



Research report

Concrete images of the sugar content in sugar-sweetened beverages reduces attraction to and selection of these beverages



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ABSTRACT

In the present research, we offer a novel method for informing consumers about the sugar content in sugar-sweetened beverages (SSBs). With a series of experiments, we present evidence that this method curbs preference for SSBs and leads to more negative attitudes toward SSBs. We propose that people view SSBs more negatively and show less preference for SSBs when they are able to concretely visualize the quantity of sugar in SSBs. For example, we suggest that people might have more negative views toward the idea of consuming 28 sugar cubes (concrete information), compared to consuming “70g” of sugar (abstract information). Indeed, we found that, without any intervention, people struggle to convert sugar grams into a concrete, physical sugar representation (Experiment 1). But, when people are provided ways to convert abstract sugar-nutrition information into a concrete representation, they find SSBs less attractive (Experiment 2) and are less likely to select SSBs in favor of sugar-free beverage options (Experiments 3 and 4). These findings offer direct applications to the design of public-health messages and nutrition-education interventions. Such applications might benefit society in its battle with the obesity epidemic.

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Introduction

Recently, there has been a great deal of interest in making the nutritional content of food (e.g., nutrition labels) easier for consumers to understand (e.g., Cowburn & Stockley, 2005; George, 2014; Rothman et al., 2006; Scaperotti & De Leon, 2009; Silk et al., 2008). For example, there has been a push to promote attention to calorie information in food through the use of bold, large lettering (George, 2014), and some studies have shown that people are better at avoiding unhealthy foods when nutrition information is accompanied by color-coded heuristic cues (e.g., red = unhealthy; Balcombe, Fraser, & Di Falco, 2010; Hieke & Wilczynski, 2012). Presumably, if nutrition information were easier for consumers to understand, then consumers would be empowered to make healthful, wise consumption decisions. The present research explores a novel approach for increasing the comprehensibility of nutrition information. In particular, we explored the effects of making sugar information more visually concrete.

Specifically, we suggest that if people could concretely visualize the sugar content in sugar-sweetened beverages (SSBs), they might develop more negative attitudes toward and less prefer-

ence for SSBs. Presumably, when deciding whether to consume food, people first imagine what the consumption experience would be like (Papies, 2013). If this mental simulation is pleasant, the person will experience a stronger desire toward the food than if the mental simulation was unpleasant (Papies, 2013). Currently, the excessive sugar in SSBs is being conveyed via sugar-gram information on nutrition labels. This sugar-gram information may often fail to deter SSB consumption because it is difficult to imagine consuming, say, 70 g of sugar (i.e., a typical sugar amount for a 20 oz SSB). Indeed, because “70 g of sugar” fails to evoke any concrete sensations (image, taste, smell, texture, etc.), this information may often fail to elicit much of a response in the consumer. In contrast, sugar-content information could be expressed concretely to consumers as, for example, a photograph of 28 sugar cubes. While it is difficult to simulate the experience of consuming “70 g of sugar,” it is easier to imagine consuming 28 sugar cubes, and this latter simulation seems quite unappetizing. As such, in the present research, we offer a variety of tests of the idea that preference for SSBs can be curbed if people are provided with concrete (vs. abstract) sugar-content information. To be sure, prior research has identified numerous variables that relate to SSB consumption (Bere, Glomnes, Velde, & Klepp, 2007; De Coen et al., 2012; Forshee & Storey, 2003; Grimm, Harnack, & Story, 2004; Harnack, Stang, & Story, 1999; Hearst, Pasch, Fulkerson, & Lytle, 2009; Vereecken, Inchley, Subramanian, Hublet, & Maes, 2005; Zoellner et al., 2011), but manipulations designed to enhance

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the comprehensibility of sugar information have yet to be explored as a determinant of SSB attitudes and consumption decisions. The present research provides a start toward addressing this gap.

The present research seems broadly consistent with prior findings showing that food-consumption decisions can be influenced by the contextual features of a food display. For example, prior research shows that consumption decisions can be influenced by factors such as packaging (Balcombe et al., 2010; Hieke & Wilczynski, 2012; Peters-Teixeira & Badrie, 2005), food-container size (Wansink & Sobal, 2007), and the provision of concrete health-consequence information (Dowray, Swartz, Braxton, & Viera, 2013; Kees, Burton, Andrews, & Kozup, 2006; Witte & Allen, 2000). The present research builds on these findings by exploring whether food-consumption decisions can also be influenced by concrete displays of the nutritional ingredients in foods. Specifically, the current research tests the hypothesis that SSBs become less desirable when people are able to associate the excessive sugar content in SSBs with a concrete visual image. As some researchers have suggested that SSB consumption contribute to obesity and obesity-related diseases and mortality (Belpoggi et al., 2006; Johnson et al., 2007; Ludwig, Peterson, & Gortmaker, 2001; Schulze et al., 2004; for counter-evidence, see Forshee, Anderson, & Storey, 2008; Gibson, 2008), the present research may have important public-policy implications. Perhaps concrete reminders of sugar content on packaging would reduce preference for SSBs and, to the extent excessive refined sugar intake is harmful, help promote the health and well-being of citizens.

Overview of current experiments

We present four experiments to test different aspects of this hypothesis. First, in Experiment 1, we tested the hypothesis that people are generally poor at converting sugar grams into a concrete representation of sugar. Experiments 2 and 3 examined whether providing (vs. not providing) people with concrete representations of SSB sugar content would reduce the attractiveness of and selection of SSBs. Experiment 4 examined whether teaching people to convert abstract sugar quantities into concrete visual representations would subsequently decrease selection of SSBs.

Experiment 1

We think that people might be unaware of what the sugar content of an SSB actually *looks like*. To address this idea, participants were asked to estimate 69 grams of sugar (i.e., the amount of sugar in a 20 oz. Pepsi) by moving 69-grams of sugar from a container into a coffee filter. Some participants completed this task without additional information (*no-information condition*). To create a useful comparison condition, other participants were given information on how to translate 69 g into a concrete representation (1 sugar cube = 2.5 g of sugar; *education-information condition*); we suspected this information would reduce inaccuracy. If this hypothesis were supported, it would provide evidence that people are generally unable to relate abstract sugar quantities (i.e., 69 g) to concrete representations of these quantities (i.e., a physical amount of sugar).

Method

Participants

Forty-eight participants (28 males; 20 females)¹ were recruited from the campus center at the University of Alabama.

Participants' mean age was 30.0 ($SD = 1.79$). Participants were offered a snack as compensation.

Design

Participants were randomly assigned to one of two cells (education-information vs. no-information).

Procedure

Experimenters set up a table at 10:30 am on a weekday, and pedestrians were recruited to participate. After agreeing to participate in the study, participants were presented with a 20 oz bottle of Pepsi, and they were told, "This bottle of Pepsi contains 69 grams of sugar. We are interested to see if you can estimate 69 grams of sugar by moving 69-grams of sugar from this container onto this coffee filter." Prior to beginning this task, participants were randomly assigned to one of two different information conditions. Participants in the education-information condition were informed that there are 2.5 grams of sugar in a sugar cube, and they were provided with a calculator, a pencil, and some scrap paper (in case they wanted to make any grams-to-sugar-cubes conversion calculations during the task). Participants in the no-information condition were not provided with this information; instead, they proceeded immediately to the estimation task. Participants then moved sugar cubes from a large container (roughly 2 pounds of sugar) onto a coffee filter. After participants were done making their estimation of 69 grams of sugar, they were asked to provide their age and gender. After each participant was thanked and debriefed, experimenters weighed the coffee filter with the participant's estimate of 69 grams of sugar. Prior to analysis, an "inaccuracy" variable was created by taking the absolute value of the difference between 69g and the participants' estimate of 69 g. Hence, larger numbers indicate greater inaccuracy (and 0 indicates perfect accuracy).

Results and discussion

"Inaccuracy" was submitted to a one-way ANOVA with condition (no information vs. educational information) as the independent variable. Because Levene's test revealed that the variances in the two groups differed, $F(1, 46) = 4.04, p = .05$, we used Welch's test to account for this heterogeneity. This analysis revealed the predicted main effect of condition, $F(1, 26.52) = 16.69, p < .001$, such that inaccuracy was higher in the no-information condition ($M = 48.04, SD = 44.87$) than in the education-information condition ($M = 9.21, SD = 12.45$; see Fig. 1).² In other words, as we anticipated, without education, people were more inaccurate at converting sugar grams into physical amounts of sugar. Would people's consumer decisions (e.g., selection of SSBs vs. sugar-free alternatives) be more influenced by abstract sugar-content information if they were able to relate such information to representative concrete representations? This question is explored in Experiments 2–4.

Experiment 2

Perhaps if people could relate the sugar content in an SSB to a concrete representation (e.g., an image of this amount of sugar)

¹ Of note, gender did not vary significantly between conditions in any of the four present experiments ($ps > .05$). Also, gender failed to moderate any effects in the present experiments. Thus, gender will not be discussed further.

² Inspection of the individual scores revealed that the large variance in the no-information condition was driven by two highly inaccurate estimates ("inaccuracy" scores of 128 and 228). When these two extreme scores were excluded, the variances between the groups stabilized according to Levene's test, $F(1, 44) = 1.57, p > .20$, and the main effect of condition grew in significance according to an ANOVA, $F(1, 44) = 46.30, p < .001$.

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