



Wine and health perceptions: Exploring the impact of gender, age and ethnicity on consumer perceptions of wine and health

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Abstract

This study explores U.S. wine consumers' perception of wine and health by gender, age, and ethnic background. An extensive body of epidemiological studies suggests that there are health benefits from moderate wine drinking. In light of an increased consumer preference over healthier foods and beverages, it is important to understand the health orientation of wine consumers and the effect of gender, age, or ethnicity on their perceptions of wine and health. An online survey was used to collect data from more than 1000 U.S. wine consumers. The results show that there is a statistically significant difference across demographic segments in terms of the level of health consciousness. Millennials and Asians are the most concerned, whereas Whites are the least, about health in their respective segments. Red wine is considered the healthiest wine type compared to other colors and styles. Moreover, more than 80% of the sample believes drinking red wine is healthier than drinking beer or spirits. However, nearly 50% of the sample thinks sulfites in wine can cause headaches. Managerial implications are discussed.

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Keywords: Wine and health; Demographics; Market segmentation

1. Introduction

The subject of “enotherapy” or “treatment with wine” can be traced back to the ancient Egyptians (Robinson, 2006). From ancient Greece and Rome to the Middle Ages, a wide range of wine's health benefits has been documented, from killing bacteria in drinking water to using as a digestive aid, an antiseptic, or pain reliever (Harding, 2005). Today, wine maintains its linkage to personal health due to myriad research studies confirming that drinking wine in moderation can be beneficial. The health benefits are primarily related to the resveratrol content (found in the skins and tannins of red grapes) of red wine. For example, resveratrol was proven to lower risk of heart disease and stroke, protect against memory loss, and promote long life (Baur and Sinclair, 2006; Anekonda, 2006). Strandberg et al. (2007) reported that red wine drinkers had a 34% lower mortality rate than beer or vodka

drinkers. Similar studies like these have received much attention in the media. With exposure to the marketing claims for nutritional supplements for wellness as a direct result of resveratrol, many Americans have come to embrace the idea that moderate red wine drinking is healthy. Given a growing awareness of healthier foods and beverages, as well as food sourcing and sustainability, around the globe over the past decade, it is of practical importance for wine producers and marketers to have a thorough understanding of consumer perceptions on wine and health by demographic segments.

Wendell Smith (1956) coined the term “market segmentation” by suggesting products would find their maximum potential as a result of understanding different requirements of market segments. The theory of market segmentation provides guidance for a company to develop marketing strategy and allocate scarce resources among its different markets and products to improve profitability. The demographic segment studies are particularly important to the wine industry because wine is becoming a lifestyle beverage for all generations (Bruwer et al., 2011), wine consumption increases with age and experience (Quester and Smart, 1996), and wine

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is perceived as a gender-specific product (Spawton, 2000; Charter et al., 2011). Prior literature has mainly focused on the effect of gender and age on wine knowledge and wine related behaviors; the role of ethnicity was much less discussed. In addition, there have been few segment-based studies focusing on the health orientation of U.S. wine consumers using a large sample.

The main purpose of this paper is to investigate whether U.S. wine consumers have the same orientations toward health and to explain the possible impact of gender, age, and ethnicity on consumer perceptions of wine and health. The study analyzed over 1000 survey responses from U.S. wine consumers across 50 states to investigate the relationship between demographics and consumer perceptions of wine and health. The findings show that there is a statistically significant difference across these demographic segments in terms of health alertness, health self-consciousness, health involvement, and health self-monitoring (Gould, 1988). Such relationship is found to be more prevalent between Whites and African Americans or Asians. Red wine is identified as the healthiest wine type among various wine colors and styles, and more than 80% of the respondents, independent of their gender, age, or ethnicity, believe that drinking red wine is healthier than drinking beer or spirits. Finally, nearly 50% of the sample believes that sulfites in wine can cause headaches. This paper contributes to the literature by providing empirical evidence about U.S. wine consumers' overall health orientation by different demographic segments. It adds to researchers' understanding about consumer perceptions on wine and health and how these perceptions may affect wine consumption behaviors.

The remainder of the paper is organized as follows. The next section reviews the literature. Section 3 describes the research design and methodology. Section 4 presents the results. Section 5 discusses the findings. Section 6 concludes with limitations and future research opportunities.

2. Literature review

2.1. Wine and health

Wine-based studies suggest that there are various psychological and hedonic motives for wine consumption, such as enjoying the taste of wine, pairing wine with food, and the social aspects of wine (Olsen et al., 2007), for symbolic value and perceived health in China (Liu and Murphy, 2007), and for pleasure, lifestyle patterns, and situational factors such as health concerns (Charters and Pettigrew, 2008). Studies have also explored the idea of health as a motive for wine drinking, but offered contradictive evidence. Scholars have documented that moderate consumption of wine may produce beneficial results, including decreased risk of stroke, diabetes, and heart disease (Shen et al., 2015; O'Keefe et al., 2014). Sacco et al. (1999) even indicated that any type of alcohol consumption in moderation such as wine, beer, or spirits would have positive health benefits. It should be noted that the findings of scientific research have linked alcohol consumption to negative health outcomes as well (National Cancer Institute, 2016). For example, alcohol consumption has been linked to various

forms of throat, liver, and colon cancers, and wine consumption in particular may increase blood pressure and increase the chance of breast cancer in women (Schatzkin et al., 1987; O'Keefe et al., 2014).

On the other hand, sulfites have been added to wine production to prevent oxidation and spoilage since the Roman era (Lyons, 2014), and many consumers believe that sulfites in wine, especially red wine, cause headaches (Costanigro et al., 2014), even though people who are allergic to sulfur often develop a bad asthmatic reaction instead of headaches. Such a perception, combined with an individual health consciousness level, may result in altered wine purchasing behavior and wine consumption. For example, some consumers drink only white wine in the mistaken belief that it has less sulfites. Others purchase only organic wine that is presumably made with a smaller amount of added sulfites.

Nonetheless, many consumers remain optimistic about the health benefits of wine (Costanigro et al., 2014). Such views, to a certain extent, may be attributable to the media reporting on the so-called "French Paradox", which refers to lower incidence of coronary heart disease among the French despite a diet high in saturated fat and cholesterol (Renaud and de Lorgeril, 1992). Because wine consumption was common within the French diet and wine contains antioxidants, the health benefits of wine became the focus of academia as well as the media. For example, a CBS news segment of "60 min" did a story on the "French Paradox"; it interviewed researchers from the U.S. and France who suggested that drinking red wine in moderation and on a regular basis might be the main cause of lower rate of heart disease (Prial, 1991). The resulting effect on sales of red wine was evidenced by a 40% increase in U.S. red wine sales in the following months after the show was aired in November 1991; this positive effect was replicated when "60 min" rebroadcasted the show a year later (Emsley and Fell, 2001).

However, social policy on alcohol consumption in France has focused on lowering alcohol consumption due to concerns of overindulgence that could lead to behavioral and/or health problems (Moran and Saliba, 2012). Similarly, advertising the health benefits of moderate wine consumption is generally not recommended in the United States due to regulatory concerns. The Alcohol and Tobacco Tax & Trade Bureau (TTB) regulates alcohol labeling and advertising practices and explicitly prohibits any health related statements that are false or misleading. Moreover, health claims and health related statements will subject to a thorough review (The Alcohol and Tobacco Tax & Trade Bureau (TTB), 2015). Consequently, most wineries in the United States do not mention the health benefits of wine on their labels or in their promotions to avoid any potential fines and/or loss of business permits.

2.2. Health consciousness

The concept of health consciousness refers to an individual's comprehensive orientation towards overall well-being and health. Health consciousness has multiple dimensions ranging from integration of health behaviors, psychological or inner

state, health information seeking and usage, personal responsibility, and health motivation (Hong, 2009). Prior studies suggest that an individual's health consciousness helps shape one's health attitudes and influence one's behaviors (Furnham and Forey, 1994; Gould, 1988, 1990). Others document that the level of health consciousness is closely related to how an individual seeks and responds to health information (Basu and Dutta, 2008; Iversen and Kraft, 2006).

With respect to the information-seeking aspect of health consciousness, a number of studies found significant differences existed across gender and age groups. For example, Rice (2006) analyzes multiple data sets from Pew Internet and American Life Project and finds that female gender identification is the most consistent predictor of frequent health information seeking, consistent with the view that women are more active seekers of health-related information than men (O'Keefe et al., 1998; Renahy et al., 2010). Older adults are more concerned about their current and future health state (Norman, 1985; Stoller and Pollow, 1994), more frequently seek information on nutrition to better control their overall well-being (Manafa and Wong, 2012), and are generally regarded as consumers with high health consciousness (Macias and McMillan, 2008).

2.2.1. Gould's (1988) Health consciousness scale

Unlike other scholars, Gould (1988) interpreted health consciousness as an individual's psychological or inner-state orientation to health alertness, involvement, and self-monitoring of one's health. Therefore, Gould's Health Consciousness Scale was designed at a cognitive level and focused on an individual's health self-perception. The 9-item scale includes four sub-dimensions (Ibid, p102): health alertness ("I am alert to changes in my health", "I'm usually aware of my health"), health self-consciousness ("I reflect about my health a lot", "I'm very self-conscious about my health", "I'm generally attentive to my inner feelings about my health"), health involvement ("I'm constantly examining my health", "I'm very involved with my health"), and health self-monitoring ("I'm aware of the state of my health as I go through the day", "I notice how I feel physically as I go through the day").

This paper adopts this scale for the purpose of exploring the different levels of health consciousness among wine consumers within demographic segments. If health self-perception plays an important role in the person's wine related behaviors; then any significant difference found between these segments could be useful for wine producers and marketers in determining their operational and marketing strategies. The subsequent related analysis and discussion are focused on these four sub-dimensions, where applicable.

2.3. U.S. Wine consumer demographics

The United States is home to more than 324 million people, according to the U.S. Population Clock as of July 2016. Based on the 2010 U.S. Census, 49% were male and 51% female. In terms of age group or generation, 27% were Millennials (ages 21–37), 14% Gen Xers (ages 38–49), 23% Boomers (ages 50–

68), and 9% over the age of 69. The remaining individuals were under the legal drinking age of 21 and thus not ethically considered in a U.S. wine consumer study.

We used the U.S. Census definitions to categorize the ethnic groups.¹ According to 2010 Census Data, about 64% of the population reported their race as White/Caucasian, 16% Hispanic, 5% Asian, and 13% African American. Over next 50 years, the composition of racial and ethnic demographics in the United States will change drastically because of increased Asian and Hispanic immigrant populations and lower birth-rates for White Americans. Specifically, the U.S. population is projected to be 46% White, 24% Hispanic, 14% Asian and 13% African American by the year 2065 (Pew, 2015). It is partially due to this phenomenon that marketers from many industries are investigating diversity marketing.

With respect to wine consumers, however, the picture is somewhat different. Currently only 35% of the U.S. population consumes wine, with an estimated 11 l per capita (Wine Market Council, 2015). According to a recent Nielson study (2016), the estimated demographics of American wine consumers are 43% male and 57% female. In terms of ethnicity, wine consumers are 70% White, 11% African American, 13% Hispanic, and 5% Asian - White Americans currently drink more wine than the other three ethnic segments combined. In addition, Nielson reports age of wine drinkers, instead of generation, by different age groups as follows: ages 21–34=21%; ages 35–44=16%; ages 45–54=18%; ages 55–64=21%; and ages 65 and over =24% (as shown in Table 1).

3. Methodology

An online survey instrument was developed to collect information regarding American wine consumer preferences, behaviors, and demographics. The research on consumer perceptions on wine and health was part of the 35-question survey instrument, which used standard 5-point Likert scales, simple rating questions, and questions requiring short answers. The definitions provided by the Wine Market Council (2015) to define generations were used: Millennials (age 21–37); Gen Xers (38–49); Boomers (50–68); Swing (69–81); and WWII (82 and over). However, Millennials were further segmented into two age categories because Bureau of Labor Statistics (2014) showed that Young Millennials in their 20's spent less than Old Millennials in their 30's.² Moreover, research on wine consumption of Millennials suggested that Old Millennials drank more wine than Young Millennials (Thach and Chang, 2016). Finally, we used U.S. Census definitions to identify ethnic groups as follow: White/Non-Hispanic, Hispanic, Asian, African American, and Native Americans, Pacific Islanders and Mixed.

¹The ethnic group definitions by U.S. Census: <http://www.census.gov/prod/cen2010/briefs/c2010br-02.pdf>

²In 2014, households headed by older Millennials spent an average of \$49,547. Households headed by younger Millennials averaged only \$32,179. More information is available at: <http://www.bls.gov/>

Table 1
Sample demographics compared to other sources.

	Sample	U.S. Census (2010)	Nielson*
Gender			
Male	41%	49%	43%
Female	59%	51%	57%
Age Group			
21–29 Young Millennials	27%	20–29: 14%	21–34: 21%
30–37 old Millennials	29%	30–39: 13%	35–44: 16%
38–49 Gen Xers	23%	40–49: 14%	45–54: 18%
50–68 Boomers	21%	50–69: 23%	55–64: 21%
69+	n/a	70+: 9%	65+: 24%
Ethnicity			
African American	11%	13%	11%
Asian	11%	5%	5%
White/Caucasian	65%	64%	70%
Hispanic	13%	16%	13%

*Nelson (2016) U.S. wine demographics study.

Measures for wine related behaviors were adapted from previous research. For the purpose of this study, we adopted Gould's (1988) Health Conscious Scale to gauge our understanding about American wine consumers overall health orientations. In addition, we included a 3-items questionnaire related to statements about healthy type of wine compared to other alcohol beverages, along with a statement about possible negative health effect by sulfites in wine. We also included a question about healthy wine types and style choices to examine the effect of demographics on consumer perceptions about healthy wine colors and styles.

A representative sample of the American population was sought through the use of quota sampling technique across selected socio-demographics of gender, age, and ethnicity. The sampling protocol required that all respondents must be wine drinkers over the age of 21, all 50 states be included in the sample, at least 10% from the four major ethnic groups (White, Hispanic, Asian, and Black), that gender be at least 40% male to match US wine consumption statistics (Nielsen, 2016). The survey was pilot tested and minor revisions were made based on the feedback. Survey Sampling International, a panel data provider conducted the survey, which was launched on Survey Monkey for a period of two weeks in spring of 2015.

A total of 1109 responses were received at the end of the survey period. Some survey responses had to be discarded because they were either incomplete or there were not enough responses. For example, we did not include Native Americans, Pacific Islanders, Mixed race and respondents age 69+ in the study due to lower number of usable responses. Therefore, the final number of completed and usable surveys for gender was 1054, generation was 1055, and ethnicity was 1028.

Statistical analyses were performed using SPSS 22.0. In general, a one-way ANOVA was used to determine whether there was an overall significant difference in group means among these demographic segments. Because ANOVA did not provide information about which specific groups differed, the Tukey's honestly significant difference (HSD) post hoc test

was performed. In the case of the assumption of homogeneity of variance was violated based on Levene's test, a non-parametric equivalent Kruskal-Wallis test was conducted, followed by the Dunn-Bonferroni post hoc test.

4. Results

4.1. Sample demographics

As shown in Table 1, about 41% of the respondents were men and 59% were women, closely matched with the Nielson study (2016) on the gender of U.S. wine consumers. The percentages for the four generation groups were relatively even ranging from 27% Young Millennials, 29% Old Millennials, 23% Gen Xers, and 21% Boomers. Although it was not a perfect match for U.S. Census or Nielson numbers, it supported Wine Market Council (2015) statistics showing that Millennials consume more wine than Boomers or Gen Xers.

In terms of ethnicity, the final sample was 11% African American, 11% Asian, 65% White, and 13% Hispanic. The domination of White / Caucasian sample was largely representative of the general population based on U.S. Census (2010). With respect to American wine consumers, our sample numbers exactly matched the Nielson (2016) statistics for African Americans and Hispanics.

4.2. Health perceptions by gender, generation and ethnicity

In order to understand our respondents' orientation toward health, we utilized four sub-dimensions of Gould's (1988) Health Consciousness Scale, which consists of a 9-item instrument as mentioned in Section 2.2.1. We asked our respondents to indicate to what extent these statements describe themselves on a five-point Likert Scale (1=Not like me at all, 2=Describes me a little, 3=Describes me about fifty-fifty, 4=Describes me fairly well, 5=Describes me very well). Table 2 reports the results of statistical analyses related to American health perceptions by segments.

In general, men are more concerned about their own state of health than women. Both genders are equally alert to any changes in their health and physical well-being as they go through daily routine activities. However, the mean scores on health self-consciousness and health involvement are statistically significant at the $\rho \leq 0.05$ level, suggesting that men and women are different in terms of how much they think about their health and how often they physically examine their health.

The level of health consciousness is significantly different across generation groups at the $\rho \leq 0.05$ level for three out of four sub-dimensions. Based on the magnitude of mean scores, it appears that Millennials are much more concerned about their health when compared to Gen Xers and Boomers. The same observation remains when using Kruskal-Wallis test to investigate the mean rankings. Kruskal-Wallis is a nonparametric equivalent to ANOVA for health self-consciousness and health self-monitoring (descriptive as shown in Fig. 1a and b). It is possible that such orientation toward their own health help

Table 2
Results from statistical tests.

Comparison	Test*	n	Health consciousness		
			df	Test statistic	P-Value
<i>Health Alertness</i>					
Gender (Male, Female)	ANOVA	428,626	1	(F) 1.769	0.184
Generation (Young Millennials, Old Millennials, Gen Xers, Boomers)	ANOVA	290,305,241,219	3	(F) 2.471	0.060
Ethnicity (African American, Asian, Caucasian, Hispanic)	ANOVA	111,110,673,134	3	(F) 3.983	0.008
<i>Health Self-Consciousness</i>					
Gender (Male, Female)	ANOVA	428,626	1	(F) 4.295	0.038
Generation (Young Millennials, Old Millennials, Gen Xers, Boomers)	Kruskal-Wallis	290,305,241,219	3	(H) 35.739	0.000
Ethnicity (African American, Asian, Caucasian, Hispanic)	Kruskal-Wallis	111,110,673,134	3	(H) 26.601	0.000
<i>Health Involvement</i>					
Gender (Male, Female)	ANOVA	428,626	1	(F) 7.113	0.008
Generation (Young Millennials, Old Millennials, Gen Xers, Boomers)	ANOVA	290,305,241,219	3	(F) 10.892	0.000
Ethnicity (African American, Asian, Caucasian, Hispanic)	Kruskal-Wallis	111,110,673,134	3	(H) 24.587	0.000
<i>Health Self-Monitoring</i>					
Gender (Male, Female)	ANOVA	428,626	1	(F) 1.486	0.223
Generation (Young Millennials, Old Millennials, Gen Xers, Boomers)	Kruskal-Wallis	289,305,241,219	3	(H) 16.439	0.001
Ethnicity (African American, Asian, Caucasian, Hispanic)	ANOVA	111,110,672,134	3	(F) 5.422	0.001

*ANOVA tests were used to investigate the parametric data, whereas Kruskal-Wallis tests were used for nonparametric data.

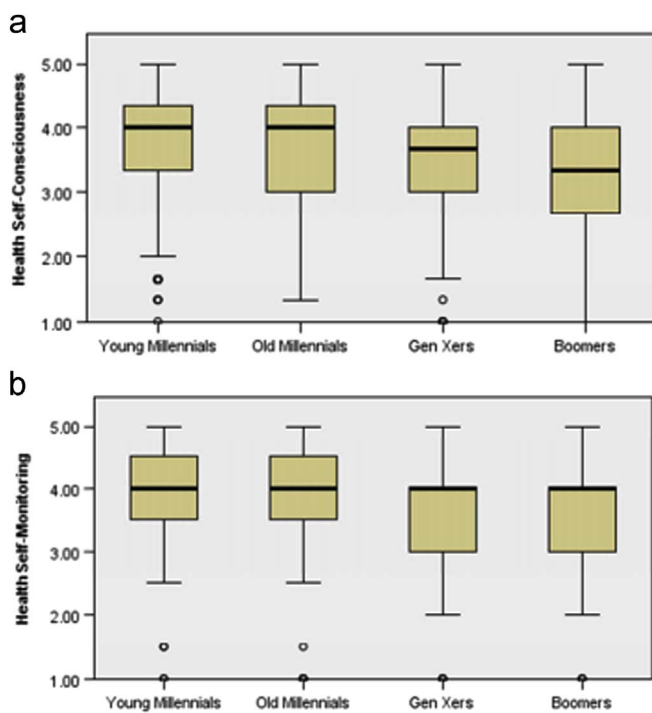


Fig. 1. Health self-consciousness (a) and health self-monitoring (b) by age results. The line represents the median value, the shaded box represents the inter-quartile range, and the whiskers represent the maximum and minimum value. The outliers is excluded from the minimum value and shown as a circle.

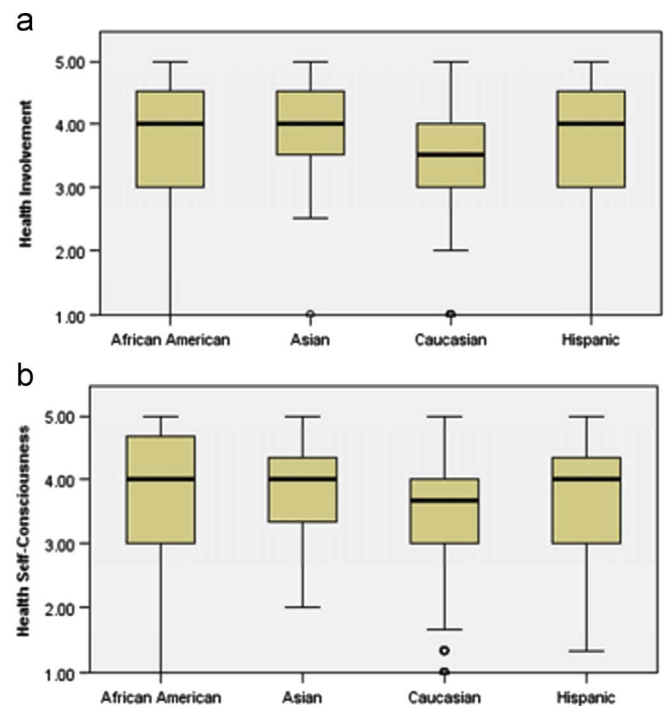


Fig. 2. Health self-consciousness (a) and health involvement (b) by ethnicity results. The line represents the median value, the shaded box represents the inter-quartile range, and the whiskers represent the maximum and minimum value. The outliers is excluded from the minimum value and shown as a circle.

Millennials shaping their interest in specialty and organic/all-natural foods and making healthy life style choices that are different from older generations (Hoffman, 2012).

Similar observations can be found for ethnic groups where the level of health consciousness is significantly different at the $\rho \leq 0.05$ level in terms of health alertness, health self-consciousness, health involvement, and health self-monitoring. The

results from ANOVA analysis suggest that African Americans and Asians are more concerned about their health compared to Hispanics and Whites. Interestingly, White Americans are the lowest in terms of health consciousness level when compared to other three ethnic groups. A Kruskal-Wallis test shows that there is a statistically significant difference in health self-consciousness and health involvement between ethnic groups,

Table 3A
Health perceptions by age groups.

Comparison	Difference		
	Mean/Rank	Std. error	P-Value
<i>Health Alertness</i>			
Gen Xers - Old Millennials	-0.20	0.08	0.047
<i>Health Self-Consciousness</i>			
Boomers - Young Millennials	114.65	27.06	0.000
Boomers - Old Millennials	128.79	26.78	0.000
Gen Xers - Young Millennials	93.47	26.35	0.002
Gen Xers - Old Millennials	107.61	26.06	0.000
<i>Health Involvement</i>			
Boomers - Young Millennials	-0.25	0.09	0.018
Boomers - Old Millennials	-0.38	0.08	0.000
Gen Xers - Young Millennials	-0.25	0.08	0.012
Gen Xers - Old Millennials	-0.39	0.08	0.000
<i>Health Self-Monitoring</i>			
Boomers - Old Millennials	83.12	26.27	0.009
Gen Xers - Old Millennials	82.70	25.56	0.007

Note: Results were from Tukey's HSD post hoc or Dunn-Bonferroni pairwise comparisons.

Table 3B
Health perceptions by ethnic groups.

Comparison	Difference		
	Mean/Rank	Std. error	P-Value
<i>Health Alertness</i>			
Caucasian - African American	-0.23	0.09	0.062
Caucasian - Asian	-0.24	0.09	0.049
<i>Health Self-Consciousness</i>			
Caucasian - African American	83.99	30.18	0.032
Caucasian - Hispanic	-85.19	27.87	0.013
Caucasian - Asian	124.56	30.30	0.000
<i>Health Involvement</i>			
Caucasian - Hispanic	-78.42	27.69	0.028
Caucasian - African American	85.64	29.99	0.026
Caucasian - Asian	117.76	30.10	0.001
<i>Health Self-Monitoring</i>			
Caucasian - Asian	-0.23	0.09	0.056
Caucasian - African American	-0.29	0.90	0.007

Note: Results were from Tukey's HSD post hoc or Dunn-Bonferroni pairwise comparisons.

with a similar tendency where White/Caucasian is distinguished from other groups (descriptive as shown in Fig. 2a and b).

In order to identify exactly which group differed from each other or whether such significance was due to mere chance, post hoc tests were performed and the results are presented in Tables 3A and B for significant age and ethnic groups, respectively. Table 3A reports the significant results from post hoc tests between age groups. While their orientations toward health are similar, Millennials are significantly different from Gen Xers and Boomers in terms of health self-consciousness and health involvement. Moreover, Young (but not Old) Millennials have the same level of awareness about their physical well-being and changes in health as Gen Xers and Boomers. Additionally, Old Millennials are different from

Boomers in monitoring their own health when they are going through the daily physical routines.

Table 3B reports the significant results from post hoc tests between ethnic groups. It is clear that the significant results between groups observed in ANOVA or Kruskal-Wallis tests was primary driven by the differences in overall health orientations between White/Caucasian and other ethnic groups.

4.3. Health perceptions about Wine vs. Beer/Spirits and sulfites

To understand wine consumers general perception about healthy types of alcohol beverages and possible health concerns about sulfites in wine, respondents were asked about the level of agreement with three following health-related statements: "I believe wine is healthier to drink than beer", "I believe wine is healthier to drink than spirits (e.g. vodka, gin, etc.)", and "I believe the sulfites in wine can give some people headaches". Respondents were not given any instruction about what level of daily consumption of wine is considered healthy nor a list of health benefits of drinking wine.³ A 5-point Likert scale was used with 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, and 5 = strongly agree.

When asked about their perception of healthy types of alcohol beverages, about 80% of our respondents agree or strongly agree that wine is healthier to drink than beer or spirits, independent from their gender, age or ethnic background. Only 3.6% of the sample indicates disagreement with the statements. Such a result is largely consistent with prior studies (Shen et al., 2015; O'Keefe et al., 2014). On the other hand, the results show that about half of the sample agree or strongly agree with the statement "I believe the sulfites in wine can give some people headaches". Again, such agreement is seen in similar patterns across different demographic segments. However, the disagreement appears to be much higher compared to other two statements, ranging from 10% for Whites to 16% for African Americans.⁴

Table 4 presents the results from one-way ANOVA analysis. Men and women have the same perception that drinking wine is healthier than drinking beer or spirits. However, they have different views on whether the sulfites in wine may give some people headaches ($\rho \leq 0.05$). Based on the magnitude of mean scores, women are more likely than men to believe the sulfites in wine cause headaches, consistent with prior studies indicating women are more actively seeking health-related information offline or online (O'Keefe et al., 1998; Renahy et al., 2010), thereby are more perceptive to the information. It is interesting to find that there is no apparent difference between Millennials and their older counterparts related to these statements, even though there are obvious differences in their lifestyle choices.

While the respondents tend to agree with these statements, the results suggest that there is a statistically significant difference at the level of $\rho \leq 0.05$ for at least two ethnic

³We thank and acknowledge an anonymous reviewer's comment.

⁴Results are not reported here.

Table 4
Wine health statement perceptions by segment.

	I believe wine is healthier to drink than beer	I believe wine is healthier to drink than spirits (e.g. Vodka, gin, etc.	I believe the sulfites in wine can give some people headaches
Gender			
Male	4.15 (0.79)	4.19 (0.78)	3.53 (0.96)
Female	4.12 (0.77)	4.17 (0.76)	3.71 (0.93)
<i>p</i> -Value	0.602	0.783	0.004
Age Group			
Young	4.21 (0.72)	4.16 (0.75)	3.66 (0.94)
Millennials			
Old	4.13 (0.77)	4.17 (0.77)	3.69 (0.95)
Millennials			
Gen Xers	4.14 (0.80)	4.20 (0.76)	3.53 (0.95)
Boomers	4.13 (0.78)	4.20 (0.78)	3.64 (0.95)
<i>p</i> -Value	0.108	0.902	0.261
Ethnicity			
African American	4.31 (0.83)	4.31 (0.81)	3.44 (1.04)
Asian	4.10 (0.80)	4.31 (0.81)	3.64 (0.95)
White/Caucasian	4.09 (0.77)	4.15 (0.75)	3.70 (0.94)
Hispanic	4.22 (0.72)	4.22 (0.77)	3.50 (0.93)
<i>p</i> -Value	0.024	0.226	0.017

Note: Mean scores with standard deviations in parenthesis.

groups in terms of believing wine is healthier than beer or believing the sulfites in wine cause headaches. Tukey's post hoc test indicates that such significance existed only between White/Caucasian and African American groups.

4.4. Health perceptions on wine colors and styles

We did not specify wine color or style on the 3-item questionnaire in Section 4.3. However, prior studies have largely reported health benefits of drinking still red wine because it contains more resveratrol than other wine colors and styles. To explore whether the respondents had a specific wine type in mind when they answered the questionnaire or if the respondents believed drinking any type of wine could be good for their health, we asked our respondents the following question: "Which types of wine do you think are most healthy? Please check all that apply." Responses included red, white, rosé, sparkling, and fortified wine. We used cross tabulation and *Chi-Square* test to compare the relationship between the wine types and demographic segments.⁵

In general, at least 85% of the respondents from each segment selected red wine as the healthiest wine type. Additionally, the level of the agreement on red wine was very similar across gender, age, or ethnic groups. The next healthy wine type selected was white wine (up to 43%), followed by rosé (up to 24%), sparkling (up to 20%), and fortified wine (up to 8%). Several significant differences (at the $\rho \leq 0.05$ level) emerged from the analysis. First, men and women have different health perceptions on white and rosé wines. Men

appeared to believe white and rosé were healthier wine types than did women. Second, Old Millennials were most likely to consider white, rosé and sparkling wines as healthier wine types compared to any other age groups. Finally, about 20% of African Americans selected sparkling wine as a healthier wine type while only 8% of Whites did.

5. Discussion

The results of this study indicate that, in general, American wine consumers are concerned about their health, believe that wine is a healthier alcohol beverage to consume than beer and spirits, and consider red wine the healthiest wine type. The study was able to document a general consumer perception about wine and health. These perceptions might be as a direct result of media exposure (e.g. television shows, news articles, and online discussions) on the subject. Because the level of health consciousness appears to have a strong influence on personal choices related to food and beverage consumption, the findings have several business implications as described below.

First, Millennials are more concerned about their health relative to Gen Xers and Boomers, despite the view that health consciousness increases with age and that older generations are more health conscious (Macias and McMillan, 2008). Such findings may explain why Millennials care about the sourcing and sustainability of food and tend to make healthy lifestyle choices. For example, Millennials favor natural and organic ingredients, locally grown and made products free from GMOs and allergens, global ingredients and flavors, and food that is fresh, prepared, and convenient (The Hartman Group, 2015). A successful marketing strategy should consider Millennials' needs for adventurous, experiential, affordable, and healthy tastes.

Second, Asians are the most health conscious group in our sample. According to Pew Research Center (2015), the Asian population in the US will increase from 5% in 2010 to an estimated 14% in 2065 due to increased immigration. The effect of Asian cultures rich in food may have a definitive impact on the food and beverage sector in the United States. Chen (2009) studies attitudes toward organic food among the Taiwanese and finds that concern for one's health is the most commonly stated motive for purchasing organic foods. Symbolic value (e.g. status, prestige, etc.) aside, wine is considered a healthy alternative to other alcoholic beverages in China, so much so that the Chinese government actually encourages wine consumption for health reasons (Nelson, 2011). It is conceivable that U.S. wine producers and wine marketers need to focus on the health attributes of wine when they market their products to this segment.

Third, the perception that wine is healthier than beer or spirits is independent from gender, age, or ethnic background is a positive finding for wine marketers. Although TTB regulations may limit the ability of U.S. wine marketers to advertise the health benefits of wine through regular channels, it is possible for wine professionals to mention research studies highlighting the health benefits from moderate and regular

⁵Cross tabulation results are not reported here.

wine consumption in face to face settings with customers, such as winery tasting rooms, restaurants, and fine wine shops.

Fourth, about 50% of the sample believes that sulfites in wine can cause headaches, despite of prior studies have stated otherwise (Gaiter and Brecher, 2000). This should be of concern to wine marketers and educators. Possible ways to educate the public and change such perception may include (1) promoting research findings about the real cause of headaches after drinking wine (i.e. histamines or tannins) through different media outlets; (2) highlighting the history and usefulness of sulfites in preserving food and beverages during the manufacturing process; and (3) mentioning the fact that many other foods (e.g. dried fruit, fresh vegetables and fruit, etc.) contain far more sulfites than those can be found in a bottle of wine.

Finally, several unexpected results emerged from the analysis of segmented data. For example, more African-Americans (20%) perceive sparkling wine as healthy than people from any other ethnic groups. It is possible that African-Americans may be more convinced by the popular belief that bubbles can help with digestion. Hammond et al. (2014) point out that African Americans demonstrate a thirst to elevate their wine knowledge and wine involvement based on a focus group study. This presents an opportunity for wine professionals to design a better strategy to reach out and connect with this segment. In terms of health consciousness, we find that White/Caucasian is the least concerned among all ethnic groups about health. Such overall health orientation from White/Caucasian wine consumers is rather puzzling and may have significant implications beyond the wine sector; it deserves more research attention from various disciplines to help understand it.

6. Limitations and future research

This study used a non-probability quota sampling technique to collect data due to limited resources. Despite the fact that it allowed a better representation of specific groups within the general population and was easier to implement, it was impossible to detect a potential sampling error due to the fact that the sample was not chosen through a random selection procedure. Because the sample may be biased, which in turn may lead to difficulties in generalizing the results, findings from this study should be interpreted with caution. In addition, the percentages for Asian and White/Caucasian segments, as well as for different generations included in the sample did not exactly matched with the American wine consumer demographics compiled by Nielson (2016). This could have created over- or under- representation issues that may affect the reliability of the results. Future studies may use a random sample, large enough to allow refined ethnic segmentation, to correct these problems.

This paper provides empirical evidence at a cognitive level that Millennials are more concerned about their health relative to older generations, surprisingly against the expectation that the level of health consciousness grows in direct proportion with age. This is interesting especially in light of the fact that

Millennials are now the largest demographic segment of the U. S. population (Wine Market Council, 2016) with 43% of them reported as non-White (Lilley, 2014). Moreover, Millennials have consistently gained market share of high frequency wine drinkers, while Boomers and Gen Xers are gradually losing market share (Franson, 2016). Future research may explore the mediating effect of health consciousness on the relationship between cultural diversity and wine related behaviors of Millennials.

Because TTB regulations prohibit false advertisement of wine health benefits and impose a stringent review process on any health-related claims, studies on wine and health especially those have focused on health as a motive for wine consumption are relatively limited. Nevertheless, many Americans drink wine for perceived health reasons obtained from various informal or formal channels. The discussion of wine health benefits is relevant as the U.S. population becomes more diversified due to an increased immigrant population from countries where wine is considered part of the food chain and the health benefits of wine are constantly promoted. Future studies on this topic are needed because consumers and wineries and/or wine marketers will benefit from more accurate knowledge about wine and health.

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