The impact of nutrition labeling on consumer perceptions of wine

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Abstract

Purpose – The purpose of this study is to examine how consumers perceive nutrition labeling on wine and how this information impacts healthiness perceptions of wine.

Design/methodology/approach – A series of four experiments focused on healthiness perceptions and purchase likelihood.

Findings – Consumers who read wine labels rate wine as significantly less healthy. Sugar content affects healthiness perceptions of wine more than calories. Changing the serving size on the label moderates these effects. Consumers high in dietary restraint process this nutrition information differently.

Research limitations/implications – Future research could examine actual purchase behavior using retail data.

Practical implications – This study has implications for consumers, manufacturers and public policy. While currently most consumers are not motivated to read a nutrition label on wine, specific nutrition information can impact consumer perceptions of wine. Consumer education is recommended.

Originality/value – Research on nutrition labeling of alcohol specifically has been very limited.

Keywords Wine, Nutrition, Healthiness, Dietary restraint

Paper type Research paper

Introduction

While legislation requiring nutritional labeling on alcoholic beverages lags behind food labeling requirements, an e-label platform for wine and spirits, U-Label.com, was launched in 2021 in response to EU requirements, and industry analysts believe that the US alcohol industry may soon offer similar information transparency (Arthur, 2021). Alcohol manufacturers generally oppose this as bad for business, while the World Health Organization (2010) supports it as good for health.

Nevertheless, it is unclear how nutritional labeling on wine would affect consumer behavior. As nutritional information is still novel for wine labels, consumers may not expect to see it, and research shows that most consumers do not use this information when it is provided (Balasubramanian and Cole, 2002; Drichoutis *et al.*, 2008). If they do read nutrition information, then will their perceptions change, and if so, how? The current research explores these questions through the theory of disconfirmed expectations, based on an understanding that many consumers perceive wine as healthy, with implications for consumers, manufacturers and public policymakers.

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Theoretical background

As wine, particularly red, is typically perceived as "healthy" by most consumers, we expect nutrition label information to contrast prior beliefs when consumers pay attention to it. Disconfirmed expectations related to wine nutrition labeling may reduce healthiness perceptions of wine. The effect of nutrition information on consumer perceptions depends on the extent to which objective nutrition label information contradicts prior expectations (Van Raaij, 1991).

Consumers often rely on a simplifying heuristic to categorize food items along a virtues-vices continuum (Chernev and Gal, 2010; Wertenbroch, 1998). Virtues aid long-term health goals but often without immediate gratification. Vices are tasty and provide short-term enjoyment but are inconsistent with long-term health goals. The vice/virtue distinction is based on consumer perceptions, rather than actual nutrition information, so these categories can be cognitively malleable. The French Paradox and other lay theories have led most consumers to view wine as a heuristically healthy virtue.

A contrast effect (Anderson, 1973; Helson, 1964) is likely to occur when a wine evaluation contradicts a holistic "virtue" expectation through a presentation of the calories and/or sugar content of wine. Perceptions of the product will likely be worse than if no evaluation of the nutrition information occurred,

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because the disconfirmation of expectations usually leads to negative emotions or perceptions (Sherif and Hovland, 1961; Zeelenberg *et al.*, 2000).

Disconfirmed expectations occur only when information is made salient to consumers. Research shows only one-third of young adults frequently use nutrition facts to make food consumption decisions (Christoph *et al.*, 2018), a group that skews educated (Drichoutis *et al.*, 2008), highly involved in the product (Grunert *et al.*, 2018) and female, and the gender effect occurs with respect to both food (Drichoutis *et al.*, 2008) and alcoholic beverages (Annunziata *et al.*, 2016a; Thomson *et al.*, 2012). Consumers have difficulty understanding these labels (Patterson *et al.*, 2012) and are easily swayed by serving size manipulations (Mohr *et al.*, 2012).

Based on this discussion, we hypothesize:

H1. Information on a wine nutrition label will impact consumer perceptions when the nutrition label is salient.

Because alcohol is often associated with an unhealthy lifestyle, particularly when consumed in excess (Foster and Marriott, 2006), alcoholic beverages are generally considered vices without nutritional benefits. Nonetheless, wine is often associated with health benefits and is sometimes regarded as part of a healthy diet (Johansen *et al.*, 2006). Likewise, wine may be regarded as a transparent product because it requires only one ingredient – grapes; consumers may not feel a need for ingredient information. Wine also has fewer nutrients than packaged foods, so nutrition labels for wine may be less confusing. Conversely, with fewer indicators, nutrition labels may make wine appear less healthy than certain food items. Thus, there is likely some confusion about whether wine is a virtue or a vice.

Because consumers are not accustomed to seeing nutrition information on wine labels, they may not associate wine with calories, carbs and sugar, which would increase the likelihood of categorizing wine as more of a vice. Nutrition information is expected to disconfirm the heuristic expectation that wine is more of a virtue. Based on this discussion, we hypothesize:

H2. The salience of a nutrition label will reduce consumers' healthiness perceptions of wine and purchase likelihood.

Research related to portion sizes of food has shown a strong association between smaller serving sizes in nutrition labeling and enhanced healthiness perceptions because of lower counts of calories and other indicators perceived as "bad," such as fat and sugar (Chandon, 2013; Elshiewy *et al.*, 2016). When serving sizes are smaller for "healthier" snacks, consumers tend to have more accurate calorie expectations (Tangari *et al.*, 2019). Research on consumer awareness of alcohol guidelines found that drinkers do not know what constitutes a serving (Kerr and Stockwell, 2012; Martin-Moreno *et al.*, 2013). Bui *et al.* (2008) found that consumers' estimates of calories and nutritional indicators in alcoholic beverages had a great deal of variance, and consumers indicated low confidence in these estimates. Expectations that wine is relatively healthy should be less likely to be disconfirmed when serving sizes are smaller, as the associated calories and sugar content will be lower. Based on this discussion, we hypothesize:

H3. Larger serving sizes on nutrition labels attenuate healthiness perceptions of wine (because of increased calories and sugar content), while smaller serving sizes enhance healthiness perceptions of wine.

Consumers may experience more disconfirmed expectations related to sweet wine than dry wine because of its higher sugar content. Because a product evaluation based on a nutrition label is formed via non-sensory cues, the label creates an expectation of healthiness separate from consumption (e.g. taste). These non-sensory cues for products such as wine are more impactful than the sensory experience itself (Lange *et al.*, 2002). Based on this discussion, we hypothesize:

H4. Dry wines appear healthier than sweet wines.

Healthiness perceptions are impacted by how people approach eating. Restrained eaters regulate their dietary behaviors through cognitive self-regulation, rather than relying on physiological cues of satiation (Polivy and Herman, 1995). It may seem reasonable that restrained eaters are better at self-control than consumers who do not restrict their diets, but research has shown that restrained eaters' strategies often backfire.

Self-regulation is difficult, particularly over the long term. Consumers who are high in dietary restraint tend to have an unhealthy relationship with food (Herman and Polivy, 1980). Willpower becomes depleted to the point of undermining the very behavior individuals are attempting to avoid (Hofmann *et al.*, 2007; Vohs and Heatherton, 2000). High dietary restraint and increased alcohol consumption have a positive correlation (Stewart *et al.*, 2000; Xinaris and Boland, 1990). Because restrained eaters are more likely to consume alcohol, they may also have a stronger belief that wine is healthy. Research has shown that people who are dieting are more likely to categorize using a vice/virtue dichotomy (Chernev, 2011; Scott *et al.*, 2008). We predict that consumers who are high in self-reported dietary restraint will perceive wine as healthier than those consumers who are low in dietary restraint:

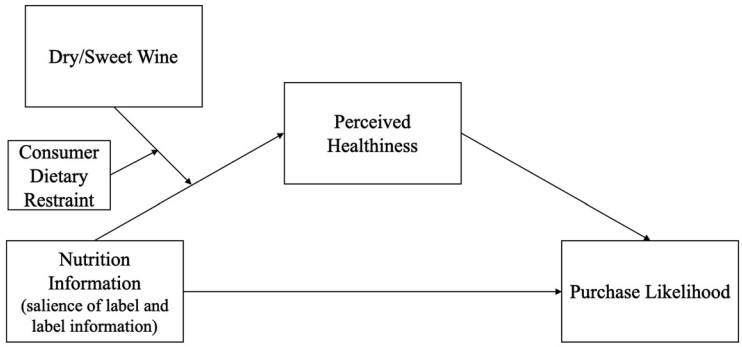
H5. Dietary restraint enhances healthiness perceptions such that consumers who describe themselves as having chronic dieting behavior are more likely to rate wine as healthier when they are focusing on calorie information, regardless of whether it is dry or sweet.

Our conceptual model (Figure 1) tests how wine nutrition labels can impact purchase likelihood. We predict that healthiness perceptions will mediate this effect such that as nutrition information become salient, healthiness perceptions and purchase likelihood will significantly decrease because of disconfirmed expectations.

Experiment 1: Wine nutrition label salience decreases healthiness perceptions and purchase likelihood

Experiment 1 examines whether asking consumers questions about a nutrition facts panel on a bottle of wine, making it salient, will affect their healthiness perceptions and purchase likelihood.

Figure 1 Conceptual model



Source: Authors

Method

Using Amazon Mechanical Turk, we recruited 184 adults of legal drinking age (38% female and M_{age} = 37). They were randomly assigned to one of three conditions in a between-subjects design:

1 no nutrition facts panel shown;
2 nutrition facts panel and questions about the label; and
3 a nutrition facts panel without questions.

Participants in all three conditions saw the back label of a bottle of Stella Rosa Moscato D'Asti white wine. Participants in condition 2 were first asked to indicate how many calories and how many grams of sugar this wine has per serving.

All participants were asked to indicate perceived healthiness of the wine (Higgins and Llanos, 2015; Saliba and Moran, 2010) and their purchase likelihood (Areni, 1999). They also responded to four questions related to nutrition knowledge (Higgins and Llanos, 2015; Hussain *et al.*, 2007), which we combined into a nutrition knowledge index, and two questions related to wine knowledge, which we combined into a wine knowledge index. For the nutrition knowledge index, three items were recorded on a seven-point scale and one on a five-point scale, so we also calculated a mean-centered (Iacobucci *et al.*, 2016) nutrition index.

We also asked participants to indicate whether they prefer semi-dry, dry, semi-sweet or sweet wine (Dodd *et al.*, 2010; see Appendix for measures used in all studies); which type of wine they consume most often (red, white or rosé); and whether they had heard of Stella Rosa wine before taking this survey (yes/no). If yes, then we asked whether they had tried Stella Rosa wine (yes, no and not sure).

Results

A one-way ANOVA revealed a significant effect of condition on healthiness perceptions [$F(2, 180) = 3.89$, $p < 0.05$ and $\eta^2 = 0.04$]. Participants rated the wine as significantly less healthy in condition 2 (M = 4.12 and SD = 1.65) than condition 1 (M = 4.87, SD = 1.40, $t(120) = 2.73$, $p < 0.01$ and Cohen's d = 0.49). However, there was no significant difference between condition 1 (M = 4.59 and SD = 1.46) and condition 3 [M = 4.87, $t(122) = 1.10$ and $p = 0.27$], indicating that consumers in condition 3 did not read the nutrition facts panel.

Another one-way ANOVA indicated that condition had a significant effect on purchase likelihood [$F(2, 180) = 3.59$, $p < 0.05$ and $\eta^2 = 0.04$]. Purchase likelihood was lower in condition 2 (M = 4.45 and SD = 1.72) than in condition 1 (M = 5.05, SD = 1.44, $t(119) = 2.08$, $p < 0.05$ and Cohen's d = 0.38). Once again, condition 1 (M = 5.16 and SD = 1.52) was not significantly different from condition 3 (M = 5.05, $t(123) = -0.43$ and $p = 0.67$; Figure 2).

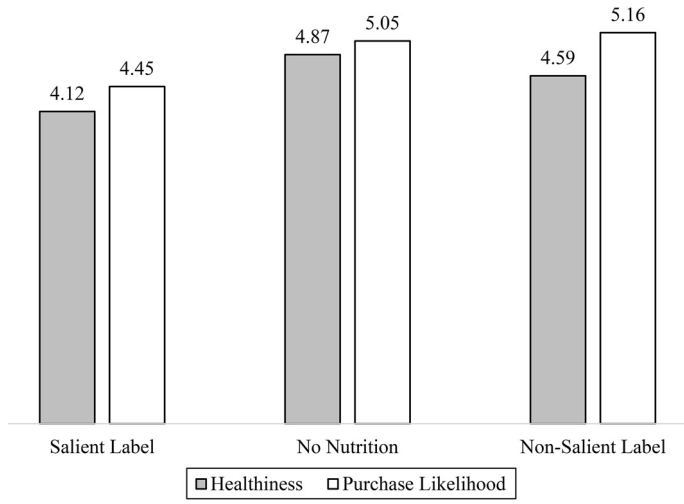
Higher nutrition knowledge ($\beta = 0.44$ and $p < 0.001$) [including mean-centered nutrition knowledge ($\beta = 0.42$ and $p < 0.001$)], higher wine knowledge ($\beta = 0.62$ and $p < 0.001$), frequency of wine consumption ($\beta = 0.20$ and $p < 0.001$) and older age ($\beta = 0.03$ and $p < 0.01$) all had a positive association with healthiness perceptions. Higher nutrition knowledge ($\beta = 0.36$ and $p < 0.01$) [including mean-centered nutrition knowledge ($\beta = 0.35$ and $p < 0.01$)], wine knowledge ($\beta = 0.76$ and $p < 0.001$), greater frequency of wine consumption ($\beta = 0.32$ and $p < 0.001$) and older age ($\beta = 0.02$ and $p < 0.05$) had a positive association with purchase likelihood.

In line with our predictions, a mediation model (Preacher and Hayes, 2004; Process Model 4) showed that healthiness perceptions mediated the relationship between reading a nutrition label (salience: yes/no) and purchase likelihood. Reading the nutrition label as compared to the other two conditions combined significantly lowered healthiness ratings of the wine ($\beta = -0.75$ and $p < 0.01$), which in turn lowered purchase likelihood ($\beta = 0.65$ and $p < 0.001$). The total effect of reading a nutrition label on purchase likelihood was significant ($\beta = -0.58$ and $p < 0.05$) except when controlling for healthiness perceptions ($\beta = -0.09$ and $p = 0.69$). The bootstrap results based on 5,000 re-samples indicated that the 95% confidence interval for the indirect effect did not include zero [−0.85, −0.12], confirming healthiness perceptions mediate the effect of reading a nutrition label on purchase likelihood.

Experiment 2: Reading a wine nutrition label induces uncertainty about sugar content

The first study used a white wine as the stimuli. Generally, consumers perceive red wines as healthier than white wines (Chang *et al.*, 2016). Therefore, Experiment 2 examines whether asking consumers to read a nutrition facts panel on a bottle of red wine would shift healthiness perceptions. This study also tests how accurate consumers are in their estimates of calorie content and sugar content and to what extent violated

Figure 2 Label salience impacts healthiness perceptions and purchase likelihood (Experiment 1)



Source: Authors

expectations related to these two key nutritional indicators impact healthiness perceptions.

Method

We recruited 121 adult participants of legal drinking age in the USA (41% female and M_{age} = 39) from Amazon Mechanical Turk and randomly assigned them to one of two conditions in a mixed design with a between-subjects factor: a no nutrition facts panel shown condition, and an estimation condition. Participants in both conditions saw the back label of a bottle of Stella Rosso semi-sweet red wine. Because Experiment 1 established that the nutrition-only and no-nutrition condition do not differ, Experiment 2 lacks a nutrition-only condition.

First, we asked participants in both conditions to indicate healthiness of red wine: "In general, how healthy do you think red wine is?" on a seven-point scale where 1 = "extremely unhealthy" and 7 = "extremely healthy" (Chang *et al.*, 2016). In the estimation condition, participants saw the label with no nutrition facts, were asked to estimate calorie and sugar content and then saw the label with the nutrition facts panel. We then asked them how much the calorie content and sugar content them, from 1 = "extremely unsurprised" and 7 = "extremely surprised." Next, the four-question nutrition knowledge index and two-question wine knowledge index were applied.

Also using the same questions as in Experiment 1, we asked participants to indicate their frequency of and preferences for wine consumption (Appendix). We then repeated the healthiness question from the beginning of the study, "Now, in general, how healthy do you think red wine is?" We calculated a percentage difference between the first healthiness rating and this second rating to use in the analysis.

Results

A one-way ANOVA indicated significant differences in healthiness perceptions of this particular bottle of wine between conditions [$F(1, 119) = 5.91$, $p < 0.05$ and $\eta^2 = 0.05$)]. The wine was perceived to be significantly less healthy in the estimation condition (M = 4.53 and SD = 1.67) than in the no-nutrition condition (M = 5.16 and SD = 1.12).

We calculated an estimation accuracy score by subtracting the actual sugar grams and calories from the provided estimates for those participants in the estimation condition. The accuracy score for sugar content was significantly correlated with healthiness perceptions ($r = 0.33$ and $p < 0.01$), but the accuracy score for calories was not ($r = -0.08$ and $p < 0.57$). These results show that accuracy in estimating sugar content was more impactful than estimates of calories in shifting healthiness perceptions of the wine.

An independent-samples *t*-test revealed that the percentage difference in healthiness ratings of red wine dropped significantly more in the estimation condition (M = −0.13 and SD = 0.37) than the no-nutrition condition [M = −0.04, *SD* = 0.17, $t(119) = 1.80$, $p < 0.05$ and Cohen's $d = 0.33$]. That is, reading the nutrition label reduced their healthiness perceptions of both this bottle of red wine and of red wine in general. Healthiness perceptions of red wine were relatively high at time 1. One-sample *t*-tests revealed that the time 1 rating was significantly higher than 4, the mid-point of the scale [M = 5.35, SD = 1.06, $t(120) = 13.95$ and $p < 0.001$]. The rating also remained relatively high at time 2 [M = 5.15, SD = 1.23, $t(120) = 10.28$ and $p < 0.001$].

Higher nutrition knowledge ($\beta = 0.40$ and $p < 0.001$) [including mean-centered nutrition knowledge ($\beta = 0.39$ and $p < 0.001$)], higher wine knowledge ($\beta = 0.64$ and $p < 0.001$) and familiarity with the brand ($\beta = 0.63$ and $p < 0.05$) had a significantly positive association with healthiness perceptions.

Experiment 3: Serving size moderates healthiness perceptions

A standard unit pour is 5 oz, but 8 oz are more commonly consumed at once. Experiment 3 tests the impact of serving size and the associated calories and sugar content on perceptions of healthiness and purchase likelihood.

Method

In all, 240 adult participants of legal drinking age (48% female and M_{age} = 41) were recruited from Amazon Mechanical Turk and randomly assigned to one of four conditions in a 2 (5 oz vs 8 oz) × 2 (cal vs g of sugar) between-subjects design. In the 5-oz conditions, participants saw a written description of red wine with a serving size of 5 oz, 119 cal or 17 g of sugar. In the 8-oz conditions, participants saw a description of red wine with a serving size of 8 oz, 190 cal or 27 g of sugar.

Like the previous study, participants in both conditions were asked first and last how health they think wine is from extremely unhealthy (1) to extremely healthy (7), and the nutrition knowledge index, wine knowledge index and frequency of and preferences for wine consumption were the same.

Results

Two-way ANOVAs with 2 (5 oz vs 8 oz) × 2 (cal vs g of sugar) as the independent factors were used to examine differences in healthiness perceptions and difference in purchase likelihood among the four conditions. As to healthiness perceptions, calories vs sugar has a significant main effect [$F(1, 236) = 34.59$, $p < 0.001$ and $\eta_p^2 = 0.13$] but serving size had no effect [$F(1, 236) = 1.58$ and $p = 0.21$], and there was no significant interaction [$F(1, 236) = 1.28$ and $p = 0.26$]. Post hoc tests showed that participants viewed the wine as least healthy in the 8 oz/sugar condition (M = 3.38 and SD = 1.50).

As to purchase likelihood, calories vs sugar had a significant main effect on purchase likelihood [$F(1, 236) = 16.29$, $p < 0.001$ and $\eta_p^2 = 0.07$], as did serving size, albeit marginal [$F(1, 236) = 3.78$, $p = 0.05$ and $\eta_p^2 = 0.02$]. There was again no significant interaction [$F(1, 236) = 1.12$ and $p = 0.29$]. Participants were least likely to purchase the wine in the 8 oz/sugar condition (M = 3.43 and SD = 1.59; Figure 3).

A repeated-measures t-test demonstrated that participants' overall evaluations of red wine healthiness decreased significantly from time 1 (M = 4.90 and SD = 1.22) to time 2 [M = 4.54, SD = 1.34, $t(239) = 6.55$, $p < 0.001$ and Cohen's $d = 0.42$], although this shift did not vary significantly by condition [$F(3, 236) = 1.87$ and $p = 0.14$]. Like the previous study, healthiness perceptions of red wine were relatively high at time 1. One-sample t-tests revealed that the time 1 rating was significantly higher than 4, the mid-point of the scale [$t(239) = 11.46$ and $p < 0.001$]. The rating also remained relatively high at time 2 [$t(239) = 6.23$ and $p < 0.001$].

Higher wine knowledge ($\beta = 0.546$ and $p < 0.01$), greater frequency of wine consumption ($\beta = 0.18$ and $p = 0.001$) and older age ($\beta = 0.02$ and $p < 0.01$) each had a significant association with healthiness perceptions. Higher wine knowledge ($\beta = 0.60$ and $p < 0.001$) and greater frequency of wine consumption ($\beta = 0.29$ and $p < 0.001$) each had a significantly positive association with purchase likelihood.

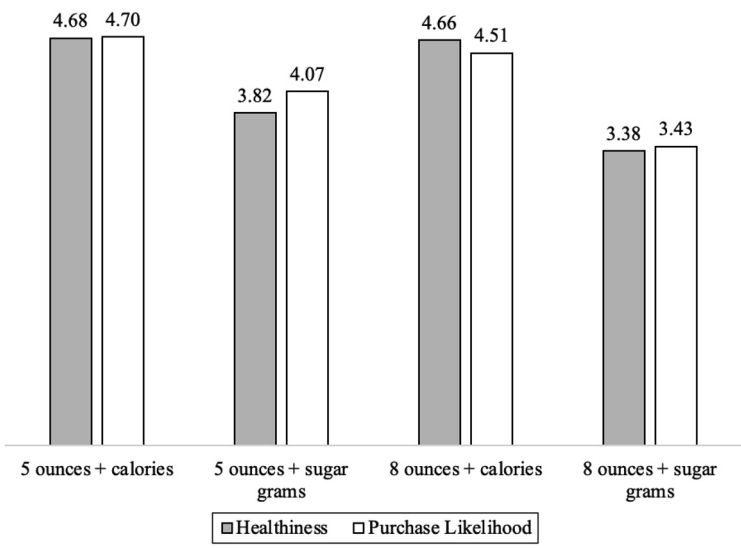
Experiment 4: Dietary restraint moderates healthiness perceptions

We predict that consumers who are higher in dietary restraint may perceive wine to be healthier to justify increased alcohol consumption relative to non-dieters and that a dry wine, which has fewer calories and less sugar than a sweeter wine, should appear healthier than a sweet wine. We predict that dietary restraint will moderate these perceptions such that consumers who are chronically dieting perceive both wines as significantly healthier when they are viewing calories (as chronic dieters tend to focus primarily on calories).

Method

Amazon Mechanical Turk provided 240 adult, legal drinking-age US participants (48% female and M_{age} = 40). We randomly assigned them to one of four conditions in a 2 (dry vs sweet) × 2 (cal vs g of sugar) between-subjects design. In this study, we held serving size constant at 8 oz. In the dry wine conditions, participants saw a written description of white wine with a serving size of 8 oz, 176 cal or 0 g of sugar with the following description:

Figure 3 Serving size moderates healthiness perceptions and purchase likelihood (Experiment 3)



Source: Authors

White Wine (Brut)

A dry and effervescent sparkling wine with notes of lemon, elderflower, and bergamot.

In the sweet wine conditions, participants saw a description of white wine with a serving size of 8 oz, 197 cal or 28 g of sugar. Participants viewed the following description of the same wine that participants viewed in Experiment 1:

White Wine (Moscato d'Asti)

A sweet and effervescent white wine with notes of pear and apple.

The wine descriptions simulated what would appear on a wine label while being as consistent as possible. All participants were asked to indicate perceived healthiness of the wine. Participants then indicated their purchase likelihood (Appendix A).

Next, participants responded to four questions taken from the cognitive restraint subscale of the revised three-factor eating questionnaire (Banna *et al.*, 2018): Please indicate your level of agreement with the following statements: 1. I consciously hold back at meals to not to gain weight. 2. I do not eat some foods because they make me fat. Both questions were recorded on a seven-point scale where 1 = "strongly disagree" and 7 = "strongly agree." 3. How frequently do you avoid "stocking up" on tempting foods? This question was recorded on a five-point scale where 1 = "never" and 5 = "always." 4. How likely are you to consciously eat less than you want? This question was recorded on a seven-point scale where 1 = "extremely unlikely" and 7 = "extremely likely." As with the nutrition index, we calculated a mean-centered (Iacobucci *et al.*, 2016) index.

The nutrition knowledge index, wine knowledge index and frequency of and preferences for wine consumption (Appendix A) questions were the same as in earlier experiments. Then we asked whether they prefer semi-dry, dry, semi-sweet or sweet wine. We also asked which type of wine they consume most often (red, white or rosé).

Results

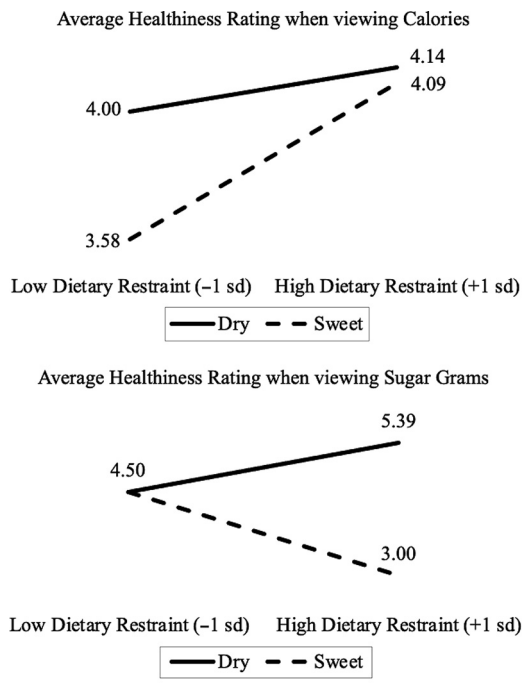
We analyzed the 2 (dry vs sweet) × 2 (cal vs g of sugar) interaction on healthiness perceptions using Process Model 1 (Hayes, 2018). The overall model was significant [$F(3, 236) = 23.12$, $p < 0.001$ and $R^2 = 0.23$]. The main effect of dry versus sweet was significant [$\beta = 1.96$, $t(236) = 3.48$ and $p < 0.001$]. The main effect of calories versus sugar was significant [$\beta = 3.02$, $t(236) = 5.37$ and $p < 0.001$]. The interaction was also significant [$\beta = -2.04$, $t(236) = -5.70$ and $p < 0.001$]. The conditional effect for dry/sweet predicting healthiness perceptions was significant in the sugar condition [$\beta = -2.12$, $t(236) = -8.32$ and $p < 0.001$], whereas the conditional effect for dry/sweet predicting healthiness perceptions was not significant in the calories condition [$\beta = -0.08$, $t(236) = -0.33$ and $p = 0.74$].

Next, we analyzed the 2 (dry vs sweet) × 2 (cal vs g of sugar) interaction on purchase likelihood using Process Model 1 (Hayes, 2018). The overall model was significant [$F(3, 236) = 3.63$, $p < 0.05$ and $R^2 = 0.04$]. The main effect of dry versus sweet was not significant [$\beta = 0.91$, $t(236) = 1.31$ and $p = 0.19$]. The main effect of calories versus sugar was not significant [$\beta = 0.89$, $t(236) = 1.27$ and $p = 0.20$]. The interaction was significant [$\beta = -0.88$, $t(236) = -1.99$ and $p < 0.05$]. The conditional effect for dry/sweet predicting purchase likelihood was significant in the sugar condition [$\beta = -0.85$, $t(236) = -2.68$ and $p < 0.01$], whereas the conditional effect for dry/sweet predicting purchase likelihood was not significant in the calories condition [$\beta = 0.03$, $t(236) = 0.11$ and $p = 0.91$].

Because we are theoretically interested in low versus high dietary restraint, we used the average of the four cognitive restraint items to calculate a cognitive restraint index. We then split the index data into two groups: those participants who were −1 SD from the average (low restraint) and those participants who were +1 SD from the average (high restraint). We analyzed the three-way interaction using Process Model 3 (Hayes, 2018). The overall model was significant [$F(7, 76) = 2.34$, $p < 0.05$ and $R^2 = 0.17$], and there was a significant 2 (low vs high restraint) × 2 (dry vs sweet) × 2 (cal vs g of sugar) interaction [$\beta = -2.75$, $t(76) = -1.98$ and $p < 0.05$]. When participants were shown only calories, low restraint consumers rated the sweet wine as significantly less healthy (M = 3.58) than the dry wine (M = 4.00), but high restraint consumers rated both wines as relatively healthy ($M_{dry} = 4.14$ and $M_{sweet} = 4.09$). Conversely, when participants were shown only sugar, low restraint consumers rated both wines as equally healthy ($M_{dry} = 4.50$ and $M_{sweet} = 4.50$), but high restraint consumers rated the sweet wine as significantly less healthy (M = 3.00) than the dry wine (M = 5.38; Figure 4).

To decompose this interaction, we used the Johnson–Neyman technique (Johnson and Neyman, 1936; Spiller *et al.*, 2013) to identify the ranges of dietary restraint for which the conditional effects of calories/sugar were significant for both dry wines and sweet wines. For dry wines, when dietary restraint is greater than $\mathcal{J}N = 2.13$, the slope of calories/sugar is $p < 0.05$. A simple slopes analysis revealed that the slope of calories/sugar when dietary restraint is 2.50 (−1 SD) is $\beta = 0.80$ ($t = 2.38$ and

Figure 4 Dietary restraint moderates healthiness perceptions (Experiment 4)



Source: Authors

$p = 0.02$). The slope of calories/sugar when dietary restraint is 3.85 (mean) is $\beta = 0.98$ ($t = 3.97$ and $p < 0.001$). Finally, the slope of calories/sugar when dietary restraint is 5.20 (+1 SD) is $\beta = 1.17$ ($t = 3.37$ and $p < 0.001$). Thus, dry wines appear healthier when consumers who have at least a minimal level of dietary restraint (less than −1 SD) are more focused on sugar content than calories. Conversely, for sweet wines, when dietary restraint is greater than $\bar{X}N = 2.88$, the slope of calories/sugar is $p < 0.05$. A simple slopes analysis revealed that the slope of calories/sugar when dietary restraint is 2.50 (−1 SD) is $\beta = -0.50$ ($t = -1.28$ and $p = 0.20$). The slope of calories/sugar when dietary restraint is 3.85 (mean) is $\beta = -1.05$ ($t = -4.20$ and $p < 0.001$). Finally, the slope of calories/sugar when dietary restraint is 5.20 (+1 SD) is $\beta = -1.61$ ($t = -4.41$ and $p < 0.001$). Thus, sweet wines appear significantly less healthy when consumers who have some dietary restraint (greater than −1 SD) are more focused on sugar content than calories, whereas those consumers who are high in dietary restraint (+1 SD) rate sweet wine significantly healthier when they are more focused on calories rather than sugar content.

General discussion

A series of four experimental studies showed that nutrition labeling shifts healthiness perceptions and purchase likelihood of wine, but only among consumers who are prompted to read the labels. Experiment 1 showed that consumers prompted to read the nutrition label view white wine as significantly less healthy and are significantly less likely to purchase it. Consumers who were not prompted to read the label did not rate the wine differently from those who were not provided a nutrition label. Study 1 also showed that healthiness perceptions fully mediate the relationship between reading a label (or not) and purchase likelihood. Experiment 2 replicated the results of the first study with red wine and further demonstrated that the sugar content of wine, but not the number of calories per serving, tends to surprise consumers. Experiment 3 showed that altering the serving size on the label can moderate these effects, such that a larger serving size and its associated sugar content can significantly lower both healthiness perceptions and purchase likelihood. This was a rather conservative between-subjects test; we would expect these results to be stronger in a within-subject design where participants could see both sets of information. This study has implications for public policy as to serving size on wine bottle nutrition labels. Experiment 4 examined another moderator of these effects and found that consumers who are focused on calorie information and are high in dietary restraint are more likely to rate wine as healthier than consumers who are low in dietary restraint.

Theoretical contributions

This research contributes to the literature on nutrition labeling, dietary restraint and wine marketing. The findings support the theory of disconfirmation of expectations related to nutrition information in the wine category by showing that wine nutrition labeling reduces healthiness perceptions of wine. When they are prompted to use the information on nutrition labels, the sugar content surprises consumers more than the caloric content. However, they are generally not motivated to read or use this information.

Reducing the serving size to 5 oz attenuates this effect. Additionally, dry wines appear healthier than sweet wines because of lower sugar content. Counterintuitively, restrained eaters are more likely to rate wine as healthier, regardless of whether it is dry or sweet, when they are focused on calories. We argue that these consumers tend to believe in the health benefits of wine and therefore drink more of it than their peers (Annunziata *et al.*, 2016b; Chang *et al.*, 2016). They may want to justify their increased consumption by viewing wine as being particularly healthy, and nutrition information may be insufficient to affect their assumptions. This may be especially true for red wine, which the media has touted as having the most health benefits. Thus, we add to the literature on restrained eating to show that nutrition information may disrupt the general pattern of wine consumption among restrained eaters just as it disrupts their food consumption.

Practical implications

Our research shows that when consumers do read wine labels, they are concerned about sugar levels. It suggests that to aid customers with more informed purchasing decisions, wine companies can publish the grams of sugar per standard unit pour, as well as produce wine with lower sugar content. This information is crucial for health-conscious wine consumers who are avoiding sugar.

Additionally, our findings show that nutrition information labeling may function as a self-restraint aid, but only for those who are prompted to read and use this information in their decision-making and who are not restrained eaters. Assuming that a large portion of the 72% of adult Americans who are currently overweight or obese are restrained eaters (CDC, 2021), our findings suggest these are the very consumers who will be swayed in the wrong direction to consume more alcohol if nutrition labels are eventually required in the marketplace.

Participants in our studies had significantly different perceptions of wine nutrition labeling based on the serving size. Serving size reminders as label indicators should be clear and unambiguous, as our findings show that the information must be made salient, and wine tends to be enjoyed more when labels are easy to read (Gmuer *et al.*, 2015).

For the wine trade, this research has implications for identifying and targeting certain consumer segments. Across our studies, we show that wine and nutrition knowledge, as well as frequency of wine consumption do not significantly moderate the effects of nutrition labels on healthiness perceptions or purchase likelihood. Nevertheless, these variables had significant main effects, independent of any possible nutrition labeling. This indicates that wine marketers can continue to reach to more informed and more frequent consumers, for example, by continuing to emphasize the hedonic aspects of wine consumption.

For now, wine producers can take comfort in knowing that unless consumers are on a diet or they are paying closer attention to a nutrition label, most of them are not motivated to read a wine nutrition label. However, evidence from the industry suggests that this is likely to change soon. Thus, the wine trade needs to be ready for more transparency regarding nutritional information. Wine manufacturers can lobby for standard unit pours instead of the more commonly used pour

to be used on the nutrition labels, which would help temper unhealthiness perceptions.

This research provides additional implications for packaging types and sizes. Previous studies have shown that partitioned packages can have an influence on both intended and actual food consumption (Bui *et al.*, 2017). Thus, wine manufacturers may consider providing consumers with smaller and/or portioned containers (e.g. producing smaller "half" bottles and/or boxed wine with multiple smaller bags-in-boxes). This type of packaging may help consumers regulate their consumption.

For public policymakers, we show that, like food, nutrition information on wine labels may need to be simplified. For example, policy might require a traffic light label for calories (high, medium and low) or revised holistic nutritional NuVal score (0–100). In this respect, recent digital labeling efforts seem to effectively respond to consumer expectations for clear labeling, by boosting comprehensive nutritional information about alcohol beverages. Digital labeling also avoids dramatically changing the appearance of the packaging. Public policymakers need to coordinate with producers to find cost-effective ways to provide nutrition information to consumers who are interested. In particular, mandatory labeling may not be feasible for smaller producers unless this information can be provided online rather than printed on the label. Public policymakers may instead wish to focus their attention on regulating the use of simple front-of-bottle cues such as "organic," "biodynamic" or "sustainably produced." These cues should ideally only be used when they objectively map onto healthiness.

This research supports the theory of disconfirmed expectations by demonstrating that because consumers believe media reports on the healthiness of wine, information about the calorie and sugar content defies their expectations. At the same time, the industry needs to be prepared for the forthcoming changes in wine labeling where disclosing nutrition information may soon become mandatory. Consumer education regarding nutrition and ingredients may increase the expectation of seeing this information on wine labels. As consumers become more familiar with this information, it is possible that their perceptions of wine healthiness will become more in line with their expectations over time. The wine sector can continue to work on creating a fair and transparent environment by allowing consumers to have access to relevant information on the products they wish to buy.

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Appendix

Table A1 Measures

Measure/Questions	Scale anchors	Experiment 1	Experiment 2	Experiment 3	Experiment 4
Perceived healthiness		√	√	√	√
How healthy do you think this wine is?	1 = extremely unhealthy | 7 = extremely healthy				
Purchase likelihood		√	√		√
How likely would you be to purchase this wine?	1 = extremely unlikely | 7 = extremely likely				
Nutrition knowledge					
How often do you read nutrition labels?	1 = never | 7 = daily	√			√
How often do you read about nutrition and diet online?	1 = never | 7 = daily	√			√
How knowledgeable are you about nutrition?	1 = not knowledgeable | 5 = extremely	√			√
How would you rate your knowledge about nutrition, compared to the average person?	1 = far below average | 7 = far above average	√			√
Wine knowledge					
How would you describe your level of wine knowledge?	1 = no prior knowledge | 4 = advanced knowledge	√			√
Compared to others you know, how knowledgeable are you about different types of wine in the market?	1 = not knowledgeable at all | 5 = extremely knowledgeable	√			√
Frequency of and preferences for wine consumption					
How often do you consume wine (both at home and while dining out)?	1 = I do not drink wine | 8 = every day	√			√
Do you prefer wine that is dry or sweet?	semi-dry| dry | semi-sweet | sweet wine	√			√
Which type of wine do you consume most often?	red | white | rosé	√			√
Have you heard of Stella Rosa wine before taking this survey?	yes | no	√			
Have you ever tried Stella Rosa wine before?	yes | no | not sure	√			
Healthiness perception					
In general, how healthy do you think red wine is?	1 = extremely unhealthy | 7 = extremely healthy		√	√	
How surprised were you by the calorie content and sugar?	1 = extremely unsurprised | 7 = extremely surprised		√		
Now, in general, how healthy do you think red wine is?	1 = extremely unhealthy | 7 = extremely healthy		√	√	
Dietary restraint					
I consciously hold back at meals to not to gain weight	1 = strongly disagree | 7 = strongly agree				√
I do not eat some foods because they make me fat	1 = strongly disagree | 7 = strongly agree				√
How frequently do you avoid "stocking up" on tempting foods?	1 = never | 5 = always				√
How likely are you to consciously eat less than you want?	1 = extremely unlikely | 7 = extremely likely				√

Source: Credit: Authors

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