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The Impact of Wine Nutrition and Ingredient Labeling on Consumers' Attitudes and Purchase
Intentions

by

Kara Ashley Tate

A thesis submitted to the faculty of The University of Mississippi in partial fulfillment of the
requirements of the Sally McDonnell Barksdale Honors College

Oxford April 2021

Approved by

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ABSTRACT

KARA ASHLEY TATE: The Impact of Wine Nutrition and Ingredient Labeling on Consumers' Attitudes and Purchase Intentions

(Under the direction of Dr. Laurie Babin)

Current TTB regulations do not require that US wine producers display nutrition and ingredient labeling on their wine labels. However, recent attempts at passing legislation to mandate that such information be provided on labels in the EU suggests that US policy makers will soon follow suit. Research on how this addition would impact consumers has been scarce and has been primarily conducted in Europe, but what is available suggests that consumers are unaware of the nutritional values in a glass of wine and many do not look at the back label when selecting a bottle to purchase. We conducted a study that examined consumers' attitudes and purchase intentions towards ingredient and nutrition labeling on wine. Our findings indicated that the exposure to nutrition and ingredient labeling or the absence of it yielded no statistically significant difference between consumers' attitudes towards the label, wine, and intentions to purchase. This implies an apparent apathy towards whether or not wine labels display nutritional and ingredient information. An analysis of participants' objective wine knowledge found that consumers with high wine knowledge were more positive about the label and were more likely to purchase the wine that provides ingredient information.

Acknowledgements:

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1. Introduction

Nearly every product intended for consumption features labels informing buyers of nutrition facts such as caloric content, sodium, and sugars, as well as a list of the ingredients that comprise the product. This is due to regulations implemented by the Food and Drug Administration (FDA) that require nutrition and ingredient information be listed on products to allow consumers to make informed decisions about what they choose to put into their bodies. Alcoholic beverages such as wine, beer, and liquor are exempt from this rule because they are regulated by the Alcohol and Tobacco Tax and Trade Bureau (TTB) rather than the FDA. Health officials and consumer advocates have expressed concern that the absence of such information on alcoholic beverages can lead consumers to drink an excessive amount of calories (Stromberg, 2014). In contrast, alcohol groups argue that providing nutrition facts would lead consumers to erroneously believe that alcoholic beverages are nutritious, thereby increasing overconsumption (Thomson, 2017). Several proposals and petitions have been submitted to the TTB to require a fixed “alcohol facts” label on beer, wine, and liquor (*"Alcohol Facts" Label Proposed For Beer, Wine, and Liquor* 2016). Although none of these proposals have been implemented, the US should anticipate further pressure from alcohol groups and consumers to necessitate transparency about nutrition and ingredients should countries, such as those in the European Union (EU) begin requiring labeling on their alcoholic beverages.

The purpose of this paper is to explore the impact of wine nutrition and ingredient labeling on consumers’ attitudes and purchase intentions. It will begin with a review of the literature, including a reflection of previous studies related to this issue, an examination of current labeling regulations in both the European Union and the United States, and both consumer and producer interest in mandatory labeling regulations. Next, the paper will provide

an overview of the methodological design used to conduct an empirical study that had the purpose of answering our research questions. The third section of the paper is an analysis of the survey's results, while the fourth section provides a discussion of the results, as well as limitations to this paper. It concludes with a highlight of major implications.

2. Literature Review

2.1 Current Regulations in the United States

Currently, the TTB only requires wine labels to provide brand name, bottler name and address, varietal designation, alcohol content, color ingredient disclosures, country of origin, health warning statements, net volume, and a sulfite declaration (see Figure 2). Dietary information such as gluten content statements, major food allergen labeling, and statements relating to nutrient content, serving facts, alcohol facts, and sugar content are all optional (Bugher, 2019). If a winery should choose to display caloric and carbohydrate content, they must include a statement of average analysis that lists the number of calories and the number of grams of carbohydrates, protein, and fat contained in the product based on a single serving. This requirement is in accordance with TTB Ruling 2004-1 that aims to prevent alcoholic beverages from displaying health information that might mislead or deceive consumers (United States, Alcohol and Tobacco Tax and Trade Bureau). TTB Ruling 2004-1 defines a single serving of wine to be 5 fluid ounces; therefore if a winery wishes to make the statement per container size, the container must be equal to or less than 5 ounces or they must provide a dual statement presenting both per serving size and per container size. TTB Ruling 2013-2 held further that should an approved label be altered only to include a statement of average analysis or a Serving Facts statement that is compliant with TTB Ruling 2004-1 and matches one of the formats attached in the ruling, submission of a new application for a certificate of label approval (COLA)

would not be necessary. Figure 1 shows pre-approved serving facts statements that do not require a new application for a COLA. Should a winery deviate from the formats provided in TTB Ruling 2013-2, they would be required to submit a new COLA application, which will be considered on a case-by-case basis.

Figure 1

Examples of acceptable serving facts statements. (United States, Alcohol and Tobacco Tax and Trade Bureau).

Serving Facts	
Serving Size	5 fl oz (148 ml)
Servings Per Container	5
Amount Per Serving	
Alcohol by volume	14%
fl oz of alcohol	0.7
Calories	120
Carbohydrate	3g
Fat	0g
Protein	0g

Serving Facts: Serving size: 1.7 fl oz (50 ml); Servings per container: 1; **Amount Per Serving:** Alcohol by volume: 40%; (80 proof); Fl oz of alcohol: 0.7; Calories: 131; Carbohydrates: 0g; Fat: 0g; Protein: 0g

Serving Facts		
Serving Size	5 fl oz (148 ml)	
Servings Per Container	4 3/4	
	Amt Per Serv.	Amt Per Bottle
Alcohol by volume	12%	12%
fl oz of alcohol	0.6	2.9
Calories	139	660
Carbohydrate	14g	67g
Fat	0g	0g
Protein	0g	0g

Figure 2

Example of a label that only displays what is required by the TTB. (Understanding Wine Labels & Required Information 2017).



2.2 Current Regulations in the European Union

Section 3 of Regulation (EU) No 1308/2013 presents labeling guidelines that winemakers must adhere to if they wish to distribute their product (Official Journal of the European Union, 2013). Article 119 provides the mandatory details that must be displayed on the front label of a wine bottle, while Article 120 imparts non-compulsory particulars that can be included at the winemaker's discretion (Casalonga, 2019). Aside from an optional listing of sugar content (unless the wine is sparkling) neither article mentions disclosing ingredients or nutritional facts.

Article 16(4) of Regulation (EU) No 1169/2011 placed burden on the European Commission to “produce a report concerning the application of Article 18 (List of ingredients) and Article 30(1) (nutrition declaration) to the products referred to in this paragraph (alcoholic beverages above 1.2% abv), and addressing whether alcoholic beverages should in future be covered, in particular, by the requirement to provide the information on the energy value, and the

reasons justifying possible exemptions” (European Commission, 2017). As a result, the European Commission gave the EU alcohol industry one year from March 12, 2017, to produce a self-regulatory proposal for nutrition labeling and ingredients requirements. In response, the wine industry proposed the following options (Brans, 2018):

- Limiting nutrition information to caloric content
- To simplify the label and its translation by using the international symbol “E” for energy
- To add a portion/serving alongside the 100ml declaration
- To use an average energy value of a certain wine or commonly established and accepted data made accessible in a coordinated database for different wine categories.

Despite the industry’s suggestions, EU Health Commissioner Vytenis Andriukaitis was unsatisfied with the proposal as he felt that it was inconsistent and did not deal with some issues pertaining to information for consumers. (Michalopoulos, 2018).

2.3 Producer Interest/Obstacles

When the EU’s alcoholic beverage industry was charged with developing a common regulatory framework for nutrition information and ingredient labeling, they realized several obstacles that rendered the creation of uniform labeling regulations extremely difficult (Brans, 2015). Specifically, the wine industry was distressed about the ingredients listing because wine composition varies each year as a result of climatological changes. Furthermore, the composition of the wine could change as it ages, meaning that an ingredients list placed on a bottle at the time of corking might not accurately represent that same bottle once it has aged in a cellar for 10 years. The expenses associated with regularly testing the wine and updating the ingredients list to

reflect the most exact wine composition could have a detrimental financial impact on small and medium-sized wineries.

A 2019 German study conducted qualitative surveys and interviews with bottling wineries, estate wineries, and cooperatives to understand how the addition of ingredient and nutrition labeling would affect wine producers (Pabst et al., 2019). Estate wineries and cooperatives often cater to higher-involved wine consumers, who tend to care less about calorie content. Bottling wineries do most of their business with food retail, where consumers might use caloric information more frequently when making their purchase decisions. A free-response section of the survey provided direct insights into producers' attitudes towards the potential legal mandate of nutrition and ingredient labeling. One producer demonstrated his ability to separate business interests from consumer interests, saying: "As a vintner I reject it, but as a consumer, those values are absolutely useful and interesting particularly sugar values" (quoted in Pabst et al., 2019, 108). Another producer expressed concern that consumers would no longer use their senses as a means to evaluate wine: "Consumers will orientate by analytical values and not by their taste" (quoted in Pabst et al., 2019, 109). Many producers agreed that consumers would be unable to interpret the chemical names and ingredients that would be listed on the label which could potentially result in a diminished perception of wine as a natural product.

The expectation of higher production costs associated with the addition of ingredient and nutrition labeling stems from several reasons. First, many producers believe that wineries will change their oenological processes to avoid using declarable substances. This act, referred to as "clean labeling," is costly and can reduce the quality and availability of the wine, resulting in a loss of revenue (Pabst et al., 2019). Many estate wineries that only use front labels would see a rise in production costs from adding a back label to fit all required information. Additionally, the

laboratory costs required to test each batch of wine for an average analysis of nutritional values and ingredients would be a significant expense to small and large wineries alike.

2.4 Consumer Interest:

Half of the world's population consumes alcohol, yet almost none of them have easily accessible information about the nutrition and ingredients in the alcoholic beverages that they consume (Martin-Moreno et al., 2013). When considering the enforcement of a mandate that would make this information compulsory, government officials must take into account both the pros and cons of such requirements. Several studies have focused on consumers' interests, knowledge, and preferences for labeling on wine in an effort to provide insight on the most effective way to implement potential regulations.

A common argument for the absence of nutrition and ingredient labeling on alcoholic beverages is that it will mislead consumers to believe that alcohol is nutritious should they realize that the actual caloric content is lower than what they had originally perceived. However, this rationale was disputed in 1995 after The Coors Brewing Co. argued that a Federal Alcohol Administration Act that prevented them from disclosing the alcohol content of their beer violated their right to free speech (*Rubin v. Coors Brewing Co. 1995*). The purpose of the act was to prevent "strength wars," i.e., competition amongst alcohol producers based on the potency of different beers, which Justice Clarence Thomas wrote, "could lead to greater alcoholism and its attendant social costs" (*Rubin v. Coors Brewing Co. 1995*). The Supreme Court subsequently overturned the law, as it did not narrowly advance a substantial state interest. Justice John Paul Stevens delivered a concurring opinion, stating that "The Constitution is most skeptical of supposed state interests that seek to keep people in the dark for what the government believes to be their own good" (*Rubin v. Coors Brewing Co. 1995*).

A European study sought to examine consumers' interest in nutritional labeling on the back of wine (Annunziata et al., 2015). The study consisted of 500 consumers from Italy, France, and Spain. The study found a geographic discrepancy among consumer tendencies to read the back of a wine label. While over 40 percent of French and Spanish consumers claimed to read the back label, only 26 percent of Italians claimed to do so. Findings also showed that most individuals were unaware of the caloric value of a glass of red wine, and 12 percent thought it had no caloric value at all. An analysis of the consumers' socio-demographic variables found that in Italy and Spain, women and young adults are most interested in the nutritional information on wine, while gender and age were insignificant in France. The article concluded by justifying its research, which was that mandatory nutritional labeling will result in major associated increased costs, and implementing them requires a serious evaluation of consumer benefits.

A 2016 study that focused on consumer interest in wine labeling established itself as the first of its kind to research wine nutritional and health labeling in a core wine-consuming country, such as Italy (Annunziata, Pomarici, Vecchio, & Mariani, 2016a). A brief literature review suggested that better-educated consumers are more likely to find utility in nutrition and health labels when shopping. Previous studies have found that consumers who place the highest value on price and taste are typically less likely to use nutritional labels. The study collected objective knowledge by surveying 300 consumers in four regions of Italy. To gauge consumers' nutrition knowledge, they were asked how many calories a glass of red wine contained and which alcoholic beverage has the highest caloric value among a beer, glass of wine, shot, and alcopop. Sangiovese, one of the most common types of wine in Italy was selected as the base product to be more relatable to consumers. 63 percent of respondents said they typically

purchase a bottle of wine for less than 8 euros. When surveyed, only 20 percent of respondents could accurately estimate the caloric value of a glass of wine. 27 percent claimed to inspect nutritional information on food labels only upon first purchase, 17 percent claimed that they rarely use nutritional labels, and 15 percent said that they never did. The study yielded findings that Italian consumers wish to see nutritional and health information on wine labels. The study also found that Italians have little knowledge of the nutritional properties of wine.

Another 2016 study surveyed EU and US consumers to determine the extent to which consumers wish to see nutritional and health information on labels, as well as their preferred format (Annunziata, Pomarici, Vecchio, & Mariani, 2016b). The study found significant differences in consumer preferences with respect to moderating variables such as wine consumption habits, attitudes towards nutritional information, and the extent of their wine involvement. The study also found that US consumers tend to pay more attention to nutritional labels than consumers in other countries. It was noted that this could be due to the FDA requirement of mandatory nutrition facts on most products for consumption since the 1990s. Additionally, a consumer's attentiveness to nutritional information on food and wine is typically significantly different from their actual behavior in-store. This is due to the self-report bias that consumers engage in during surveys.

A 2018 study conducted an Artefactual Field Experiment (AFE) to understand consumer interest in nutritional information on wine as well as their preferred nutrition label format (Vecchio et al., 2018). Participants were handed four wine bottles, one by one, each featuring different nutritional labeling formats, and asked to submit a sealed bid for each product, indicating the amount that they would pay. The first back label indicated only kcal for a glass of wine (Label A); the second label provided the nutritional panel referred to 100 mL (Label B); the

third label did not provide nutritional information but instead displayed a link to an external website— www.wineinmoderation.eu.it (Label C); and the fourth label displayed the Guideline Daily Amount (GDA) labeling, which includes the key nutrients for a glass of wine (Label D). A post-auction survey was also issued to further investigate consumers' willingness to pay. The post-purchase survey found that 45% of respondents read the nutritional information on labels when buying food and beverages, and 42% use it to compare and choose products. However, 33% of participants stated that they are not overly concerned with the healthiness of food. Only 8% of participants said that they have always looked for wine nutritional information. Consumers expressed a high interest in receiving wine nutritional information on the label and slightly less interest in seeing a mandatory ingredients list. Consumers bid the highest for the bottle that provided the most information (Label B) with a sample mean of €4.97. The label that only provided a link to a website that contained the wine's nutritional information received the lowest bid (€3.92). Findings from the study suggest that consumers are interested in receiving nutritional information about wine, specifically in the label format of a nutritional panel. The EU alcohol industry's proposal to provide nutritional information via a QR code or website does not appear to align with consumer preferences.

Based on previous literature, it appears that the majority of consumers are unaware of the nutritional content in a glass of wine. Additionally, there is some variation in consumers' usage of the back of wine labels, as well as their preference for having access to nutrition and ingredient information. Educational campaigns that spread awareness of the nutrition facts label could increase the use of them and aid consumers in making informed decisions about what they choose to consume.

3. Research Questions

Research questions were developed upon the realization that there are a lack of consumer studies on this subject. Additionally, a majority of the previous research has set out to understand consumers' current knowledge of the ingredient and nutrition information in wine, and their interest in receiving these facts on wine labels. While this information is certainly valuable, we wanted to add to current literature by conducting research that sought consumer's feelings and willingness to pay for actual labels. This study examines the following research questions:

- How will the addition of mandatory nutrition and ingredient labeling in the United States affect consumers attitudes and purchase intentions?
- Will wine knowledge affect the extent to which they value nutrition and ingredient labeling?

4. Methodological Design

A study was conducted online to understand consumers' attitudes and purchase intentions towards ingredient and nutrition labels on wine bottles. The survey was a 2 (Nutrition Facts: present vs. absent) x 2 (Ingredient List: present vs. absent) between-subjects experimental design. Labels were developed for four separate conditions, and each participant was only exposed to one label.

4.1 Participants

We distributed a brief, initial survey that specifically recruited wine drinkers that were 21 years of age or older using Amazon Mechanical Turk (Mturk), a web-based survey tool. Mturk provides researchers with access to a large number of participants that are willing to engage in surveys for research purposes (University of Massachusetts Amherst, 2019). Researchers generate a Human Intelligence Task (HIT) that gives Mturk workers a description of the task,

compensation that will be received upon completion of the task, and the amount of time that the task will take. The primary purpose of Mturk is to be a recruitment site, and participants are usually redirected to a survey software site to complete the task. In this case, participants completed the survey on Qualtrics.

If respondents were verified to be of the legal drinking age and consumed wine, they were then invited to participate in a second survey that sought to achieve our research objectives. The second survey was distributed to 112 participants, also via Mturk. Once the survey was completed, participants were paid \$1.00. Participants were asked their age range, gender, average wine consumption per week, education level, and income for classification purposes.

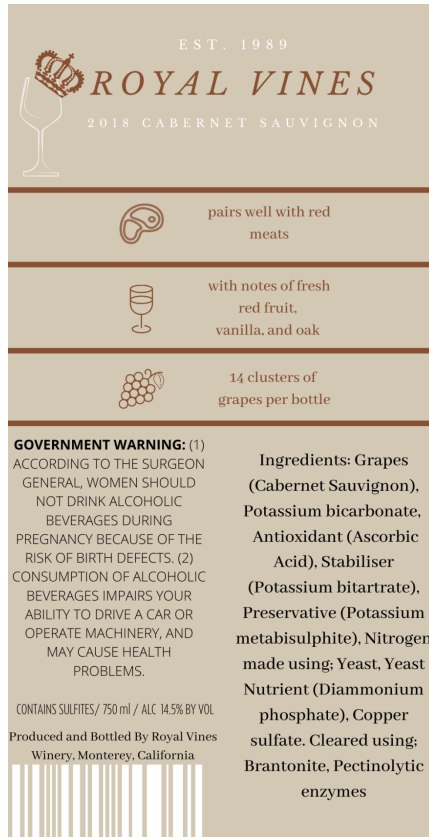
4.2 Materials and Procedure

This survey was confined to the United States. The study was divided into 28 participants per cell, for a total of 112 participants. At the beginning of the survey, respondents were randomly exposed to one of four wine labels for a fictitious winery (see Figure 3): (A) one displaying only an ingredient label, (B) one displaying only a nutrition label, (C) one displaying neither an ingredient or nutrition label, or (D) one displaying both a nutrition and ingredient label. The wine labels were shown for 30 seconds, and participants could not proceed with the rest of the survey until the entire time had passed. Compulsory information currently required by the TTB, including a government warning and declaration of sulfites was included on every label. Non-compulsory information, including food pairing recommendations and wine notes, were added to the labels to make the purpose of the study less obvious to participants. After label exposure, participants were asked to answer a series of questions regarding their attitudes towards the label they observed. Questions not relevant to nutrition and ingredient labeling

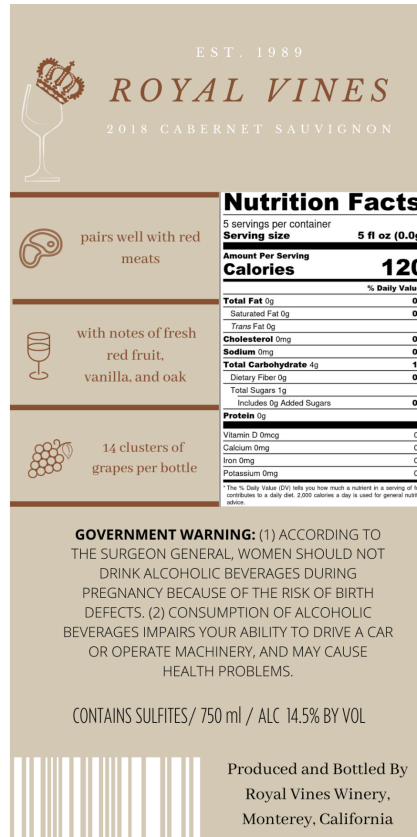
(“What was your attitude towards the color scheme, font, etc.”) were asked so that surveyees were not immediately primed to the nature of the study, which could have induced response bias. The dependent variables of attitudes towards the label, attitudes towards the wine, and intentions to purchase the wine were measured using five 5-point semantic differential items taken from Spears and Singh (2004). Questions that measured participants’ attitudes towards the wine and attitudes towards the label included these adjective pairs: unappealing/appealing, bad/good, pleasant/unpleasant, unfavorable/favorable, unlikeable/likeable. Questions that measured participants’ intentions to purchase the wine included these adjective pairs: never/definitely, definitely do not intend to buy/definitely do intend to buy, very low purchase interest/very high purchase interest, definitely would buy/definitely would not buy, probably would not buy/probably would buy. Figure 4 displays the 4-item objective wine knowledge scale that was used in the survey. Analysis of variance (ANOVA) was used to analyze the difference among means of the results.

Figure 3

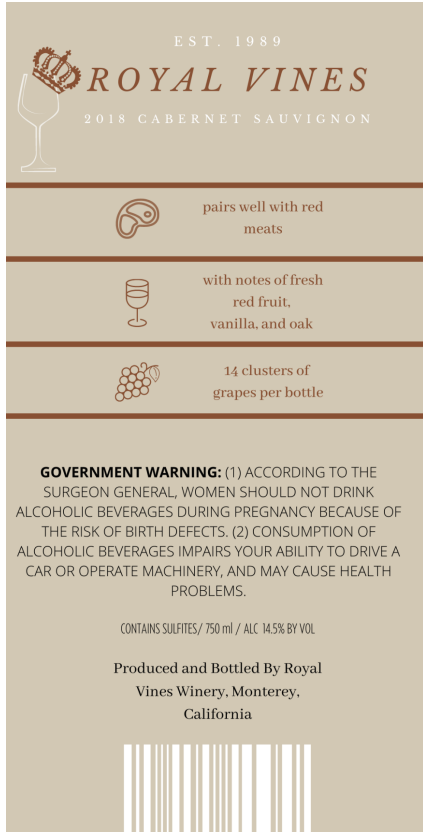
Labels used in survey. Each participant was only exposed to one.



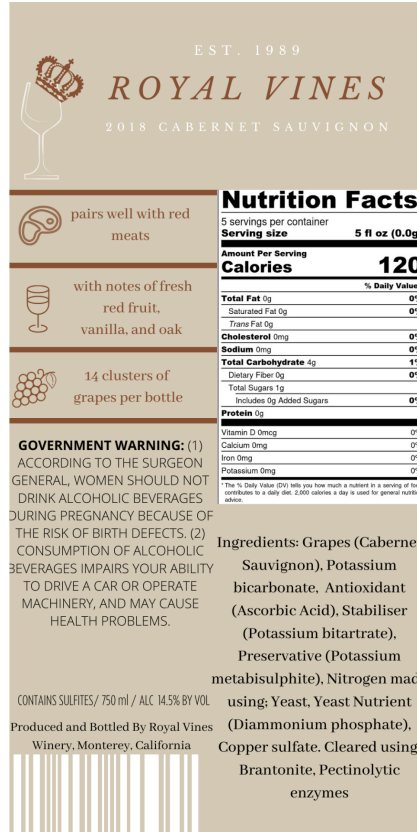
Label A: Only ingredients labeled



Label B: Only nutrition labeled



Label C: Neither ingredients nor nutrition labeled



Label D: Both nutrition and ingredients labeled

Figure 4

Objective wine knowledge questions (Moulard et al., 2015).

Question	Answer Choices
Which of the following is not a wine region?	Champagne Langhe <i>Aligote</i> Napa Valley
Which of the regions below is most associated with sweet wine?	Rioja California Chianti <i>Sauternes</i>
Which of the following regions is best known for fortified wines?	<i>Port</i> Carneros Australia Argentina
Which of the following is a wine region in Italy?	<i>Puglia</i> Barossa Valley Santa Lucia Rioja

* correct answer is in italics

Figure 4. Objective wine knowledge questions (Moulard et al., 2015).

5. Results

Overall, there were more female respondents (59%) than male (see Table 1). The average age of surveyees was 39, and 48% of them had a 4-year college degree or higher. Participants were asked about their wine consumption in terms of bottles per week, and 59% of them consumed one bottle or less per week. 28% of participants consumed 1-2 bottles of wine per week.

The dependent measures were created by averaging the five semantic differential items. The measures demonstrated excellent reliability with all Cronbach Alphas exceeding 0.95

(Attitude toward the label = .9625, Attitude toward the wine = .9612 and Purchase Intentions = .9657.)

Data were analyzed using a 2 (Nutrition Facts: present vs. absent) by 2 (Ingredient List: present vs. absent) between-subjects ANOVA (see Table 2). With respect to Attitude Toward the Label (ATT_{Label}) the data did not reveal a significant main effect for Nutrition Facts ($F(1, 108) = 2.22, p = .1387$). The data did not reveal a significant main effect for Ingredient List ($F(1, 108) = 1.28, p = .206$). The Nutrition Fact by Ingredient List interaction was also not significant ($F(1, 108) = 0.00, p = .9857$).

For Attitude Toward the Wine (ATT_{Wine}), the data did not reveal a significant main effect for Nutrition Facts ($F(1, 108) = 0.89, p = .3466$). The data did not reveal a significant main effect for Ingredient List ($F(1, 108) = 0.75, p = .3900$). The Nutrition Fact by Ingredient List interaction was also not significant ($F(1, 108) = 0.29, p = .5942$).

For Purchase Intentions (PI), the data did not reveal a significant main effect for Nutrition Facts ($F(1, 108) = 0.26, p = .6131$). The data did not reveal a significant main effect for Ingredient List ($F(1, 108) = 0.05, p = .8320$). The Nutrition Fact by Ingredient List interaction was also not significant ($F(1, 108) = 0.00, p = .9609$). The means and standard deviations by condition are presented in Table 3 and Figure 5 shows the means and 95% confidence intervals by condition.

5.1 Analysis of Objective Wine Knowledge as a Moderator

Table 4 depicts participants objective wine knowledge scores. For Objective Wine Knowledge, respondents who answered 2, 3, or 4 questions correctly are scored “high” (1). Respondents who answered 0 or 1 questions correctly are scored “low” (0). 58 are in the “high” group (51.79%); 54 are in the “low” group (48.21%). Data were analyzed using a 2 (Nutrition Facts: present vs. absent) by 2 (Ingredient List: present vs. absent) by 2 (Objective Knowledge: high vs. low) between-subjects ANOVA. As can be seen in Table 5, Objective Wine Knowledge

had a significant main effect on attitudes toward and intentions, and a significant interaction with the Ingredient List condition. Figure 6 provides a pictorial depiction of the effects of objective wine knowledge and ingredient information on attitudes and intent to purchase.

Table 1
Sample Characteristics

Variable	Overall	Nutrition & Ingredients	Nutrition Only	Ingredients Only	No Nutrition/Ingredients
Female	58.93%	60.71%	64.29%	57.14%	53.57%
Male	41.07%	39.29%	35.71%	42.86%	46.43%
Average age (in years)	39.10	40.17	38.35	36.78	41.07
Education					
High school/GED	5.36%	10.71%	3.57%	3.57%	3.57%
Some college	16.07%	21.43%	17.86%	21.43%	3.57%
2-year degree	14.29%	10.71%	7.14%	10.71%	28.57%
4-year degree	48.21%	50%	42.86%	50%	50%
Postgraduate degree	16.07%	7.14%	28.57%	14.29%	14.29%
Wine Consumption (bottles per week)					
1 bottle or less	58.93%	53.57%	60.71%	71.43%	50%
1-2 bottles	27.68%	28.57%	21.43%	21.43%	39.29%
2-3 bottles	10.71%	14.29%	10.71%	7.14%	10.71%
3-4 bottles	2.68%	3.57%	7.14%	0%	0%
Observations	112	28	28	28	28

Table 2*ANOVA Results*

Effects of Nutrition Facts and Ingredient Information on Attitude Toward the Label (ATT_{Label}), Attitude Toward the Wine (ATT_{Wine}), and Purchase Intentions (PI)

<i>ANOVA Results</i>			
Independent Variables	ATT_{Label}	ATT_{Wine}	PI
Main effects			
Nutrition Facts (N)	2.22 (.1387)	0.89 (.3466)	0.26 (.6131)
Ingredient List (I)	1.28 (.2601)	0.75 (.3900)	0.05 (.8320)
Interaction effects			
N x I	0.00 (.9857)	0.29 (.5942)	0.00 (.9609)

The first figures are *F* values. *p* values are provided in parentheses.

Table 3*Means and Standard Deviations by Condition*

Variable	Nutrition & Ingredients		Nutrition	Ingredients	No
	Overall	Ingredients	Only	Only	Nutrition/Ingredients
<hr/>					
Average Attitude toward the					
Wine Label (1-5)	3.7732	3.8071	4.0357	3.5143	3.7357
	(1.054)	(1.1489)	(.9158)	(1.1054)	(1.0213)
<hr/>					
Average Attitude toward the					
Wine (1-5)	4.0893	4.05	4.2929	3.9786	4.0357
	(.9151)	(.9485)	(.8388)	(.9681)	(.9174)
<hr/>					
Average Intention to Purchase					
the Wine (1-5)	3.3339	3.3714	3.4071	3.25	3.3071
	(1.141)	(1.1922)	(.9213)	(1.1983)	(1.2771)
<hr/>					
Observations	112	28	28	28	28

Table 4
Objective Wine Knowledge Scores

Wine Knowledge	Frequency	Percent	Cumulative
0	18	16.07	16.07
1	36	32.14	48.21
2	36	32.14	80.36
3	16	14.29	94.64
4	6	5.36	100.00
Total		112	100

Table 5
Objective Wine Knowledge ANOVA Results

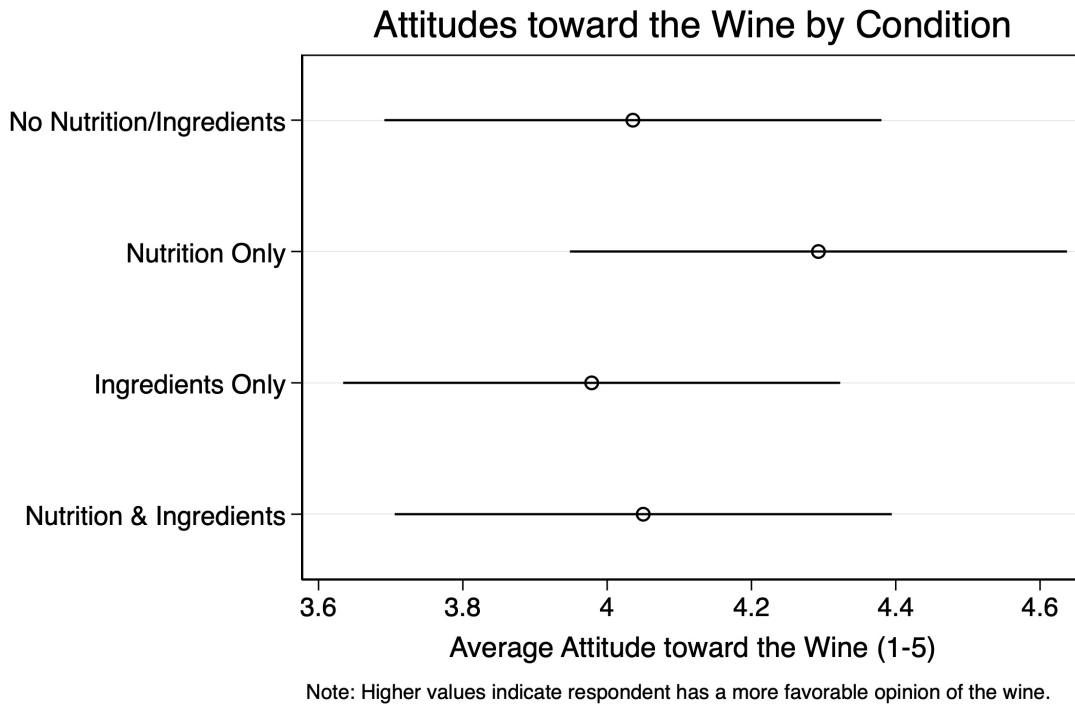
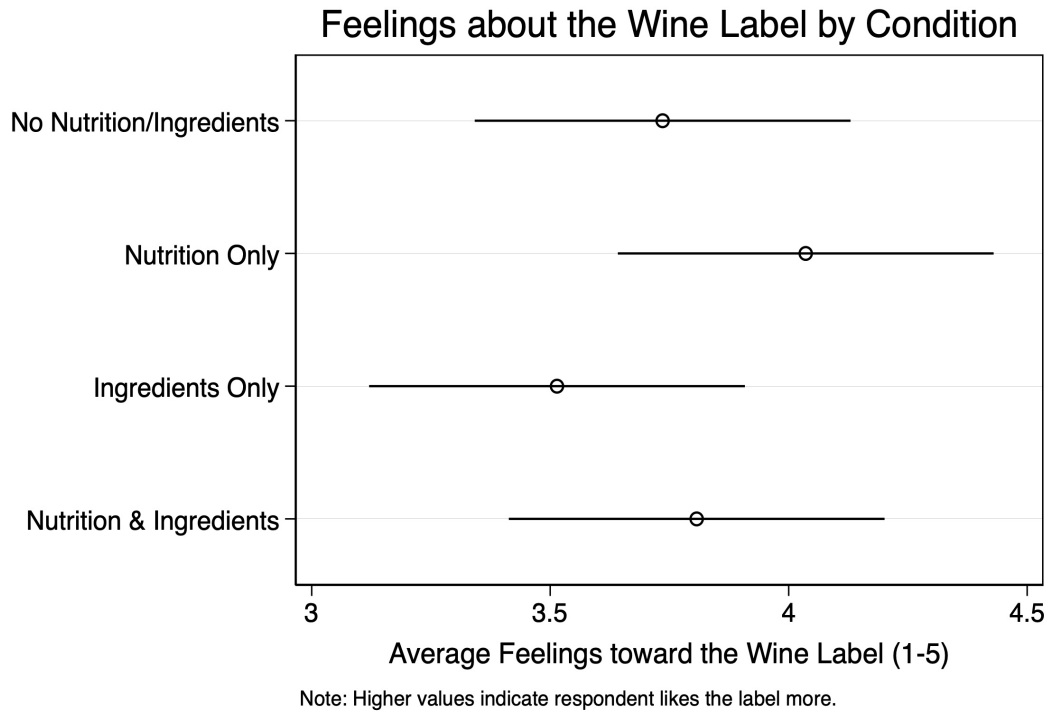
Effects of Nutrition Facts, Ingredient Information, and Objective Wine Knowledge on Attitude Toward the Label (ATT_{Label}), Attitude Toward the Wine (ATT_{Wine}), and Purchase Intentions (PI)

<i>ANOVA Results</i>			
Independent Variables	ATT_{Label}	ATT_{Wine}	PI
Main effects			
Nutrition Facts (N)	3.74 (.0557)	1.54 (.2179)	0.57 (.4503)
Ingredient List (I)	0.96 (.3291)	0.41 (.5229)	0.01 (.9388)
Objective Knowledge (K)	7.31 (.0080)	5.72 (.0185)	3.11 (.0807)
Interaction effects			
N x I	0.06 (.8121)	0.51 (.4785)	0.13 (.7204)
N x K	0.70 (.4032)	0.00 (.9816)	0.84 (.3605)
I x K	3.96 (.0493)	0.67 (.4164)	5.32 (.0231)

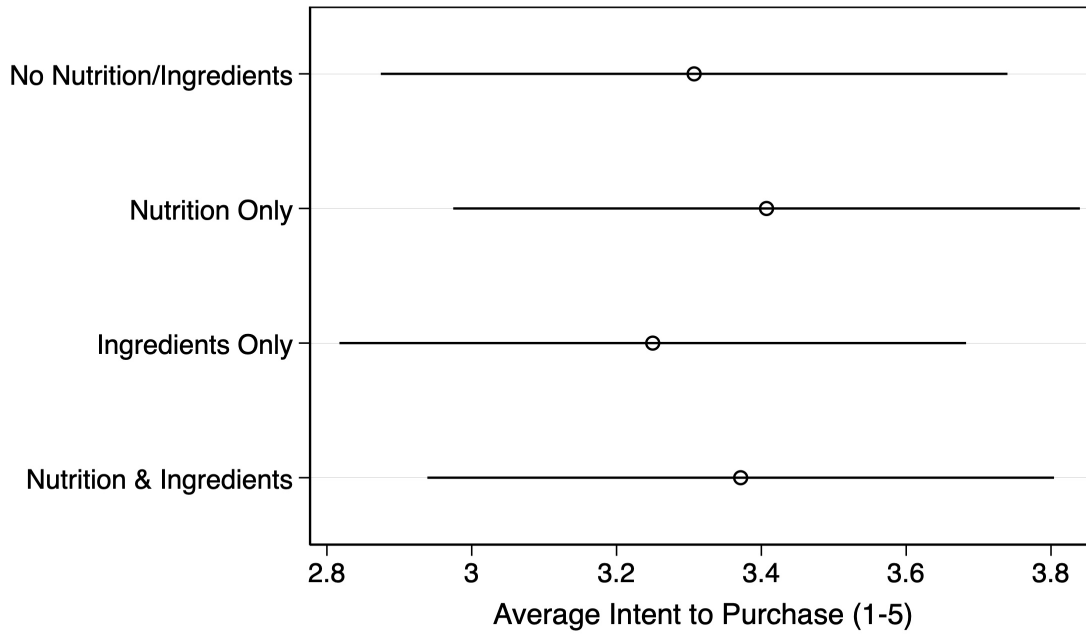
The first figures are F values. p values are provided in parentheses.

Figure 5

Means and 95% Confidence Intervals



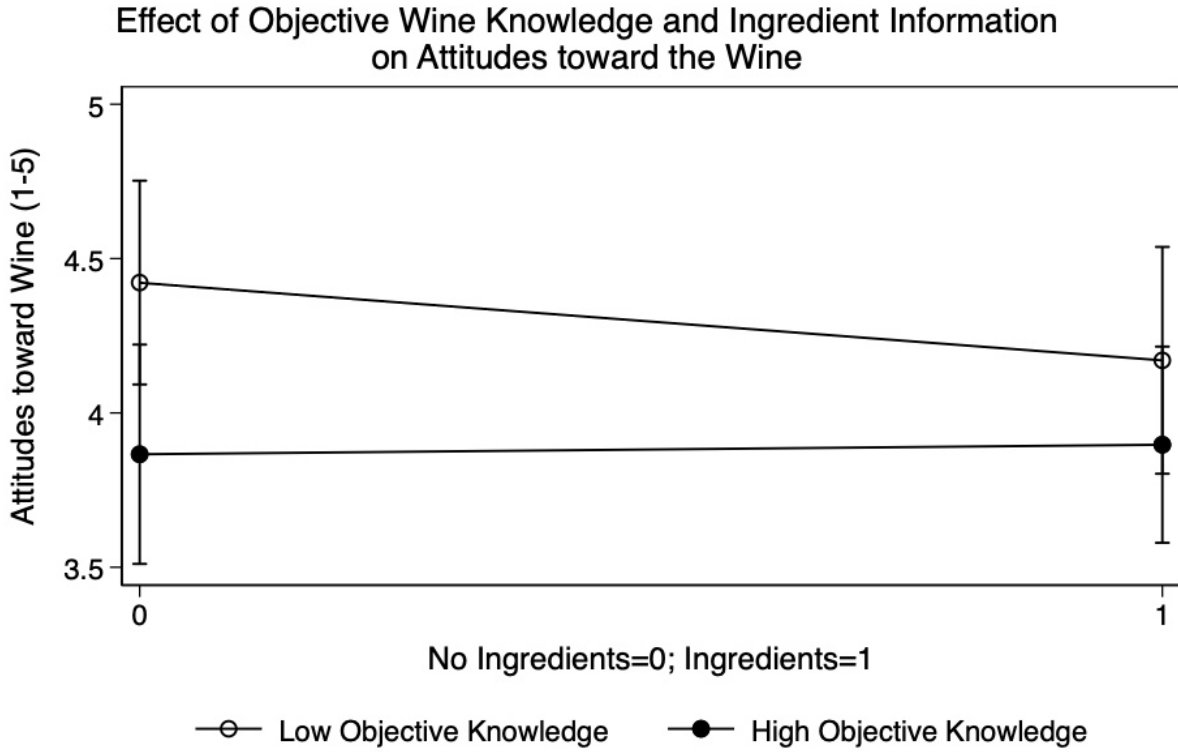
Intent to Purchase Wine by Condition



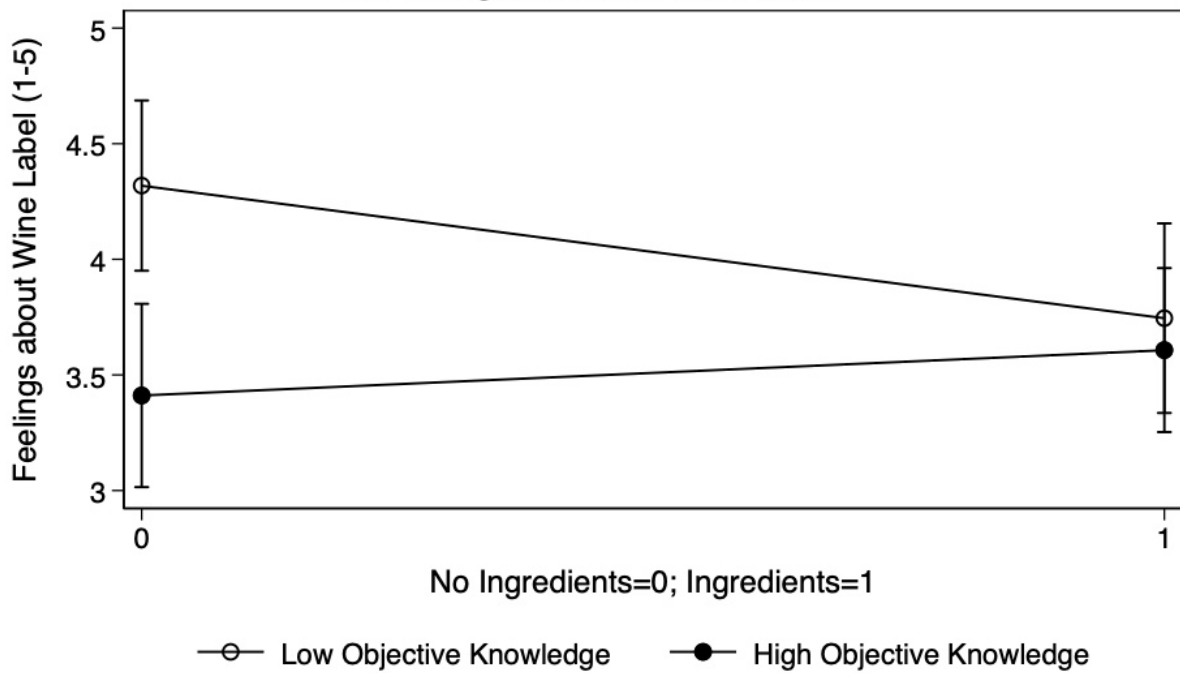
Note: Higher values indicate respondent is more willing to purchase the wine.

Figure 6

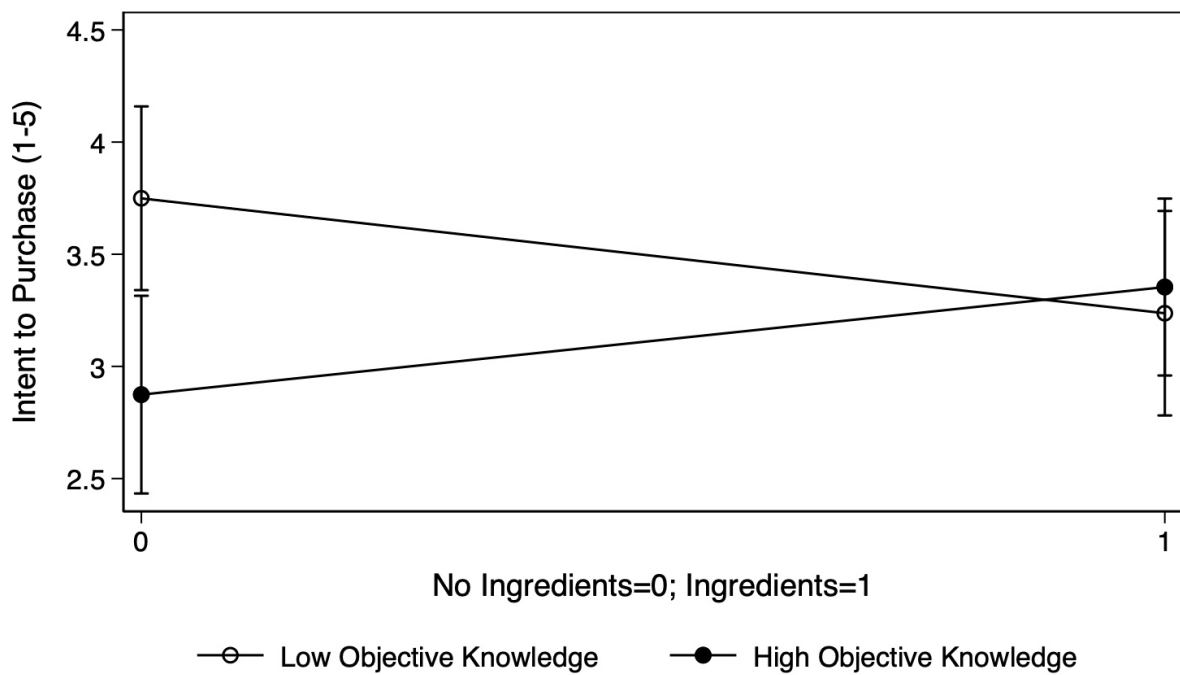
Effect of Objective Knowledge and Ingredient Information on Attitudes toward the Wine, Wine Label, and Intent to Purchase



Effect of Objective Wine Knowledge and Ingredient Information on Feelings about the Wine Label



Effect of Objective Wine Knowledge and Ingredient Information on Intent to Purchase



6. Discussion

The study found no statistically significant difference between consumers' attitudes towards the label, wine, and intentions to purchase, regardless of whether or not they were exposed to nutrition and ingredient labeling. This implies that consumers do not care if wine labels display nutritional and ingredient information. These findings are consistent with previous studies that have sought to examine the effects of mandatory nutrition and ingredient labeling on consumers. A qualitative 2019 study revealed that consumers were not interested in receiving nutritional information because they did not find value in it. Instead, consumers said that they would find greater utility in the addition of tasting notes or background about the winery (Pabst et al., 2019). Previous studies have suggested that while consumers express interest in seeing nutrition and ingredient labeling on wine, the majority do actually not get any utility out of it. Participants who were exposed to a label that only displayed ingredients indicated slightly more negative attitudes towards the wine and label, as well as less of an intent to purchase. This could be due to consumers' tendency to perceive wine as an entirely natural product composed only of fermented grapes.

The study also examined the effect of a participants' objective wine knowledge on their attitudes and intentions to purchase. We found that, on average, people with high wine knowledge have less positive attitudes about the label, less positive attitudes towards the wine, and are less likely to purchase the wine than people with low knowledge (i.e., there is a negative and statistically significant main effect of Objective Knowledge). In terms of interactive effects, Knowledge x Ingredient List is statistically significant for attitudes toward the label and purchase intentions (but not attitudes toward the wine). High wine knowledge participants who see the list of ingredients are more positive about the label and more likely to purchase the wine than high

knowledge people who don't see the list of ingredients. This could be due to the fact that highly involved wine drinkers are very selective when choosing wine, therefore they are more inclined to seek deeper information that would aid them in making their decision (Vecchio et al., 2018).

As several European Union member states take the initiative to propose the implementation of mandatory nutritional and ingredient labels on alcoholic beverages, US health officials, as well as US wine producers should adopt a forward-thinking approach towards a plan of action. If the European Commission requires such labels, US wine producers will be forced to comply with EU regulations for any bottles that they wish to export (Pabst et al., 2019). Requiring this information on alcoholic beverages is thought to be one way that public health officials can reduce the harmful use of alcohol. Even if additional studies confirm that consumers receive no utility from such labeling, officials should still consider consumers' right to health information regardless of how they choose to interpret it.

Limitations

Previous studies of consumer food research have found that attitudes and stated preferences do not accurately reflect a consumer's actual behavior (Pabst et al., 2019). Observational research conducted at a wine retailer would provide more accurate and provide detailed insight into consumers' usage of nutrition and ingredient labeling. Consumer attitudes and intentions to purchase might differ if they were physically holding the bottle of wine and comparing it with other bottles in a store. Another limitation was the size of the sample. The small sample size can not be generalized to reflect the views of all US wine drinkers, and a larger sample size could have potentially yielded findings that were significantly different from one

another. There is a lack of existing research and policy on this topic. Thus, further research should be conducted before the implementation of any policy takes place.

7. Direction for Future Research

A primary objective of this research was to examine consumers' attitudes and intentions to purchase wine that displayed nutrition and ingredient labels, as well as whether or not their objective wine knowledge impacted those attitudes and intentions. This study's results suggest that additional research that addresses the significance of moderating variables such as consumers' subjective wine knowledge, product involvement with wine, willingness to pay, awareness of the linkage between wine and health, and use and perception of nutritional information on food labeling with a broader sample of consumers is warranted. Finally, the lack of US studies about this subject means that there is still considerable research to be conducted. Subsequent US research that evaluates consumer utility, consumer preference, and costs to producers will be meaningful for deciding whether to pass legislation on this subject. For policy makers and academic researchers, we hope that the results of this study will encourage further research.

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