	0.11	0.001
<b>Warning design</b>												
Text (reference)												
Icon	0.18	0.03	<0.001	0.16	0.03	<0.001	-0.10	0.03	<0.001	-0.11	0.02	<0.001
Graphic	0.30 <sup>a</sup>	0.03	<0.001	0.35 <sup>a</sup>	0.03	<0.001	-0.18 <sup>a</sup>	0.03	<0.001	-0.16 <sup>a</sup>	0.02	<0.001

Note. ADE=average differential effect from mixed effects linear regression models. SE=standard error. Excluding littering (control), Nutrient and health warning topics (i.e., added sugar, heart damage, type 2 diabetes, and weight gain not different from each other for any outcome).

<sup>a</sup>Graphic different from icon at  $p<.05$  level.