A healthy indulgence? Wine consumers and the health benefits of wine

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Abstract

Heart disease is the leading cause of death in the US. Moderate red wine consumption has been linked to a reduction in the risk of death by heart disease and heart attack by 30–50%. With about 600,000 people dying from heart disease in the US each year, red wine has become increasingly popular among health conscious consumers. Wine is often touted for its potential health benefits, but to what extent is "health" a factor when consumers make their consumption decisions for alcoholic beverages? This study aims to further understand how consumers make their beverage choices and to understand the role wine health benefit knowledge plays in the willingness of consumers to purchase wine. The results suggest that consumers value the relationship between food/beverage intake and their health status. Consumers with few health issues were the ones more likely to indicate that they consume wine for health reasons, suggesting a potential market among consumers with known health issues. In addition, consumers who attributed the most health benefits to wine were the ones most likely to drink more wine and pay more for wine if it were health enhanced.

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1. Introduction

1.1. Wine and health

Amid the increasing health concerns among consumers, preferences are changing toward healthier foods and beverages. Consumers are eating out less and have shifted their diets to include less saturated fat and cholesterol while increasing consumption of fiber (Todd, 2014). Sales of organic foods in the US increased from $11 billion in 2004 to $25 billion in 2013, accounting for 3.5% of US food sales (Osteen et al., 2012). In addition, there has been a marked growth in the demand for functional foods. Functional foods, defined as foods fortified for additional health benefits, reached $37.3 billion in US sales in 2009, which was up from $28.2 billion in 2005 (Singer, 2011). Popular health-oriented food marketing package claims range from the heart-healthy red hearts found on the box of Quaker Oats cereal, to the happy-colon yellow arrow on a carton of Activia Yogurt.

The French paradox suggests that consuming red wine daily not only helps the cardiovascular system, but it also increases lifespan due to the resveratrol (found in the skins and tannins of red grapes) content in red wine (Catalgol et al., 2012). Resveratrol has been linked to preventing decline in cardiovascular function caused by age (Das et al., 2011). France surpasses many countries in average life expectancy partly due to the common practice of drinking red wine with meals (Brownlee, 2006). The French consume red wine moderately, at 2–3 glasses daily, reducing the unhealthy effects of high cholesterol foods common in the French diet, including breads, cheeses, and rich desserts (Brownlee, 2006).

Red wine contains antioxidants, called flavonoids, which reduce the risk of coronary heart disease by decreasing the bad cholesterol (low-density lipoprotein-LDL), and boosting the good cholesterol (high-density lipoprotein-HDL). Research has shown that a daily dose of red wine is linked to, on average, a 12% increase in HDL (Catanese, 2013). The resveratrol

Peer Review under the responsibility of UniCeSV, University of Florence.
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content found in red wine is believed to aid in a wide range of medical problems. Studies have shown that red wine can potentially decrease the risk of colon and prostate cancer when consumed in moderation (Catanese, 2013). However, not all wine is "created equal," with red wine containing eight times as many flavonoids as white wine (Catanese, 2013). In addition, region, winemaking practices, variety, harvest timing, and growing methods can all impact resveratrol levels of wine, which leaves the door open to purposefully modifying those factors to increase resveratrol levels in wine (Siemann and Creasy, 1992). Additionally, producers in Australia have explored adding additional resveratrol during the winemaking process and researchers in Rioja have explored the use of nanotechnology to increase resveratrol levels in wine (Patterson, 2009). Representatives of Willamette Valley Vineyards were successful in lobbying the Alcohol Tobacco Tax and Trade Bureau (TTB) to allow the listing of resveratrol content on US wine labels.

Although most doctors advocate limited consumption of alcoholic beverages because of triglycerides and bad blood lipids, red wine seems to be different (Guilford and Pezzuto, 2011). The resveratrol found in red wine fights against these harmful effects that other alcoholic substances cannot (e.g. high cholesterol, rising blood pressure, and unhealthy triglycerides) (Lippi et al., 2010). Moderate consumption of red wine has been suggested as a possible therapeutic supplement for the prevention and/or treatment of coronary heart disease, as a result of the wine's alcohol, resveratrol, and polyphenolic compound content (Guilford and Pezzuto, 2011; Lippi et al., 2010).

Heart disease is the leading cause of death for both men and women in the US (Centers for Disease Control and Prevention, 2014). Heart disease can be preventable and controllable through healthy diet and lifestyle choices. With moderate red wine consumption, the risk of death by heart disease and heart attack can be reduced by 30–50% (Catanese, 2013). With about 600,000 people dying from heart disease in the US each year, red wine has become increasingly popular among health conscious consumers (Centers for Disease Control and Prevention, 2014).

Despite studies suggesting otherwise, to some extent the health benefits of red wine are not entirely clear, and the jury may still be out on finding a definitive answer. It has been hypothesized that some of the studies touting the benefits of red wine achieved positive results due to confounding socioeconomic factors while other research suggests that the resveratrol content in red wine only provides negligible benefits (Xiang et al., 2014; Lindberg and Amsterdam, 2008). Because of conflicting red wine studies, it is likely that there is a certain level of confusion among consumers regarding the health benefits of wine. From infomercials to nutritional supplements, consumers are exposed to a vast array of marketing claims for health and wellness as a result of resveratrol. Research suggests that health claims on food products in the US has led to increased consumer confusion (Hasler, 2008). Consumers struggle to process nutritional information, resulting in confusion regarding health and nutrition claims (Darian and Tucci,

2011). Consumers also have difficulty distinguishing between the levels of scientific evidence on food claims (Hasler, 2008). Perhaps as a result of this, consumers are often skeptical of health claims made on food products (Petrovici et al., 2012; Szykman et al., 1997).

Little is known about the role that health concerns, perceptions, and knowledge play in the decision to purchase and consume red wine. Although consumer confusion regarding wine products is evident, are they also confused about the health benefits of wine (Drummond and Rule, 2005)? How much do consumers know about the potential health benefits of red wine and does that knowledge influence their consumption choices? As trends continue for improved health, diets, and wellness among consumers in the US, what role will red wine play in this trend? Will consumers change their wine purchase decisions because of health concerns? The objectives of this research relate to determining the existing knowledge of wine consumers as related to the health benefits of wine and to isolate the role of health concerns in a consumer's decision to purchase wine.

1.2. Literature review

Changing lifestyle and dietary habits may present more benefits than medical care, yet adjusting individual dietary habits is a challenge involving trade-offs between nutrition, taste, price, convenience, and cost (Wansink, 2006; Blaylock et al., 1999). When consumers evaluate products that they consider to be healthy, nutrition and health are two aspects that they use to assess a product's potential benefit (Lähteenmäki, 2013). Nutritional value appears to be the health benefit that has the most impact on a consumer's purchase (Darian and Tucci, 2011).

1.2.1. Heath claims and consumer choices

Evidence suggests that health is beginning to play a more prevalent role in consumer's purchasing decisions and, as a result, health claims are becoming more commonly seen on food and beverage products (Martinez, 2013). An increasing amount of research is being done to examine the link between nutrition label use and consumers' food choices. Availability of knowledge, education and information is key to informing consumer purchase decisions. Product labeling can be an essential instrument for changing and influencing dietary habits and behavior (Grunert and Wills, 2007). Drichoutis et al. (2005) found a positive link between nutrition label use and purchase decisions because of the impact nutritional labels have on consumers' perceptions. Education, gender, income level, and health status all influence nutritional knowledge and nutritional knowledge influences the use of nutrient labels when shopping for food (Guthrie et al., 1995; Szykman et al., 1997; Nayga, 2000; Drichoutis et al., 2005, 2006; Gracia et al., 2007).

Debate has also occurred over the role of socio-demographic differences in the preferences for and the impact of health claims. Health claims can only provide added value if consumers both recognize the benefit and find it important

(Lähteenmäki, 2013). Preferences for products that claim health benefits depend on the relationship between the actual health benefits being proposed and the gender that will incur the greatest advantages of the product (Lähteenmäki, 2013). Relevance increases the perceived benefit and makes products or concepts more appealing to consumers (Dean et al., 2012; Petty and Cacioppo, 1986; Verbeke, 2005). For example, claims on bone health and calcium are perceived more by women and cholesterol lowering claims are perceived more by men (Ares and Gámbaro, 2007; Dean et al., 2007; Urala et al., 2003). Age increases health-related consciousness and concerns; thus, making products with health claims more attractive (Ares et al., 2009; Herath et al., 2008; Siegrist et al., 2008). Nevertheless, socio- demographic factors do not seem to play a strong role in consumer's responses to health claims, and results show that links tend to be weak and dependent on the type of benefit being rendered, product, and target group (Lähteenmäki, 2013).

1.2.2. Consumer wine purchase decisions

More specific to this research, wine purchase decisions have been explored on several levels. Casini et al. (2009) found that previous experience, personal recommendations, and the taste of the wine were the most important factors in wine purchase decisions and that differences in respondents' preferences could be explained by demographics such as age, involvement level, and geographic area. Low involvement consumers commonly use price and awards to make their wine purchase decisions while high involvement consumers have a tendency to use region (Hollebeek et al., 2007). Consumers are also influenced by wine that they have previously tasted. Lockshin and Knott (2009) measured the effect of wine tastings on sales. On the day of the tasting, sales increased by 400% as a result of the tasting (Lockshin and Knott, 2009). Compared to women, men have greater objective and self-assessed wine knowledge (Barber, 2009). Women are more prone to seek information from store or restaurant personnel and are more likely to rely on medals and awards to guide their purchase decision than men (Atkin et al., 2007). A difference across cultures has revealed that compared to Australian wine consumers, Korean wine consumers are more likely to choose wine based on health reasons (Yoo et al., 2013). Lifestyle choices, including a healthy lifestyle, have also been shown to be positively associated with preferences for wine (Thach and Olsen, 2004).

Packaging and nutrition claims also influence wine consumers. In an exploratory study that involved the hypothetical creation of a resveratrol enhanced red wine (a "functional wine") consumer choices and valuation of that functional wine were affected by consumer characteristics (Barreiro-Hurle et al., 2008). Consumers who trust technological developments in agribusiness and the control systems were more likely to indicate a willingness to purchase functional wines (Barreiro-Hurle et al., 2008). In a study on packaging characteristics, a blind wine tasting was followed by a second tasting where participants were asked to examine packaging characteristics including font type, label design, closure, and information specified on the label (Henley et al., 2011). The results revealed that consumer's perceptions changed from the first blind tasting to the second when product packaging and labeling information were divulged to participants (Henley et al., 2011). In addition, when specific fruit characteristics were provided, consumers perceived those same characteristics in the wine (Henley et al., 2011).

Cluster analysis, as a tool for segmenting consumer groups, has grown in popularity since the 1970s in both the academic literature and in industry applications (Green, 1971; Yankelovic and Meer, 2006; Dolnicar, 2003). The goal of cluster analysis is to create relatively homogenous groups of consumers based on a set of characteristics, so that consumers within a group show more similarities to each other than to consumers in other groups (Muller and Hamm, 2014). Applications of cluster analysis with regard to consumer food and beverage choices are often based on consumer attitudes and consumption patterns (Muller and Hamm, 2014). Work by McKinna (1987) and Spawton (1991) helped form four major wine consumer segments that have been used as the base for later segmentations. Behaviors, attitudes, regions, involvement, occasion, and quality are just some of the variables that have been used as a base for clustering wine consumers (Kolyesnikova et al., 2008).

Despite the efforts to understand wine consumers and segment them by behavior and preferences, little is known about the influence of existing health problems in the wine consumption and purchasing decision. As a means to filling a gap in the existing literature on the health features of wine and consumer preferences, the purpose of this study is (a) to evaluate the role of prior health concerns and knowledge about wine health benefits in a consumer's willingness to purchase wine, (b) to segment wine consumers based on health factors, and (c) to explore differences in the health based consumer segments. The remainder of this manuscript is organized as follows: the materials and methods for the research are presented, results are discussed, and conclusions are made.

2. Materials and methods

To achieve the research objectives, an online survey was used to assess consumer wine health knowledge, consumer health status, and to make conclusions about relationships to a consumer's wine consumption beliefs and habits. There are drawbacks to collecting data through online surveys, but because the nature of the survey deals with the respondent's health history, the online environment was desirable for protecting anonymity and reducing the chances of respondent bias.

The instrument used in this study was a seventeen-question survey, which can be found in the Appendix. The first four questions in the survey had to do with wine purchasing habits and included monthly wine consumption, wine knowledge levels based on Hall and Mitchell's (2008) segmentation, influences in the wine purchase decision, and the importance of the wine characteristics in the purchase decision. Respondents were asked to indicate the importance of different wine characteristics on purchase decisions using a rating scale, with

1 representing "Not at all Important" and 5 representing "Extremely Important" to the respondent's purchase decisions. These features (including price, brand, and taste expectations) were selected from prior research, including Lockshin et al. (2006) and Casini et al. (2009) who examined wine involvement and its impact on how consumers purchase wines.

The next set of questions in the survey was used to gauge health impressions, health status, and the role health plays in the consumer's purchase decisions. Building off of research by Barriero-Hurle et al. (2008), the survey asked respondents if they have suffered from cardiovascular disease and if they suffer or have suffered from health problems related to food/beverage intake. Respondents were asked how often they read the list of ingredients on food/beverage labels (Drichoutis et al., 2005).

In order to examine prior knowledge levels of wine, the next series of questions gave the subjects several health statements about wine. Respondents were presented with a list of health benefits (some true, some false) and asked to indicate which statements are true regarding the consumption of red wine and white wine. This question was designed to assess the prior knowledge of respondents and to see if they can identify health benefits with red wine. Based off of research by Yoo et al. (2013), respondents were asked to indicate their level of agreement with attitudinal items such as: wine can reduce the risk of certain diseases, I think wine is a healthy alcoholic beverage, I would drink more wine if I thought it was healthy for me. Respondents were then asked where they would most likely get information on wine related health benefits, giving several options such as general online information sites (e.g. Yahoo!, Google and blogs) and ads (including print, TV, radio, and billboards). The final two questions in this section asked subjects if they would be more likely to consume and/or pay more for wine with higher resveratrol levels after reading a short definition of resveratrol and the potential benefits of consuming resveratrol. The final section of the survey asked basic questions about the demographics of the respondents including gender, age, and employment status.

3. Results

3.1. Demographic profile

The 17-question survey was distributed to pre-screened respondents via Survey Monkey through a snowball sampling technique. Respondents were screened to ensure that they were US residents, wine consumers, and of a legal drinking age. A total of 220 survey responses were obtained and after removing incomplete responses, the final sample size was 211 US wine drinkers.

Within the sample there was a significant difference within the representation of gender. About 65% of the respondents were female; however this is consistent with other data that suggests that women are responsible for around 80% of wine purchases and women in the US are more likely to have consumed wine in the last six months compared to men (MRI+MediaMark, 2014; Todd, 2005). Respondents had an average age of 40, and the majority (57%) was employed full-time. The student population represented around 20% of the sample. The majority of respondents were relatively moderate drinkers, consuming up to 11 glasses of wine per month. More than half of the respondents classified themselves as being "wine interested," with only about 4% indicating that they had knowledge at the wine connoisseur level.

3.2. Wine purchase and consumption behavior

Respondents most commonly drink wine for social reasons (75%), because they enjoy the taste (72%), and to relax (62%). Taste, price, and varietal were the top three factors identified as being extremely or somewhat important in the wine purchase decision at 89.1%, 70.2%, and 48.9%, respectively. On the other hand, more than 60% of respondents indicated that nutrition was slightly or not at all important when consuming wine. Additional factors most commonly cited as not important in the purchase decision were brand (32.7%) and label (31.8%). Interestingly, a full 35% of the sample indicated that nutrition/health benefits were not at all important in their decision to purchase wine.

Despite the state impact of nutrition in the wine purchase decision, this group of respondents appears to be a health oriented group. Ninety-five percent of the sample reads nutrition information at least some of the time and 40.6% reads nutrition information almost always or always. In addition, nearly 90% of the sample indicated that they are at least somewhat concerned about the health impact of their food and beverage choices while 60.3% indicated that they were extremely or very interested in the health impact of foods choices. General online sites including Yahoo!, Google, and blogs appear to be the source for most information about the healthfulness of wine consumption, with more specific health oriented sites (e.g. WebMD and Mayo Clinic) coming in as the second most popular place to seek information about wine and health.

Respondents were asked their level of agreement with eight statements regarding the health of wine (see Table 1). The statements with the greatest proportion of respondents in agreement were that relative to other alcohol, wine has more health benefits and better health properties. More than half of the sample agreed that wine reduces the risk of certain diseases, wine is a healthy alcoholic beverage, and that they know how much wine is healthy to consume. Interestingly, the most polarizing statement is related to reading wine labels. More than 1/3 of the sample indicated that they would not pay more for wine if it were fortified with additional health-enhancing properties.

After being exposed to the statement defining resveratrol, 29.7% of the sample indicated that they were very or extremely willing to consume wine with increased resveratrol levels. Just 18.9% of the sample indicated that they were not very likely to consume wine with higher resveratrol levels. Those that were very or extremely willing to consume the resveratrol-enhanced wine, report higher levels of current wine consumption ($p=.026$). While only 17% of the sample

Table 1
Wine health statement agreement.

	Agree or strongly agree (%)	Disagree or strongly disagree (%)
Wine has more health enhancing properties than other alcohol	75.3	6.1
Wine has better health properties than other alcoholic beverages	74.4	4.3
Wine can reduce the risk of certain diseases	58.3	7.6
I know how much alcohol is healthy to consume	56.9	12.8
I think wine is a healthy alcoholic beverage	50.3	12.8
I would drink more wine if it was healthy for me	39.9	10
I read wine labels when I buy wine	37.4	36
I would pay more for wine if it were health-enhanced	28.5	34.1

indicated that they would be willing to pay more for wine with higher resveratrol levels, 56% of the sample responded that they "maybe" would be willing to pay more. Of the portion of the sample that was very or extremely willing to consume wine with increased resveratrol levels, the proportion of respondents willing to pay more for fortified wine reached 42.9%, with only 4% stating that they would not pay more.

3.3. Health status and wine behavior

As a means to identifying differences in reported wine behaviors between respondents who have health concerns and those who do not, respondents who indicated that they have cardiovascular disease, are on a Dr. prescribed diet, or have health issues related to food and beverage consumption were isolated into a "health concerns" target. There was some overlap between responses on this question, but 4% of the sample indicated that they had cardiovascular disease, 4.2% were on a Dr. prescribed diet, and 13% had health issues related to food and beverage consumption.

Comparisons between the health concerns group were made against respondents who had "no health concerns." Respondents with health concerns were more likely to consume wine for social reasons ($p=.031$) and esthetic reasons ($p=.000$). Interestingly, respondents with no health concerns were more likely to indicate health as a reason to consume wine (35%), compared to respondents with health concerns (20%) ($p=.099$). Respondents with health concerns were more likely to consume more wine ($p=.051$) and agree with the statement that wine has more health enhancing properties than other alcohol ($p=.021$).

3.4. Health knowledge and wine consumption

As a means to judging the perceived knowledge of the benefits of wine consumption, respondents were provided a list of eight potential benefits of wine consumption and asked to indicate if each was a benefit of drinking red wine, white wine, or not a benefit of drinking wine. The benefits ranged from lowering cholesterol levels to lowering risk of kidney stones, and from helping to boost eyesight to improving skin elasticity. While all of the benefits have been linked to red wine, there is still some uncertainty in the scientific research linking the consumption of wine (red or white) to these outcomes. Nevertheless, these claims are frequently used in online advertisements for resveratrol supplements and in popular press articles touting the benefits of wine consumption. Thus, the idea was not necessarily to "score" each respondent on whether they selected the correct answer (especially when there is uncertainty in the science itself); it was to get a better understanding of the health attributes that people attribute to red and white wine consumption.

On average, respondents assigned three of the eight possible health benefits to red wine, and one of the eight health benefits to white wine (see Table 2). Helping the cardiovascular system was the most commonly identified benefit of drinking red wine, 76.3% of respondents identified this benefit, while boosting energy levels was the least commonly identified benefit of red wine (16.6%). As expected, respondents identified fewer health benefits associated with white wine. In all cases except one (boosting energy levels) a significantly higher proportion of the respondents associated health benefits with red wine compared to white wine (see Table 2 for the results of a paired sample *t*-test between benefits associated with red and white wine). Around 16% of the sample did not associate any of the eight health benefits with white wine. There was no statistical difference in the number of health benefits identified based on a respondent's prior health concerns.

Respondents were classified into two groups, based on the total number of health benefits that they identified. Using the mean and standard deviation of the total health benefits identified by respondents, respondents were grouped into a low identifier group (identifying zero or one health benefit of drinking wine) and a high identifier group (identifying seven or

Table 2
Frequency of health benefit identification.

	Red wine	White wine	Paired sample *t*-test (df=210)	P-value
Helps the cardiovascular system	76.3%	9%	−19.563	.000
Lowers your cholesterol	71.1%	9%	−17.516	.000
Helps control blood sugar	29.9%	7.6%	−5.749	.000
Helps boost your memory	26.5%	10.9%	−4.187	.000
Lowers risk of kidney stones	25.1%	13.7%	−2.877	.004
Helps the elasticity in your skin	24.2%	13.7%	−2.794	.006
Boosts your eyesight	22.3%	12.8%	−2.532	.012
Boosts your energy levels	16.6%	15.6%	−.253	.800
Average number benefits assigned	2.92	.92	13.106	.000

Table 3
Respondent differences based on wine health benefits identified.

	Few benefits identified	High benefits identified	Independent sample *t*-test (df=125)	*P*-value
Characteristics important when purchasing wine (1=not at all important to 5=extremely important)				
Price	3.6	4.07	−2.87	.005
Visual appeal of the label	2.85	3.01	−2.23	.028
Nutrition attributes/health	2.01	2.42	−1.90	.060
Agreement with statements regarding wine (1=strongly disagree to 5=strongly agree)				
Wine has better health properties than other alcoholic beverages	3.1	4.07	−4.48	.000
Red wine has more health enhancing properties than other alcohol	3.04	4.02	−4.41	.000
I understand how much alcohol is considered healthy	2.82	3.67	−3.51	.001
Wine can reduce the risk of certain diseases	2.82	3.62	−3.50	.001
I think wine is a healthy alcoholic beverage	2.58	3.52	−4.19	.000
I would drink more wine if it was healthy for me	2.51	3.58	−4.61	.000
I read wine labels when I buy wine	2.30	3.03	−2.84	.005
I would pay more for wine if it were health enhanced	2.04	3.35	−5.88	.000

more health benefits of drinking wine). Approximately 30% of the sample ended up in each group.

Respondents who identified few health benefits with wine tended to be older ($p=.000$) and less likely to indicate that they drink wine for relaxation ($p=.074$), celebration ($p=.041$), esthetic ($p=.083$), or social reasons ($p=.012$). As expected, those likely to attribute heath benefits to wine were more likely to agree that wine has better health properties than other alcoholic beverages, has more health enhancing properties, can reduce the risk of certain diseases, and believe that wine is a healthy beverage (see Table 3). This high benefit group also was more likely to state that they would drink more wine if it was healthy for them. Interestingly, respondents who were in the few benefits group identified less importance of price, the visual appeal of a wine's label, and, of course, the nutrition attributes/health characteristics associated with the wine (see Table 3). Perhaps most significantly, the high benefit group indicated a willingness to pay more for wine if it were health enhanced. Consistent with this last finding, respondents in the high benefit group were more likely to indicate that they would consume wine with increased resveratrol levels ($p=.000$). Respondents in the few benefits group were more likely to indicate wineries, online health sites, and friends/family as sources of information related to wine health benefits.

3.5. Wine consumer segmentation

To further understand the wine consumer that is influenced by the health aspect of wine consumption, we reduced the dimensions of the variables through a principal component analysis (Jolliffe, 2002). Respondents were asked to characterize seven factors in terms of their importance to the wine purchase, as well as identify the reasons they consume wine (based on a list of ten common reasons). Reasons for consumption and factors important in the wine purchase decision were separately tested for factorability. Use of Kaiser-Meyer-Olkin's measure of sampling adequacy suggested that the variables were appropriate for

dimension reduction, as did Bartlett's Test of Sphericity (Bartlett, 1954; Kaiser, 1974).

Factors important in the wine purchase decision were reduced into three components, explaining more than 65% of the variability. The first component loaded heavily on the extrinsic characteristics of the wine, including price and label. Component 2 loaded heavily on taste and varietal, both intrinsic characteristics of the wine. Interestingly, brand, which is often thought of as an extrinsic characteristic, was closely associated with component two. In this case, brand is likely associated with reputation and knowledge of the wine itself, rather than the more superficial look of the wine as in component 1. The third component loaded heavily on nutrition and ingredients, with brand and price having the least influence. As a result of the loadings, the components were identified as follows: component 1 (extrinsic factors), component 2 (intrinsic factors), and component 3 (health factors).

Reasons for consumption were reduced into four components that were able to explain nearly 60% of the variability associated with the ten variables. As in the case of the important factors, descriptors for the reduced set of components were easily determined based on the loadings associated with the components. Component 1 was closely associated with socialization and celebration. Component 2 was closely associated with enjoyment of wine, food pairings, and health benefits. Component 3 was heavily associated with drinking for esthetic reasons and to aid in socialization, while component 4 was associated with drinking wine due to peer pressure and to try something new. Components were identified as follows: component 1 (social reasons), component 2 (taste reasons), component 3 (appearance reasons), and component 4 (experimental reasons).

Discriminant analysis resulted in the formation of four clusters with statistically significant differences between clusters. Names were assigned to each cluster based on the key characteristics of the clusters and included mature drinkers, influenced drinkers, health conscious consumers, and wine advocates. A summary table of the clusters and their characteristics is provided in

Table 4
Wine consumer segments.

	Cluster 1	Cluster 2	Cluster 3	Cluster 4
Profile name	*Mature drinkers*	*Influenced drinkers*	*Health conscious consumers*	*Wine advocates*
% of sample	20.4%	25.6%	21.3%	32.7%
Wine health benefits identified	2.43	8.36	1.92	2.77
Reasons for consumption	• Social			• Intrinsic factors
		• Taste and appearance		• Influenced by the wine's reputation
		• Influenced by price, availability, label	• Social and celebration	• Esthetic purposes
	• Moderate drinkers	• Youngest		• Heavy wine consumers
	• Oldest group	• Lightest drinkers		• Most knowledgeable about wine
	• Most likely to have existing health issues	• Identify a large number of benefits associated with wine consumption	• Least knowledgeable about wine	• Most likely to read wine labels
		• Willing to increase consumption if more health benefits associated with wine	• Most concerned about effects of food/beverage choices on health	• Most likely to consider wine a healthy alcoholic beverage
		• Most likely to pay for resveratrol enhanced wine	• Least likely to have existing health conditions	• Most likely to recognize the healthy quantity of alcohol to consume
Characteristics				

Table 4. The clusters were fairly equally distributed across the observations, with a ratio of largest to smallest cluster of 1.60. The *mature drinker* tends to be older consumers that are more likely to have existing health conditions, and not particularly interested in changing their moderate wine consumption based on health characteristics of wine. Similarly, *wine advocates* were those consumers that were the most knowledgeable about wine, appeared to be the most interested in the wine's intrinsic characteristics (taste, varietal, etc.) and influenced by the wine's reputation. On the other hand, the *influenced drinkers* and the *health conscious consumers* are perhaps the most interesting segments for exploration with regard to wine health benefits. The *influenced drinkers* segments were the most liberal in their indication of wine health benefits (they identified 8.36 benefits compared to the other segments identification of 2 to 3 benefits). Although they do not drink a lot of wine, *influenced drinkers* recognize wine as a healthy alternative and would be willing to increase consumption if they found out wine was even healthier for them. The *health conscious consumers* tend to be light drinkers, only drinking for social and celebratory reasons. These health conscious consumers are not very knowledgeable about wine and are very concerned about the effects of consumption decisions on their health.

4. Discussion

With the growing competitive landscape in the wine industry, enhanced knowledge of consumer preferences can help wineries and wine retailers improve sales and incorporate new marketing techniques. As the interest in functional food and beverages expands, the health aspect of red wine could be a marketing tool used to set a winery or wine retailer apart from its competitors. Individual wine brands have not been typically marketed using health claims, and it is important for wineries to understand that advertising functional food or beverages have to first meet government standards. Increased regulations on label and advertising claims of functional food and beverages are intended to put some structure in place in order to protect the consumer. Additional regulations certainly apply to marketing an alcoholic beverage from a health/ functional standpoint as well.

Although many questions still remain, this research provides some interesting insight into the relationship between health and consumer behavior when it comes to wine consumption. Consistent with prior research, this survey found that consumers most typically base purchase decisions on taste expectations (50%), price (26%), and varietal (17%). Although nutritional attributes are not considered an important characteristic when consumers purchase wines, consumers believe that wine is a healthier alternative to other alcoholic beverages choices (this finding is consistent with research findings by Wright et al., 2008). In addition, the messages that resonate strongest with the general wine consuming population is that red wine is "healthier" than white wine, red wine can improve the cardiovascular system, and that red wine can lower your cholesterol. All three statements are generally considered true, although as mentioned in the introduction, there is still conflicting research regarding the health benefits of wine (Nature Publishing Group, 2012; Lin et al., 2010).

Research suggests that wine can be manufactured to have higher levels of resveratrol, either through the grape growing process or in the wine making process. Consumers initially appear to have some hesitation about consuming functional wine, such as this, with just 30% of our sample appearing to be on board with consuming this modified wine, even after reading about the potential benefits of resveratrol. However, among those interested in consuming the resveratrol-enhanced wine, the vast majority indicated a willingness to pay for that added benefit. What's more, those consumers that are willing to pay are the ones that are already consuming more wine than average.

Perhaps as a mechanism of prevention, consumers with few health issues were the ones more likely to indicate that they consume wine for health reasons. However, this is also the group that is consuming less wine. Likewise, the respondents who identified the most health benefits associated with wine were the ones most likely to increase consumption if wine were even "healthier" for them and would be willing to pay more for wine with added health benefits. The opportunities presented here are twofold. One, perhaps the relationship between health and wine can be used as a means to increase consumption among consumers who are suffering from health issues and may benefit from red wine consumption. Secondly, there appears to be a segment of the population who recognizes the health benefits of wine, but currently are not drinking much wine. Perhaps there are opportunities to make wine a more frequent choice among that group by further educating them of the health properties of wine and the quantities needed to reap the benefits.

Further research into the consumer segments suggests opportunities with three of the four consumer segments. The *wine advocate* consumer is already knowledgeable about wine, already consuming the most wine, and not likely to be influenced by wine health properties. The other three segments appear to offer some opportunities for marketing. Reaching the *mature drinker* may be effective as they have pre-existing health conditions and know relatively little about wine health benefits. On the other hand, *influenced drinkers* are enthusiastic supports of wine as a healthy beverage, over-assigning health properties to wine. In addition, these *influenced drinkers* are young and do not consume a lot of wine. Finally, the *health conscious* consumer may be a little harder to reach as they are selective regarding their food and beverage decisions and light drinkers, but because their consumption decisions are driven by health considerations, there may be opportunities for marketing wine through a health message.

5. Conclusions

Based on the findings of this study, there is potential to leverage the health aspects of wine as a marketing tool. The survey captured a fairly typical US wine consumer, female, employed full-time, and "interested" in wine and the results suggest that wineries are not the typical location respondents use to seek information about health properties of wine, potentially indicating a differentiation strategy. A little less than half of the respondents stated that the effects of food/beverage intake on their health status are very important. Consumers with few health issues were the ones more likely to indicate that they consume wine for health reasons, suggesting a potential market among consumers with known health issues. Although this is early research on wine health benefits knowledge and a willingness to purchase wine with higher resveratrol levels, the findings suggest insight into how particular groups of consumers think before making wine purchasing decisions.

5.1. Limitations and future research

Although the sample size in this survey is consistent with other published research in the topic area and sufficient to allow comparisons between groups, to further develop this research a larger, more diverse sample population may help to explain some of the additional relationships between consumption decisions and health conditions. This study was confined to non-probability convenience sampling due to limited resources and the exploratory nature of the research and, thus, the generalizability of the findings are limited. Since the results and conclusions of the survey were based on the preferences of residents in the US, the findings may not be entirely extendable to the global wine industry. The results are based on the assumption that each respondent answered the survey honestly and to the best of their capability. It is also assumed that each respondent accurately interpreted the questions being asked in the survey.

While this study uncovers initial relationships between consumers and wine as a health product, future research is needed to understand the complex relationship fully. Natural progressions of this topic would involve research in an experimental setting with wines containing different health properties. In addition, if combined with household health characteristics, household consumption data could be extremely valuable in further understanding the relationship between existing health conditions and propensity to consume wine vs. other alcoholic beverages.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.wep.2015.01.001.

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