

“Impact of warning labels on sugary beverages on risk perception, attention, and purchase intentions”

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IMPACT OF WARNING LABELS ON SUGARY BEVERAGES ON RISK PERCEPTION, ATTENTION, AND PURCHASE INTENTIONS

Abstract

The issue of warning labels on sweet beverage product packaging needs to be tested to determine its role in reducing product consumption. This study aims to examine the impact of warning labels on attention, risk perception, and purchase intention for sweet drink products. The paper conducted an experiment involving 120 participants. Most respondents fall within the age range of 25 to 34 years (38.30%). The analysis was conducted at sports facilities, schools, and playgrounds – in three major cities in Indonesia (Jakarta, Bandung and Surabaya). Two stimuli, sugar content labels and visual warning labels, were used after a pilot study. For data analysis, the study used univariate analysis of variance to assess the significance of each label stimulus interaction. Furthermore, this paper employed *t*-tests to check the significance of comparisons between cells. Through the difference test, the three hypotheses were accepted and had a significant effect. The findings reveal that the influence of visual warning labels on attention (*t*-value = 66.015), perceived risk (*t*-value = 68.064), and purchase intention (*t*-value = 60.483) is more significant than sugar content labels. These findings can serve as a set of innovative policies to support the success of demarketing strategies for sweet beverage products by governments and social marketing activists.

Keywords

social marketing, warning label, purchase intention, perceived risk, attention, Indonesia

JEL Classification

M31, M38

INTRODUCTION

Through marketing activities, civilization can continue progressing, improving quality of life and overall well-being. However, on the other side, marketing activities not only have a positive impact but can also threaten society. Marketers, both individuals and companies, and government policymakers are currently facing various pressures in addressing issues in marketing activities. These issues encompass relationships with the community, conflicts of interest, the reciprocal impact of marketing activities on society, and the pressures exerted by society on marketing (Halim & Muttaqin, 2014, 2019). There are several pressures on marketing activities and practices. First, marketing encourages individuals to purchase goods/services they do not need. Second, marketers often excessively promote potentially “deceptive” products/services. A demarketing campaign is required to control and prevent consumers from choosing a risky product. Health warning labels are one of the tools to achieve the objectives of such demarketing strategies. Literature on warning labels has developed quite well in the past ten years, with findings by Kees et al. (2010), Halim and Muttaqin (2014), Effertz et al. (2014), and Gallopel-Morvan et al. (2012). Additionally, Taillie et al. (2020), Hall et al. (2022), Hall et al. (2023), Kroker-Lobos et al. (2023), López-Olmedo et al. (2023), and Singh et al. (2022) proved the effectiveness of visual labels.

Tobacco products still dominate research on warning labels' effectiveness; few studies examined sugar-sweetened beverages. Health academics consider the consumption of sugar-sweetened beverages to be a contributor to several health issues for the global population. Therefore, the role of marketing academics is crucial in reducing or even preventing people from consuming these products. Several studies have specifically examined the effectiveness of health warning labels on sugar-sweetened beverage products, such as Halim and Muttaqin (2019), Roberto et al. (2016), Ruopeng et al. (2021), and D'Angelo Campos et al. (2023). The findings vary, but most agree that warning labels influence purchase intention, attention, and health risk perception. To get consumers' attention, warning labels need to be made attractively so that consumers can perceive the health risk message. Messages attracting attention and conveying good content will have an impact on consumers' purchasing intentions. It is necessary to examine the impact of warning labels on risk perception and reduced consumer purchase intentions. Although some previous research findings are convincing regarding the effectiveness of warning labels, research on this topic is still limited.

1. LITERATURE REVIEW

Warning labels are a tool for conveying health message information about a product. The use of warning labels on product packaging has been around for a long time, for example, on products that are dangerous to health, such as cigarettes and alcoholic drinks. This study examines health warning labels on sugar-sweetened beverage products.

1.1. Warning labels and purchase intention

The heightened awareness among academics regarding their role in supporting the anti-junk food campaign has led to rapid advancements in research on visual warning labels on packaging for beverages and snacks. This trend is particularly notable in Australia, Canada, and the United States. Empirical testing of warning labels on unhealthy beverage products remains limited. Effertz et al. (2014) showed that warning labels on beverage product packaging can influence purchase intention. This means that the progress of research findings on health warning labels on product packaging has been specific and in-depth. Consumer purchase intention is something that marketers must be able to achieve. With its influence on purchase intentions, health warning labels occupy a vital position in decision-making.

Clarke et al. (2023) proved the increased effectiveness of warning labels. Clarke et al. (2023, p. 10) indicate that warning labels are effective in influencing purchase intentions and decisions for high-calorie

sweet drink products but are less effective for alcoholic drinks. These findings provide a strong reason for using warning labels on high-calorie sweetened beverage products. Health warning labels can be a tool for consumers to find clear information before making purchasing decisions. This differs from alcoholic beverage products, which are generally known to have health effects. Products that can be said to be questionable and whose health risk information is vague or lacking really need a health warning label on the product packaging.

White-Barrow et al. (2023, p. 9) said that the influence of nutrition labels on understanding and intention to purchase sweet drink products has proven to be effective. Thus, there is a relationship between health warning labels and product purchase intentions, especially on sugary drink product packaging.

Bopape et al. (2022) discovered a positive effect of warning labels of food products and cigarettes on consumer purchase intentions; Delnevo et al. (2021) showed similar evidence on the effectiveness of cigarette products. Bopape et al. (2022, p. 7) stated that warning labels, due to their single attribute nature, present concise and easy to interpret information and may be more effective in informing consumers. This statement is in line with previous research findings. A warning label is the information that firmly and clearly conveys a warning message that consumers must pay attention to, so it has a high tendency to be read before consumers make a purchasing decision. Table A1, Appendix A, shows the complete history of the development of studies regarding health warning labels.

VanEpps et al. (2016, p. 8) indicate that warning labels displaying the calorie content of products also influence the level of purchase of health-detrimental products. Important information conveyed in health warning labels on sugar-sweetened beverage product packaging is easier for consumers to understand when compared to products without warning labels. By influencing purchasing decisions, labels tend to influence consumption patterns and can increase public awareness of the dangers of products. The history of warning label literature has shown that visual warning labels effectively reduce and eliminate purchase intentions. Currently, warning labels mostly use images depicting health hazards, as seen by Kees et al. (2010), Halim and Muttaqin (2014), Effertz et al. (2014), and Gallopel-Morvan et al. (2012). Taillie et al. (2020), Hall et al. (2022), Hall et al. (2023), Kroker-Lobos et al. (2023), López-Olmedo et al. (2023), and Singh et al. (2022) have also stressed the vital role of visual labels. In recent years, research on warning labels has been divided into four categories: sugar-sweetened beverage products, junk food, cigarettes, and alcoholic beverages. Within the scope of testing sugar-sweetened beverage products, earlier research findings showed that warning labels, especially visual ones, affect consumer understanding, health risk perception, purchase intentions, and actual purchases. These findings are consistent with Taillie et al. (2020), Hall et al. (2022), Hall et al. (2023), Clarke et al. (2023), and White-Barrow et al. (2023).

Visual warning label content will have a different effect on purchase intention. Murdock and Rajagopal (2017), Kroker-Lobos et al. (2023), and López-Olmedo et al. (2023) used social consequence content as a tool to influence purchasing behavior. Therefore, this study examines the effectiveness of warning labels that use health hazard content. This paper emphasizes that visually appealing warning labels will influence consumer purchase intentions, supported by Kees et al. (2010), Halim and Muttaqin (2014, 2019), Murdock and Rajagopal (2017), Kroker-Lobos et al. (2023), and López-Olmedo et al. (2023).

1.2. Warning labels and attention

Labels serve as a tool to increase awareness of hidden aspects of products or consumption that ordinary consumers may not readily recognize. Labels serve two general purposes:

- (1) providing consumers with the information they need before using a product, and
- (2) helping manufacturers avoid potential legal claims.

How effective the use of visual warning labels is, remains a crucial question. Many academics measure the effectiveness of visual labels by assessing how well labels influence the intent to cease purchasing or to avoid starting to purchase a product. Argo and Main (2004, p. 204) stated that warnings influence the effectiveness dimensions of attention, reading and comprehension, recall, and behavioral compliance. Since 2003, marketing and health academics have collaborated to answer these questions. For instance, Hammond et al. (2006) suggest that visual labels are more effective than textual labels. Visual warning labels with superior design and more expressiveness can be an effective tool compared to textual labels. However, not all warning labels require visual warning labels because marketers make products to be attractive so that consumers buy, not focusing on providing warning information on the product packaging. The effectiveness of visual warning labels is supported by research findings conducted in Canada (Kees et al., 2010) and Indonesia (Halim & Muttaqin, 2014, 2019). The current state of warning label research further emphasizes the pivotal role of warning labels in influencing consumer behavior, as evidenced by Taillie et al. (2020), Hall et al. (2022), Hall et al. (2023), Kroker-Lobos et al. (2023), López-Olmedo et al. (2023), and Singh et al. (2022). Warning labels have been widely used to measure intentions and purchasing decisions for products such as cigarettes, junk food, sugary drinks, and other products. However, more research needs to explore the effectiveness of labels on other variables.

Consumer purchase decisions involve several decision-making processes, starting with attention to a product before purchasing. Some studies have delved into the effects of health warning labels on consumer attention. For instance, Kim and Chua (2022, p. 7) found differences in the effectiveness of health content pictorial warning labels, moderated by the level of threat and gender, on personal relevance, attention, and intentions to purchase or avoid smoking. This means that the effectiveness

of warning labels can also be influenced by several variables that strengthen their influence on purchasing decisions. The latest findings provide insight into how many factors can moderate the effectiveness of warning labels. Saavedra-Garcia et al. (2022) found that warning labels only affect identifying healthier products among adolescent consumers and do not extend to their purchasing decisions. Warning labels significantly influence a person's level of attention to a product, especially products with health or other risks. Halim and Muttaqin (2019, p. 8) believe this influence can vary depending on several factors, such as label design, text, context, and the characteristics of individuals exposed to the warning label. Some of the main effects of warning labels on attention include increased awareness. This means that health warning labels can be effective by paying attention to each warning label design used on product packaging.

Warning labels can increase an individual's awareness of an action or product's potential dangers or negative consequences. Striking and attention-grabbing warning labels can trigger greater attention toward the product consumers' view. Secondly, warning labels can enhance the reader's focus. Therefore, researchers suggest governments create attention-grabbing warning labels using bright colors, large text, or prominent symbols. This condition can increase a person's focus on the warning message. Lastly, health warning labels can increase risk awareness when consuming a product. Influential warning labels can help individuals better understand the risks associated with the product, particularly in the case of sugar-sweetened beverage products, as found by Grummon et al. (2022) and Caruso et al. (2023). The caution triggered by exposure to health warning labels creates a reflective behavior regarding consuming a particular product. Furthermore, attention to the message content on warning labels displayed on product packaging depends on the attractiveness of the message conveyed. The attention given by message readers will influence the effectiveness of warning labels. Therefore, marketers should pay attention to the level of attractiveness of the warning label message displayed. Visual labels are more attention-grabbing than simply listing the sugar content on product packaging.

1.3. Warning labels and perceived risk

Creating attractive warning labels with the right message is essential to reduce or control consumer behavior in consuming unhealthy beverage products. Belief in the health risks associated with their products can influence consumers' purchasing choices. Berry et al. (2017) researched the effect of health warning labels on consumer perceptions. They stated that consumer belief in the health risks associated with a product is one of the factors that influence consumers in reducing their intent to purchase the product. Potential consumers may not consider some products dangerous if they do not have a health warning label on the product packaging. This means that it is critical to provide information that can influence consumers' risk perceptions. This statement is also strengthened by Aktan (2018) and Davis and Burton (2019). These findings are crucial for demarketing academics. As these findings begin to increase, they can provide new insights into the study of health warning labels on product packaging.

Therefore, this study investigates the impact of labels on beverage products, filling a research gap in social marketing regarding warning labels and campaigns against unhealthy food and drinks. Recent research findings stress a need to examine the impact of warning labels on perceived risk. This gap in research is evidenced by Prates et al. (2022), Chudech and Janmaimool (2021), Czaplicki et al. (2022), Nakkash et al. (2021), Zhang et al. (2023), Uribe et al. (2020), and Thrasher et al. (2022), who tend to focus on testing cigarette products. Research on sugar-sweetened beverage products is more limited, with studies conducted by Roberto et al. (2016), Ruopeng et al. (2021), and D'Angelo Campos et al. (2023). The message content is an essential component that can either strengthen or diminish the effectiveness of warning messages (Pechmann & Catlin, 2016). Most research on messages focuses on the effectiveness of using adverse health outcomes such as cancer, diseases, and even death (Kees et al., 2010). Murdock and Rajagopal (2017), Aktan (2018), Davis and Burton (2019), and D'Angelo Campos et al. (2023) proved the effectiveness of warning labels in influencing perceived risk.

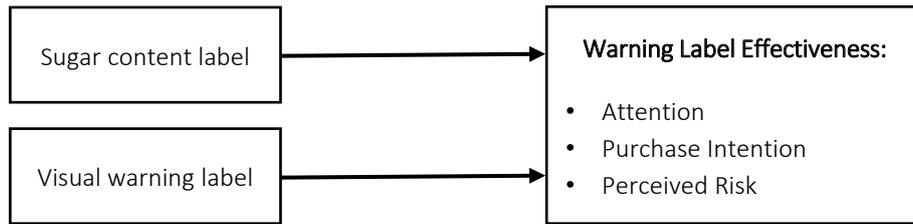


Figure 1. Conceptual framework

1.4. Aim and hypotheses

To fill the research gap in social marketing studies, specifically on warning labels on beverage product packaging, this study aims to assess the effectiveness of warning labels on sugar-sweetened beverage packaging in terms of attention, risk perception, and purchase intention. Figure 1 shows the conceptual model. The study elaborated on three hypotheses:

- H1: *Visual warning labels significantly affect purchase intention compared to sugar content labels (textual labels).*
- H2: *Visual warning labels significantly affect attention compared to sugar content labels (textual labels).*
- H3: *Visual warning labels significantly affect perceived risk compared to sugar content labels (textual labels).*

2. METHOD

The study used the experimental method, a causal research method used to establish evidence of cause-and-effect relationships (Malhotra, 2010). The target subjects were adolescents and adults. The analysis was conducted at three locations – sports facilities, schools, and playgrounds – in three major cities in Indonesia (Jakarta, Bandung and Surabaya). These locations were chosen because they are places where participants commonly gather to engage in various activities, and there is potential for an increase in the consumption of sugar-sweetened beverages. The total number of participants is 120 (2 cells x 60), as required for the study. Participants were randomly assigned to two cells formed in the experimental design. Each cell group received different stimuli to observe varying effects on each participant. The study used two stimuli: sugar con-

tent labels and visual warning labels, as presented in Figure A1, Appendix A. This paper employed univariate analysis of variance to determine the significance of the interaction of each stimulus label. Subsequently, *t*-tests were used to assess the significance of comparisons between cells. Table 1 illustrates the experimental design.

Table 1. Experimental design

Visual Health Warning Label	Textual Sugar Content Warning Label
60 participants	60 participants

This study has three dependent variables: purchase intention, attention, and perceived risk. The purchase intention variable uses questions defined by Baker and Churchill (1977). Purchase intention is the level of desire or determination of an individual to purchase a specific product or service within a defined future timeframe. Following Halim and Muttaqin (2019, p. 196), the indicators include whether participants are willing to try, purchase, intend to seek, and like the product. The perceived risk variable is akin to the research conducted by Murdock and Rajagopal (2017) and Nilsen et al. (2020). Perceived risk in product consumption is an individual’s perception of the potential risks or uncertainties associated with consuming a particular product. This perception includes subjective evaluations of various types of risks, such as health, financial, quality, or social risks that may arise from consuming the product. For the attention variable, the study followed Kim and Chua (2022). Attention toward product consumption refers to the focus individuals give to a specific product or brand in consumption decision-making. This perception includes the level of awareness, attention, and concentration individuals direct toward the product. The questions asked are designed to assess whether the warning label is easy to see and remember, attracts attention when viewed, and effectively contains warning information.

The first step in preparing for the experimental study was to conduct a pilot study to determine the warning labels to be used. The pilot study involved several stages, including selecting the sugar-sweetened beverage product, determining the message content, choosing message images, deciding on the message location, and specifying the color and size of the warning labels. This stage is carried out in order to obtain a stimulus that is truly tested and valid. The second step involved testing the validity and reliability of the measurement tools for the dependent variables: attention, purchase intention, and perceived risk. Validity testing used factor analysis techniques, with results showing a KMO value above 0.5, factor loadings, and MSA above 0.6. Furthermore, the Cronbach's alpha values were required to be above 0.6. According to the criteria outlined by Malhotra (2010), the indicator variables used in this study were deemed valid and reliable for the actual study. The experimental procedure followed several steps and procedures inspired by Halim and Muttaqin (2019), ensuring that each step and procedure was followed meticulously to obtain trustworthy experimental results.

The stages of conducting the experiment are as follows. Firstly, participants were invited to join the study voluntarily, without any coercion. If prospective participants were willing, the surveyors provided them with experimental tools divided into three sections: participant profile data, warning label stimuli, and statements related to dependent variables. This phase lasted 5-10 minutes, ensuring respondents were exposed to and observed the images carefully. During this phase, questions were asked about the displayed images. This way, participants were conditioned to be cautious and attentive when observing the images. The final part of this experiment involved providing participants with statements that measure the dependent variables. To control for stimulus effectiveness, the survey included statements that measured participants' beliefs regarding the information provided in the stimuli.

3. RESULTS

Table 2 presents the characteristics of the respondents, showing that respondents are distributed relatively evenly. These data consist of four main categories that describe the characteristics of the

respondents: age, gender, education level, and occupation. Most respondents fall within the age range of 25 to 34 years (38.30%), followed by the age group of 35 to 44 years (31.70%). There are also some participants in the younger age group, namely 18 to 24 years, accounting for 24.20% of the total respondents. Meanwhile, the number of older participants is relatively minor. Regarding the gender of the respondents, there are more female than male respondents. Most respondents hold a bachelor's degree (51.70%), followed by those with a master's degree (19.20%). The number of respondents with higher education levels, such as diploma and high school graduates, is also significant. Table 2 also illustrates the primary occupations of the respondents. The majority of respondents are entrepreneurs (33.3%), followed by civil servants (25%) and private sector employees (24.2%). A small number of respondents are students or college students (17.5%).

Table 2. Characteristics of respondents

Characteristics	Details	Total (People)	Percentage (%)
Age	18-24 years	29	24.20
	25-34 years	46	38.30
	35-44 years	38	31.70
	45-54 years	5	4.20
	≥ 55 years	2	1.70
	Total	120	100
Gender	Male	54	45.00
	Female	66	55.00
	Total	120	100
Education	≥ High School	21	17.50
	Diploma	14	11.70
	Bachelor	62	51.70
	Master	23	19.20
	Total	120	100
Job	Student/College student	21	17.5
	Entrepreneur	40	33.3
	Civil servant	30	25.0
	Non-government employee	29	24.2
	Total	120	100

The research instruments in this study were developed through a pilot study. Before conducting field experiments, the measurement tools were tested for their validity and reliability. Using factor analysis and Cronbach's alpha, as Hair et al. (2010) recommended, the results showed that all measurement tools in this study were deemed valid and reliable for further research. The results of

Table 3. Mean comparison of dependent variables

Stimulus	Purchase Intention			Attention			Perceived Risk		
	Mean	t-value	Sig.	Mean	t-value	Sig.	Mean	t-value	Sig.
Visual warning label	4.7903	60.483	.000	5.4083	66.015	.000	5.5217	68.064	.000
Sugar content label	4.4800	55.481	.000	4.9900	62.006	.000	3.8567	56.426	.000

the stimulus test indicated an interaction between the two labels being compared. Therefore, the provided stimuli successfully produced different effects corresponding to each experimental cell's stimulus.

Table 3 presents the results of the assessment of dependent variables. The stimuli provided were credible for the participants. Table 3 indicates that, overall, the average values for visual labels are higher than those for textual labels. This result occurs in every variable studied, including purchasing intention, attention, and perceived risk variables. The results also show that the sig. value for these three variables is sig. 0.000 ($p < 0.05$) and the calculated T value is greater than the T table so it can be concluded that H_0 is rejected. This condition shows that there is a significant influence between the two labels being compared, thus H_1 is accepted. With a mean visual warning label value of 4.7903 and a mean sugar content label value of 4.4800. From the results it can be seen that visual warning labels have a significant effect on purchase intentions, when compared to sugar content labels.

Hypothesis 2 is also the same. The results also show that the sig. for these three variables is sig. 0.000 ($p < 0.05$) and the calculated T value is greater than the T table so it can be concluded that H_0 is rejected. This condition shows that there is a significant influence between the two labels being compared, thus H_2 is accepted. With a mean visual warning label value of 5.4083 and a mean sugar content label value of 4.990. From the results it can be seen that visual warning labels have a significant effect on attention when compared to sugar content labels.

Hypothesis 3 test shows that the sig. on this variable is sig. 0.000 ($p < 0.05$) and the calculated T value is greater than the T table so it can be concluded that H_0 is rejected. This condition shows that there is a significant influence between the two labels being compared, thus H_3 is accepted.

With a mean visual warning label value of 5.5217 and a mean sugar content label value of 3.8567. From the results it can be seen that visual warning labels have a significant effect on perceived risk when compared to sugar content labels.

4. DISCUSSION

This study's results align with the evolving findings of previous research, confirming that visual health warning labels remain undisputedly more influential than textual warning labels. This study offers insights into the effectiveness of warning labels on sugary beverage products, particularly within the context of Indonesian consumers. These findings carry significant implications and contribute to the existing knowledge in social marketing and public health. The findings reinforce earlier research findings that visual warning labels have proven effective in reducing and, in some cases, eliminating purchase intention. These findings align with Kees et al. (2010), Halim and Muttaqin (2014, 2019), Effertz et al. (2014), Gallopel-Morvan et al. (2012), Murdock and Rajagopal (2017), Billich et al. (2018), and Hall et al. (2017). These findings also underscore the effectiveness of health warning labels on sugar-sweetened beverage products, as demonstrated by White-Barrow et al. (2023), Taillie et al. (2020), Hall et al. (2022), Hall et al. (2023), Roberto et al. (2016), Ruopeng et al. (2021), D'Angelo Campos et al. (2023), Grummon et al. (2022), and Caruso et al. (2023).

Specifically, the results reinforce the evidence that sugary beverage products, which pose health risks, can utilize visual warning labels to convey the health hazards of these products effectively. Crockett et al. (2018) state that labeling consisting of energy information on menus or adjacent to products can change people's choices at the point of selection and consumption. These findings also align with Halim and Muttaqin (2019), Taillie et al. (2020), Hall et al. (2022), Hall et al. (2023), Clarke et al. (2023), White-Barrow et al. (2023), and

Kroker-Lobos et al. (2023), who found that visual warning labels are effective in influencing attention and purchase intention. Specifically, for sugary beverage products, Bleich et al. (2014) found that calorie information can reduce the selection and consumption of sugary beverages. This team from St. Michael's Hospital in Canada found that sweetened beverages containing fructose are more harmful due to their impact on blood sugar levels. Fructose is known to stimulate the production of fat cells. People with an excess of fructose are concerned about accumulating fat more quickly than having excess glucose. An excess of fructose has effects similar to a high-fat diet. Awareness of the harmful effects of sugary drinks has led some countries, such as the United States, Canada, and European countries, to consider warning labels as an effective tool in reducing the consumption of sugary beverages.

Visual warning labels can achieve the demarketing goal of reducing product consumption. Additionally, consumers are more likely to focus on depicting the diseases resulting from consuming sugary beverages. Lastly, this study also examined the belief that health risks associated with a product can influence consumer choices when purchasing the product. As Berry et al. (2017) highlighted, consumer belief in the health risks associated with a product is one of the factors that can influence consumers in reducing their intention to buy the product. These findings hold significant importance for demarketing academics. Thus, it can fill a research gap in social marketing related to warning labels and campaigns against unhealthy food and beverages. The findings also

strengthen Murdock and Rajagopal (2017), Aktan (2018), Davis and Burton (2019), and D'Angelo Campos et al. (2023), who have shown the effectiveness of warning labels in influencing risk perception.

The results of this study reinforce the recommendations from previous research, indicating that for potentially harmful consumer products, warnings, and package disclosures are essential communication tools for public health policies and governmental institutions, as suggested by Bettman et al. (1986), Stewart et al. (2001), and Goodall and Appiah (2008). Warning labels on products represent a form of consumer protection (Halim & Muttaqin, 2014, 2019). Warnings and information disclosures can inform consumers about risks and potential hazards associated with product use and, in turn, counterbalance the positive consequences stemming from effective package design and other promotions.

Although this paper provides valuable insights, future studies can explore the long-term effects of visual warning labels and their impact on purchasing behavior. Studying various demographic groups and their responses to such labels can further enrich one's understanding. For future research, the study recommends exploring the effectiveness of warning labels on sugar-sweetened beverage product packaging among participants with varying characteristics, such as gender, age, economic status, education levels, and cultural differences. In conclusion, the paper urges stakeholders, particularly policymakers, to take heed of these research findings and use them effectively in developing and implementing appropriate policies.

CONCLUSION

This study aims to assess the effectiveness of warning labels on sugar-sweetened beverage packaging in terms of attention, risk perception, and purchase intention. The findings suggest a significant impact between the two compared labels. Visual warning labels significantly influence purchase intention, attention, and perceived risk compared to sugar content labels. Warnings and information disclosures can educate consumers about the risks and potential hazards associated with product use, thereby balancing the positive consequences originating from effective package design and other promotions. These findings can provide input for public health campaign strategies, academic research in policymaking, and marketing strategies aimed at reducing the consumption of sugary beverages and addressing related health issues. The results hold significant value for government authorities when formulating consumer protection policies to address the health risks associated with unhealthy products. The effectiveness of visual warning labels highlights their potential as a powerful tool for demarketing and public

health campaigns, specifically in reducing the consumption of sugary beverages. Such policies empower consumers to make informed choices based on information and have the potential to decrease the prevalence of sugary beverage consumption.

AUTHOR CONTRIBUTIONS

Conceptualization: Herry Novrianda, Faisal Muttaqin, Aan Shar.
 Data curation: Herry Novrianda, Faisal Muttaqin, Aan Shar.
 Formal analysis: Herry Novrianda, Faisal Muttaqin, Aan Shar.
 Investigation: Herry Novrianda, Faisal Muttaqin, Aan Shar.
 Methodology: Herry Novrianda, Faisal Muttaqin, Aan Shar.
 Project administration: Herry Novrianda, Faisal Muttaqin, Aan Shar.
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 Validation: Herry Novrianda, Faisal Muttaqin, Aan Shar.
 Visualization: Herry Novrianda.
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APPENDIX A

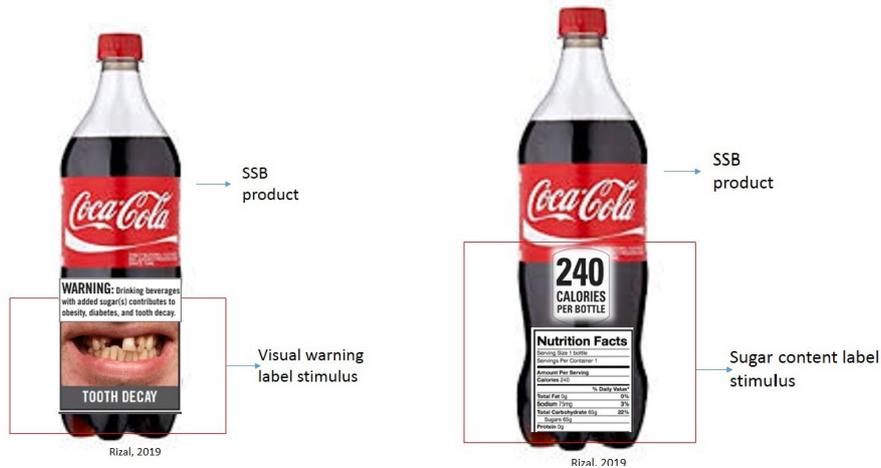


Figure A1. Experimental stimulus

Table A1. Research developments on health warning labels

Year/Author	Theme	Result
Clarke et al. (2023)	The impact of health warnings and calorie labels on the selection and purchase of alcoholic and non-alcoholic beverages. With experimental methods.	Warning labels are not effective in reducing the purchase of alcoholic drinks. Calorie label warnings are effective in reducing purchases of non-alcoholic drinks.
White-Barrow et al. (2023).	Effects of nutrition labels on comprehension and purchase intentions.	Influential labels increase the understanding and purchasing intentions of adult consumers
Bopape et al. (2022)	Effects of front-of-package labels of food products on identification of unhealthy products and intention to purchase the product.	Influential labels identify unhealthy food products and prevent the purchase of unhealthy food products.
Delnevo et al. (2021)	Experimental study of the effects of cigarette packaging characteristics on youth perceptions and adult intentions.	Warning labels influence negative perceptions and intentions.
Taillie et al. (2020)	Food labeling on purchase intention.	Food labeling is effective in reducing purchase intention.
Hall et al. (2022)	Effectiveness of pictorial health warnings on purchases of sugar-sweetened beverages for children.	Effectively influence purchasing in children.
Hall et al. (2023)	The effectiveness of pictorial health warnings on the purchase of sugar-sweetened beverage products among parents.	They are effectively influencing purchases by parents.
Kroker-Lobos et al. (2023)	Effectiveness of front-of-pack warning labels versus guidelines for daily amounts on health perceptions, purchase intentions, and understanding of nutritional content of food products.	Front-of-pack warning labels are influential compared to guidelines for daily amounts on health perceptions, purchase intentions, and understanding of the nutritional content of food products.
López-Olmedo et al. (2023)	Warning labels on alcoholic drinks.	Warning labels on alcoholic drinks effectively increase perceptions of health risks and purchase intentions.
Singh et al. (2022)	Effectiveness of front-pack warning labels for unhealthy food products.	Warning labels effectively influence consumers to identify unhealthy foods.
Zhang et al. (2023)	Testing consumer perceptions regarding the design of the warning label on the front of the product packaging.	Warning labels are effective in influencing consumers to choose healthier foods.
Roberto et al. (2016)	Warning labels on sugary drink products.	Warning labels effectively increase parents' understanding of the risks of consuming sugar-sweetened beverage products.
Uribe et al. (2020)	It is warning labels on food products classified as hedonic and utilitarian.	Warning labels are more effective on food products that are classified as utilitarian.
Ruopeng et al. (2021)	The impact of warning labels on consumer behavior.	Sugar-sweetened beverage product warning labels are effective in discouraging consumers from choosing them. Warning labels containing health effects indicate the most significant impact.

Table A1 (cont.). Research developments on health warning labels

Year/Author	Theme	Result
D'Angelo Campos et al. (2023)	Examining the impact of pictorial warning labels on parental purchases and perceptions of sugar-sweetened beverage categories.	Warning labels have heterogeneous effects across sugar-sweetened beverages product categories.
Davis and Burton (2019)	The counter-persuasive effect of natural labels on dangerous goods.	Natural labels effectively influence brand attitudes, purchase intentions, marketers' social responsibility perceptions, health misperceptions,
Aktan (2018)	The effectiveness of health warning labels on health and social risk beliefs.	This study explored the influence of HWL belief levels on individuals' perceived health and social risks associated with smoking.
Kim and Chua (2022)	Gender-specific health content illustrated warning labels: The moderating effects of threat level and gender.	There is a difference in the effectiveness of warning labels with health content images with the moderation of threat level and gender on personal relevance, attention, and intentions to purchase or avoid smoking.
Saaverda-Garcia et al. (2022)	An experimental study evaluating the effect of front-of-package warning labels on adolescents' purchase intentions of processed food products.	Front-of-package WL did not influence adolescent purchase intentions or identification of healthier products.
Prates et al. (2022)	The influence of nutrition claims on various front-of-package nutrition labeling models on supposedly healthy food packaging: Impact on understanding of nutritional information, health perceptions, and consumer purchase intentions.	The influence of nutrition claim labels is still unclear and varies on consumers' understanding, perception of health, and purchasing intentions.
Chudech and Janmaimool (2021)	The effectiveness of graphic warning labels on cigarette packages in increasing late adolescents' perceived fear of smoking-related dangers.	Effectively increases fear of the dangers of smoking.
Czaplicki et al. (2022)	Identifying credible sources of attribution for cigarette health warning labels in China: Using a cross-sectional survey of adults.	The message's source on the warning label comes from a health organization that is proven effective and credible.
Grummon et al. (2022)	Effect of sugary drink health warning labels on consumer reactions.	San Francisco's 2020 sugary drink warning labels could serve as a policy solution to inform consumers and encourage healthier beverage choices across demographic groups with diverse characteristics.
Caruso et al. (2023)	An experimental study comparing perceptions of two energy drink health warning labels.	Consumers of energy drinks consider health effect warning labels influential and accepted as an added benefit for them.
Nakkash et al. (2021)	New insights into the effectiveness of tobacco-specific pictorial health warning labels in Lebanon: Implications for tobacco control policy.	HWL health warning label describing oral cancer and dangers for babies was rated as the most effective by smokers and non-smokers
Nilsen et al. (2020)	The effect of cigarette packaging warning labels on health risk perceptions.	There is a difference in the influence of health warning labels on the perceived risk of consumers of Swedish cigarettes (snus) and regular cigarettes.