

*Article*

## Assessing the Age Effect on Consumer Attitudes and Willingness to Pay for Sustainably Produced Wine: A Transnational Analysis

Daniel Moscovici <sup>1,2,\*</sup>, Jeff Gow <sup>2,3</sup>, Lionel Valenzuela <sup>4</sup>, Rezwanul Rana <sup>5</sup>, Adeline Alonso Ugaglia <sup>6</sup>, Radu Mihailescu <sup>7</sup>

<sup>1</sup> Department of Environment Studies & Sustainability, Stockton University, Atlantic City, NJ 08205, USA

<sup>2</sup> School of Business, Faculty of Business, Education, Law and Arts, University of Southern Queensland, Toowoomba, QLD 4350, Australia

<sup>3</sup> Department of Agricultural Economics, Stellenbosch University, Stellenbosch 7600, South Africa

<sup>4</sup> Departamento de Ingeniería Comercial, Universidad Técnica Federico Santa María, Santiago 7630000, Chile

<sup>5</sup> Macquarie University Centre for the Health Economy, Macquarie Business School & Australian Institute of Health Innovation, Macquarie University, Macquarie Park, NSW 2113, Australia

<sup>6</sup> Department of Economics and Management, Bordeaux Sciences Agro, Gradignan 33170, France

<sup>7</sup> Economics, Hotel Management School, NHL—Stenden University of Applied Sciences, Leeuwarden 8917 DD, Netherlands

\* Correspondence: Daniel Moscovici, Email: daniel.moscovici@stockton.edu.

---

### ABSTRACT

There is increasing interest in the environmental sustainability of consumer food and drink. This is especially true for younger people. An interesting case study to examine is wine. This research focuses on consumers by age and their attitudes towards sustainability produced wine. While there are many different environmental wine certifications, there is interest in if and how consumers attitudes to sustainable wine differed by age. For this purpose, the study asks if young wine consumers would prefer sustainably produced wines and if they are willing to pay more compared to older consumers, and what factors influence these behaviors. To conduct the research approximately 2500 wine consumers are surveyed, online, in seven prominent wine nations including: the United States, South Africa, Netherlands, Italy, France, Chile and Australia. Descriptive statistics and the two-sample *t*-test analyze the which factors determine consumers preferences towards sustainably produced wines. Also, Pearson's chi-squared test and ordinal logistic regression with marginal effects is used to examine whether the willingness to pay a premium for sustainably produced wines differs significantly based on age. Findings indicate that younger people believe drinking sustainably produced wine is more important as compared to older individuals. Also, transnationally, younger individuals do have a higher willingness to pay

### Open Access

Received: 26 June 2024

Accepted: 13 August 2024

Published: 23 August 2024

Copyright © 2024 by the author(s). Licensee Hapres, London, United Kingdom. This is an open access article distributed under the terms and conditions of [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).

for sustainably produced wine compared to older individuals. The most important factor determining willingness to pay a premium is holding the view that sustainable certification of wine is important. Future research should continue to question younger consumers and rank their importance of the different sustainability and eco-certifications.

**KEYWORDS:** wine; age; millennials; demand; sustainability; environment; global

---

## INTRODUCTION

There are many distinct types of wine consumers located around the world and a variety of studies have attempted to understand what motivates them to purchase wine. Is it because of their age, gender, the price, expert rating, or what is on the label? And now, new considerations include the environmental or sustainability impact of the wine, specifically if that wine has a certification [1].

Many studies have studied the impact that age has on purchasing and consumption [2–4]. Millennials, also known as echo boomers, generation y, or nexters, were found to go to tasting rooms, but do not purchase as much as the older customers [5]. There is some discrepancy in the literature as to who consumes the most wine. One study shows younger people consume more wine [6], and another posits they consume less [7]. Other studies have concluded that younger people have a greater awareness for the environment and might be motivated to purchase sustainably produced wines, in their respective countries [8–14]. This study seeks to clarify this confusion and gap in the literature and to analyze it at a transnational level.

Research has found that millennials are motivated to buy wine when exposed to promotion and labelling [15,16]. They are ready to pay more for wines, use the internet to find an appropriate price, and tend to consume a higher share of white wines [7,17]. Millennials are moved by wine advertising that shows people relaxing and having fun. They insist on innovative labelling and packaging [18]. Further studies found that younger consumers aged 31 to 40 often lack self-confidence in buying a bottle of wine [19]. Conversely, another study, based on French consumers, found that older consumers were more likely to buy organic wines [20].

This research believes that younger consumers will be more likely to buy and pay more for sustainably produced wines. After all, younger generations are more concerned with energy conservation and carbon impacts of a winery [3] and millennial women, who live in urban areas are also concerned about the carbon effect of their wines [13]. Conversely, the youngest consumers, with above average incomes, buy more wine, at a lower price, and are not interested in promotions and certifications [21]. The literature has very mixed and inconsistent results on the age effect on

attitudes towards sustainable wine and it seems to differ based on the country where the study was conducted.

In a study of U.S. millennials, [22] identified significant differences in how younger versus older consumers search for and select wines. Millennials differed by gathering information from talking to friends/family and store employees and purchased wine based on medals won, label imagery and alcohol content, rather than origin and price. Another U.S. based study by [23] surveyed 540 wine consumers and the results demonstrated the importance of eco-labels to positively influence purchase intention, quality perception and attitudes towards sustainably produced New Zealand wine. [24] questioned 2000 Italian wine consumers and results indicate that millennials regard sustainability in wine consumption as a more important issue than older consumers. With respect to gender, females have a greater tendency to consider the environmental, social and the economic components compared with males.

Meanwhile it seems that sustainability is not a factor in the purchasing of wine [25], or it just depends where the individuals live. Young Italians would pay more for sustainably certified wines [11]. California wine consumers also value sustainable production [8]. Positive and environmental awareness is an important factor for Italian consumers [11,26,27], those in Austria [28], and individuals in Spain [29]. Also in France [30], conducted an interesting analysis of 128,182 French wines and found that third party certified sustainable wines received higher expert ratings (average 6% higher) and by implication the potential for consumers to pay more for the eco-certified wine.

In an attempt to clarify the age effect of consumers with respect to sustainable wines and a willingness to pay for these wines, this paper analyzes the differences between younger (18 to 44 years) and older (45 years and older) consumers with respect to sustainably certified wines and their willingness to pay (WTP) a premium for it transnationally in seven countries (the United States, South Africa, Netherlands, Italy, France, Chile and Australia). Given that most of the existing literature is focused solely on one country or region, this study attempts to fill a void in the literature by using a transnational approach in hopes of ascertaining what is happening at a more global level. The methodology includes the use descriptive statistics and the two-sample *t*-test to analyze the significant factors which determine consumers attitudes towards sustainably produced wines. Also, Pearson's chi-squared test and ordinal logistic regression with marginal effects is used to examine whether the willingness to pay a premium for sustainably produced wines differs significantly based on age.

In this context the following six hypotheses have been developed. It is believed that younger consumers, compared to older consumers, will be more likely to:

H1: buy sustainably produced food and wine.

H2: view sustainable certification as important.

H3: be willing to pay a premium for sustainably certified wine.

The rationale for these hypotheses is the belief that younger consumers have a greater interest in their impacts on the environment and greater knowledge about sustainability protocols compared to older consumers. While they may have less funds at this age, they will place a greater importance on buying a sustainably produced product so will spend more compared to those who are older and have more disposable income.

When comparing younger consumers to older consumers the factors that affect willingness to pay a premium for sustainably produced wines are hypothesized as:

H4: an increase in age has a negative influence.

H5: gender, education, income, wine knowledge has no influence.

H6: previously purchased sustainably produced products has a positive influence.

The rationale for these hypotheses is that older wine drinkers tend to take less risks with trying new things. It is also believed that sustainability is important equally to people of different gender, education and income—it is believed that age will be the primary indicator. It is hypothesized that younger age also tends to correlate with positive views on certification and that those individuals tend to buy other sustainably produced products.

## **MATERIALS AND METHODS**

### **Data**

An online survey was developed to ascertain consumer knowledge, attitudes and willingness to pay for sustainably produced wine in seven countries (the United States, South Africa, Netherlands, Italy, France, Chile and Australia). The online survey was available for one year, during 2020 and 2021, was administered using Qualtrics and took 10 minutes to complete. Data was collected from approximately 2500 consumers (see Table 1 for the breakdown by country). Ethical considerations for this study were approved by the Collaborative Institutional Training Initiative (CITI Program) (approval number 24071150).

There were four parts to the survey. First, the questionnaire asked consumers about their wine consumption. Specifically, they were asked about how many bottles they purchased each month, how much they paid for a bottle, how often they visit a winery, why they drink wine, what their favorite varietal is, where they buy wine, and any other important considerations they think about when buying wine. Second, consumers were asked about their views about sustainably produced food and wine, and their purchasing behavior of same. Next, respondents were questioned whether they would purchase, and what their willingness to pay a premium for sustainably produced wine would be. They could choose from the following price values: \$1–5; \$6–10; \$11–15; \$16 or more.

Finally, consumers were asked about their socio-demographic characteristics: income, age, education, and gender.

The sampling approach included surveying wine drinkers over the age of 18. All surveys were terminated if they were under the age or did not drink wine. In addition, convenience sampling was utilized to target the respondents. Specifically, they were found through wine club newsletters, email lists of individual and collective wineries and their associations, and personal contacts of the researchers through social media and networks. This approach is a limitation of the study, however the alternative methods of random sampling and recruitment from the general public or representative groups, either online or face-to-face, would have been either overly time consuming and/or would have required significant cost.

## Methods

Descriptive statistics identified if age, gender or other sociodemographic details influenced consumers' attitudes and willingness to pay more for sustainably produced wine.

Other methods include a two-sample *t*-test to analyze the significant factors which determine consumers attitudes towards sustainably produced wines. Pearson's chi-squared test and ordinal logistic regression with marginal effects is used to examine whether the willingness to pay a premium for sustainably produced wines differs significantly based on age.

Pearson's chi-squared test was deployed to test if the willingness to pay a premium for sustainable wine differed because of the demographic characteristics and past purchasing behavior of consumers. The test compares the observed and the expected frequencies of certain categories and it assumes the independence of the residual, and it can't be used on a repeated-measure design.

WTP a premium for sustainable wine was constructed as an ordinal variable with respondents asked whether they want to pay \$0, \$1–5, \$6–10, \$11–15 greater than \$16; for the wine. It is therefore logical to use ordinal logistic regression with marginal effects to examine whether the willingness to pay a premium for different certified wines differs significantly based on wine knowledge, attitudes, and socio-demographic characteristics.

Statistical Software for Data Science (STATA Version 18) was used for the analysis.

## RESULTS

The characteristics of the sample can be found in Table 1. Of the 2455 individuals surveyed, the results included a perfect balance with respect to gender. 50% were male and the other 50% were female. With respect to age, 60% were under the age of forty-four. In addition, 66% of the respondents had attended college/university and the median income from all was USD 95,000.

The descriptive analysis of the results is found in Table 2. It was found that younger consumers viewed sustainable wine certification as very or extremely important (38% vs. 33%), compared to older consumers.

**Table 1.** Respondent attributes.

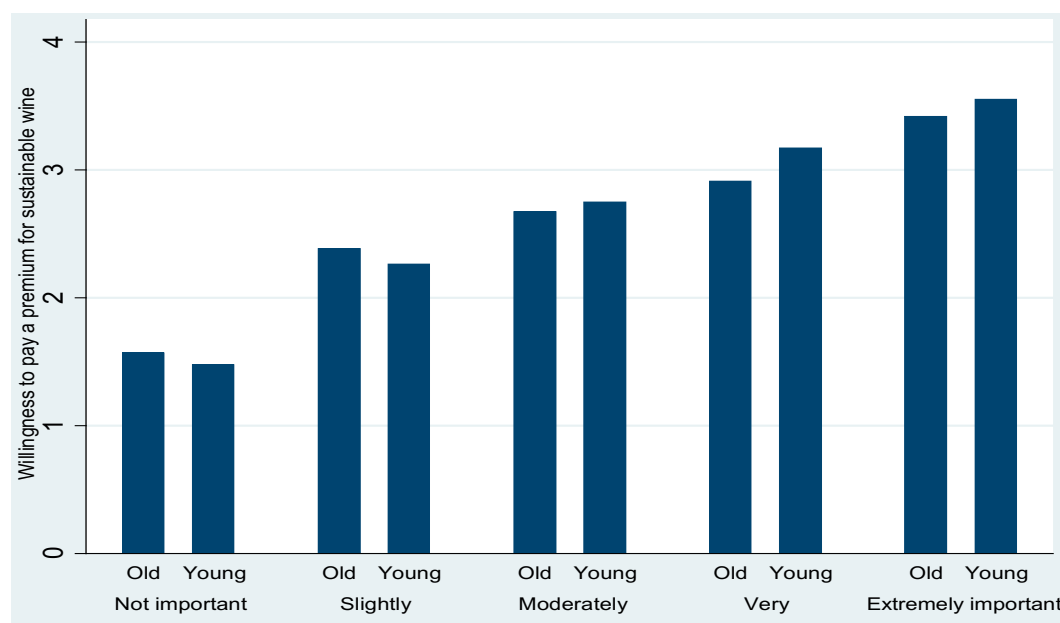
Attributes	<i>n</i>	Percent	Attributes	<i>n</i>	Percent
<u>Country of Origin</u>			<u>Male/Female</u>		
Italy	553	22	Male	1233	50
United States	459	19	Female	1222	50
Australia	449	18	<u>Age</u>		
Chile	419	17	Ages 18–24	218	9
South Africa	267	11	Ages 25–34	574	23
France	239	10	Ages 35–44	699	28
Netherlands	42	2	Ages 45–54	473	19
Other	27	1	Ages 55–64	313	13
Total	2455	100	Ages 65–74	163	7
<u>Income Ranges</u>			Ages 75+	14	1
Less than \$35,000	725	30	<u>Education Levels</u>		
\$35,000 to \$64,999	624	25	High School/GED/some college	391	16
\$65,000 to \$94,999	395	16	Associate degree (e.g., AA, AS)	161	7
\$95,000 to \$124,999	270	11	Bachelor’s degree (e.g., BA, BS)	679	27
\$125,000 to \$164,999	224	9	Doctorate (e.g., PhD, EdD)	204	8
\$165,000+	217	9	Master’s degree (e.g., MA, MS, MBA, Med)	728	30
			Professional degree (e.g., MD, DDS, DVM)	292	12

Note: AA = Associate’s of Arts Degree; AS = Associate’s of Science Degree; BA = Bachelor’s of Arts Degree; BS = Bachelor’s of Science Degree; MA = Master’s of Arts Degree; MS = Master’s of Science Degree; MBA = Master’s of Business Administration; Med = Master’s of Education; MD = Doctor of Medicine; EdD = Doctorate of Education; PhD = Doctorate of Philosophy; DDS = Doctorate of Dental Surgery; DVM = Doctorate of Veterinary Medicine [31].

**Table 2.** Descriptive analysis.

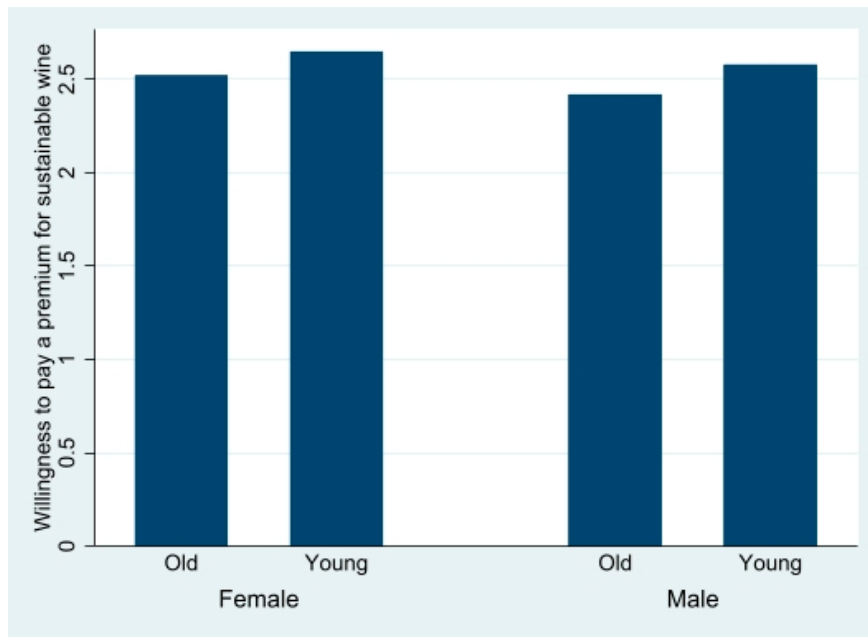
Willingness to pay premium for sustainably produced wines			Sustainable wine certification is important		
	Frequency	Percentage		Frequency	Percentage
None/Not Sure			Not sure or Not at all important		
Age 45 or more	238	24.7	Age 45 or more	243	25.2
Age 18–44	356	23.8	Age 18–44	317	21.25
up to \$1 more			Slightly important		
Age 45 or more	202	20.9	Age 45 or more	130	13.5
Age 18–44	260	17.4	Age 18–44	192	12.8
\$1–5 more			Moderately important		
Age 45 or more	392	40.7	Age 45 or more	266	27.6
Age 18–44	603	40.4	Age 18–44	402	26.9
\$6–10 more			Very important		
Age 45 or more	81	8.4	Age 45 or more	209	21.7
Age 18–44	168	11.2	Age 18–44	400	26.8
\$11–15 more			Extremely important		
Age 45 or more	37	3.8	Age 45 or more	115	11.9
Age 18–44	66	4.4	Age 18–44	181	12.1
\$16+ more					
Age 45 or more	13	1.3			
Age 18–44	39	2.6			

Figures 1 and 2 further highlights these results. They show that younger individuals had a higher willingness to pay for sustainable wine than older respondents. Moreover, young respondents who view wine certification as moderately to extremely important, had a higher willingness to pay for sustainable wines than older respondents with identical views.



**Figure 1.** Willingness to pay for sustainably produced wine by age group and views on its importance.





**Figure 2.** Willingness to pay for sustainably produced wine by age group and by gender.

**Table 3.** Two-sample *t*-test (mean difference between ages 18–44 and age 45 or more).

Group	Obs	Mean	Diff	SD	95% Conf. Interval		Sig
					Min	Max	
Buy certified foods							
Age 45 or more	963	1.15	0.01	0.36	1.13	1.18	0.55
Age 18–44	1492	1.15		0.35	1.13	1.16	
Buy wine with certification							
Age 45 or more	963	2.88	-0.28	1.64	2.77	2.98	0.00
Age 18–44	1492	3.17		1.53	3.09	3.25	
Views sustainable certification as important							
Age 45 or more	963	2.81	-0.14	1.34	2.73	1.90	0.01
Age 18–44	1492	2.95		1.31	2.89	3.02	
Pay premium for wine with sustainable certification							
Age 45 or more	963	2.49	-0.13	1.14	2.42	2.56	0.00
Age 18–44	1492	2.62		1.23	2.56	2.69	
Number of bottles purchased per month							
Age 45 or more	963	8.41	3.28	8.27	7.88	8.94	0.00
Age 18–44	1492	5.13		5.62	4.84	5.41	

Note: Obs = Observations; SD = Standard Deviation; Conf. = Confidence; Sig = Significance.

Additional analysis includes a two-sample *t*-test (see Table 3). This shows that there is no significant difference between old (age 45 or higher) and young (age 18–44) consumers regarding the buying of certified food having an impact on buying sustainably certified wines (mean diff: 0.01; *p*-value = 0.55). However, the following four results are significant at a 95% confidence interval. First, young consumers buy certified wine significantly more than older consumers (mean diff: 0.28; *p*-value < 0.05),



even though, on average, older consumers purchase more wines compared to younger consumers (8.41 vs 5.13). Furthermore, younger consumers are marginally more likely to pay a premium for these certified wines (mean diff: 0.13;  $p$ -value < 0.05) as they view sustainable certification as marginally more important than the older consumers (mean diff: 0.14;  $p$ -value < 0.05).

**Table 4.** The association of age and willing to pay premium for sustainably certified wines.

Variable	Model	Model	Model	Model	Model	Model	Model
	1	2	3	4	5	6	7
	Odds	Odds	Odds	Odds	Odds	Odds	Odds
	Ratio	Ratio	Ratio	Ratio	Ratio	Ratio	Ratio
	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)	(SE)
Age	1.20*	1.20*	1.23*	1.22*	1.23*	1.22*	1.13
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Education		0.97	0.96	0.96	0.96	0.96	0.97
		(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Income			1.01	1.01	1.01	1.01	1.01
			(0.01)	(0.01)	(0.01)	(0.12)	(0.01)
Buy food with certification				1.02	1.02	1.02	1.03
				(0.02)	(0.02)	(0.02)	(0.02)
Wine knowledge					1.02	1.03	1.02
					(0.02)	(0.03)	(0.02)
Gender						1.16*	1.16
						(0.08)	(0.09)
Views sustainable certification as important							2.61*
							(0.09)
Observations	2445	2445	2445	2445	2445	2445	2445
Wald chi2	6.38	7.78	8.73	9.47	10.25	14.72	719.51
Log pseudo likelihood	-3606	-3606	-3605	-3605	-3605	-3602	-3144
Pseudo R2	0.001	0.021	0.033	0.05	0.09	0.10	0.13

Note: \*means significant at 95% confidence interval; SE = standard error.

Table 4 analyzes the association between age and willingness to pay a premium for sustainable certified wines. This analysis indicates that consumers aged 18–44, have a higher willingness to pay for sustainable wines compared to older aged consumers (age 45 and over) in 6 out of the 7 regression models (1 bivariate and 6 multivariate). The initial estimated results found that consumers aged 18–44 had an approximate 1.20 times higher likelihood of paying a premium for sustainable wines than older consumers. These results are confirmed by additional analyses. The ordinal logit model examined all of the respondents together and also separated the two groups to determine the willingness to pay a premium for sustainably produced wine.

**Table 5.** Factors affecting WTP premium for sustainably produced wines—all countries and all age groups.

Variable	Ordinal Logit model	Predicted Marginal Effect				
	Sustainable	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
	OR (robust SE)	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Gender	1.17* (0.09)	-0.02	-0.01	0.02	0.01	0.00
Education	0.97 (0.02)	0.00	0.00	-0.00	-0.00	-0.00
Income	1.01 (0.01)	-0.00	-0.00	0.00	0.00	0.00
Age	0.97 (0.02)	0.003	0.00	-0.00	-0.00	-0.00
Wine knowledge	1.02 (0.03)	-0.00	-0.00	-0.00	0.00	0.00
Buy wine if labelled with certification	1.03 (0.02)	-0.01	-0.00	-0.01	0.00	0.00
Buy food with certification	1.09 (0.12)	-0.01	-0.01	0.01	0.00	0.00
Views sustainable certification as important	2.61* (0.09)	-0.14	-0.09	0.14	0.06	0.02
Observations	2455					
Wald chi2	723.3					
Log pseudo likelihood	-3145.196					
Pseudo R2	12.88					
Multicollinearity test (VIF)	1.10					
Condition number (multicollinearity)	9.63					

Note: \*indicates significance at 95% confidence interval. dy/dx is for discrete change of dummy variable from 0 to 1. Cut 1 = 1.14, Cut 2 = 2.38, Cut 3 = 4.95, Cut 4 = 6.06 and Cut 5 = 7.42. SE = standard error; OR = odds ratio; WTP = willingness to pay.

Table 5 demonstrates the key factors that influences the consumer willingness to pay a premium for sustainable wines from all countries. First, it is found that gender (female = 1 and male = 2) significantly influences the willingness to pay a premium for sustainably certified wines. Holding other things constant, female consumers showed a higher likelihood (1.17 times more) to pay a premium for sustainably certified wine. Second, the results indicate that consumers who view sustainable wine certification as important have a 2.61 times higher likelihood of paying more for sustainable wines compared to those who don't find

certification to be as important. Holding all other variables constant the probability of no additional payment decreases by 14% and paying an additional \$1–5 increases by 9% for consumers who think sustainable wine certification is important. For the variable in age, the odds ratio is 0.97. This suggests that for every addition year in age there is a reduction in the likelihood to pay more for sustainable wines. However, this item is not statistically significant. The age effect is further corroborated by the results of the marginal effect analysis. This shows that the probability of not paying more increases by 0.3% with every additional year of age (holding all other variables constant at their mean). Furthermore, it is important to note that higher income or higher wine knowledge did not have a statistically significant probability of paying a premium for sustainable wines compared to those with lower self-reported income or wine knowledge.

**Table 6.** Factors affecting WTP a premium for sustainably produced wines (ages 18–44).

Variable	Ordinal Logit model	Predicted Marginal Effect				
	Sustainable	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
	OR (robust SE)	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Gender	1.13 (0.12)	-0.02	-0.01	0.02	0.01	0.00
Education	1.03 (0.03)	-0.01	-0.00	0.01	0.00	0.00
Income	1.00 (0.02)	-0.00	-0.00	0.00	0.00	0.00
Age	1.09 (0.08)	-0.01	-0.01	0.01	0.01	0.00
Wine knowledge	1.06 (0.04)	-0.01	-0.00	0.01	0.00	0.00
Buy wine if labelled with certification	1.00 (0.03)	-0.00	-0.00	0.00	0.00	0.00
Buy food with certification	1.17 (0.18)	-0.02	-0.02	0.02	0.01	0.00
Views sustainable certification as important	2.72* (0.13)	-0.14	-0.09	0.13	0.07	0.02
Observations	1492					
Wald chi2	476.08					
Log pseudo likelihood	-1923					
Pseudo R2	0.1356					
Multicollinearity test (VIF)	1.13					
Condition number (multicollinearity)	11.04					

Note: \*indicates significance at 95% confidence interval. dy/dx is for discrete change of dummy variable from 0 to 1. Cut 1 = 0.86, Cut 2 = 2.07, Cut 3 = 4.67, Cut 4 = 5.78 and Cut 5 = 7.13. SE = standard error; OR = odds ratio; WTP = willingness to pay.

**Table 7.** Factors affecting WTP a premium for sustainably produced wines (aged 45 or more).

Variable	Ordinal Logit model	Predicted Marginal Effect				
	Sustainable	Outcome 1	Outcome 2	Outcome 3	Outcome 4	Outcome 5
	OR (robust SE)	dy/dx	dy/dx	dy/dx	dy/dx	dy/dx
Gender	1.22 (0.15)	-0.03	-0.02	0.03	0.01	0.00
Education	0.89* (0.03)	0.02	0.01	-0.02	-0.00	-0.00
Income	1.01 (0.02)	-0.00	-0.00	0.00	0.00	0.00
Age	0.92 (0.06)	0.01	0.01	-0.01	-0.00	-0.00
Wine knowledge	0.98 (0.04)	0.00	0.00	-0.00	-0.00	-0.00
Buy wine if labelled with certification	1.06 (0.04)	-0.00	-0.00	0.01	0.00	0.00
Buy food with certification	1.02 (0.18)	-0.00	-0.00	0.00	0.00	0.00
Views sustainable certification as important	2.48* (0.14)	-0.14	-0.08	0.15	0.05	0.02
Observations	963					
Wald chi2	262.12					
Log pseudo likelihood	-1206					
Pseudo R2	0.13					
Multicollinearity test (VIF)	1.09					
Condition number (multicollinearity)	14.06					

Note: \*indicates significance at 95% confidence interval. dy/dx is for discrete change of dummy variable from 0 to 1. Cut 1 = 1.4, Cut 2 = 2.74, Cut 3 = 5.29, Cut 4 = 6.41 and Cut 5 = 7.79. SE = standard error; OR = odds ratio; WTP = willingness to pay.

The ordinal logit regression model results for consumers aged 18–44 and 45 or more can be found in Tables 6 and 7, respectively. Similarly, to all age group results in Table 5, ‘views sustainable certification as important’ was found to be a significant factor in determining the willingness to pay a premium for sustainably produced wines. Consumers who view wines with sustainable certification as important had a 2.48 (age 45 or more) and 2.72 (aged 18–44) times higher probability of paying more for sustainably produced wines than those who do not have the same view. In addition, for the 45 or more-age group, higher education is associated

with a significantly lower likelihood to pay a premium for sustainably produced wine (OR: 0.89, 95% CI: 0.83–0.96).

## DISCUSSION

This research sought to identify whether consumers from seven wine consuming countries (the United States, South Africa, Netherlands, Italy, France, Chile and Australia) were willing to pay more for sustainably produced wines and if age, primarily, (and other factors) was a significant influence on individual consumers' decisions. The research attempted a cross-country approach with almost 2500 wine consumers surveyed in these seven countries to see if age has a significant role in the decisions of consumers to purchase sustainably produced wines.

Mixed results exist for the first hypothesis. Surprisingly, the relationship of buying food with eco certification did not hold for younger consumers when compared to older consumers, as this relationship was not statistically significant. Yet, the age difference was initially significant when only buying wine was considered, with younger consumers more likely than older consumers. This inconsistency is surprising but consistent with other studies looking at willingness to pay for environmental/ecological/sustainable wines in individual countries [13,29,32].

The findings confirm that the second hypothesis is correct. Younger consumers, compared to older consumers, view sustainable certification as marginally more important. The third hypothesis that the willingness to pay for sustainably produced wine is higher for the younger age group was true, however only marginally more and was not statistically significant compared to older consumers. Rather it seems that there is a greater relationship between attitude about sustainability and behavior with respect to willingness to pay, which may also be linked to age. Nevertheless, authors [33] discussed the variance between positive attitudes towards sustainability and how they frequently fail to translate into actual purchase behavior.

There were also interesting results when the factors that influence the attitudes of both younger and older consumers were analyzed. The fourth hypothesis holds true, that an increase in consumer age negatively influences willingness to pay more for sustainably produced wines.

The fifth hypothesis has mixed results. It was surmised that gender, education, income, wine knowledge had no influence. However, gender was positive and statistically significant in the combined analysis as women were more likely to pay more. Furthermore, educational levels have a negative impact on the willingness to pay for sustainably produced wines. One explanation for these results could be the negative quality perception of sustainably produced wines that are more prevalent in the older age group. With respect to income, there were surprising results. An increase in income does not seem to effect either age group on their willingness to pay more for sustainably produced wine. Finally, for this

hypothesis, wine knowledge was also a surprising result with no influence of that factor on willingness to pay in either age group.

The sixth hypothesis holds. Younger consumers that have previously purchased sustainably produced products will have a higher willingness to pay for sustainably produced wine compared to older customers. And consumers from both age groups that value sustainably produced products have a higher willingness to pay for sustainably produced wine than those who do not.

## CONCLUSIONS

Overall, the results are interesting, timely and relevant. The research finds that younger consumers do have a marginally higher willingness to pay for sustainable wine than older consumers and that gender is also a factor. Women are more interested in paying a premium for sustainability certified wines. Interestingly, income and wine knowledge are not factors or significant in the findings. Having more money or years of wine experience is not necessarily likely to encourage paying a premium for sustainable wine. The most important finding is that those who view sustainability certifications as important have a 2.6 times likelihood to pay more for sustainable wines. This is especially true for young consumers who view wine certification as moderate to extremely important. While older consumers buy more wine, in general, than younger consumers, the younger customers buy more certified wines. And those younger people that are moderately or extremely interested in wine certifications are willing to pay more.

This research therefore has a variety of implications for the industry and marketing of sustainably produced wines. Wealth and general wine knowledge do not seem to matter. In fact, gender, age, and especially knowledge about wine sustainability certifications are most important. While these are not necessarily translating into greater sales and profits given consumer behaviors, there is hope that it can if marketers can target their efforts. It is possible that more education about wine sustainability certifications will lead to greater purchases and a higher willingness to pay for them—especially if the education is targeted to those that are younger and female. The future of wine is always changing, but producers and marketers will need to make greater efforts to educate the public about their sustainability certification process if they want to increase this specific market and generate greater profits.

While the research has generated interesting results, there are some potential limitations to the study with respect to the sampling methods and geographic selection. The sample of convenience could potentially bias the results to a more educated, higher income, more experienced group of wine consumers. It is uncertain if the average consumer was captured in the survey population. Also, there are concerns that convenience sampling being used in wine consumer research is inferior to face to face or telephone sampling particularly due to the potential lack of

representativeness to the entire population of each of the countries surveyed [34].

Furthermore, the countries selected were also one of convenience based on the residency of the research team. This resulted in a combined transnational analysis, and the results should not then be interpreted to represent any one of the countries analyzed. In addition, the analysis omits some of the more important wine producing/purchasing nations in the old and new world and omits some countries that have sustainability certifications. While there is a sustainability certification in Chile, Australia, France, South Africa, Italy and sub-regions of the United States (which are included in the study), both New Zealand (which had the first sustainability certification in the world), and Austria (which has one of the newest and most robust certifications) are omitted from the study.

Directions for future research could include a few different areas. First, it would be interesting to include all of the countries that currently have sustainability certifications and to determine if longevity of the program or level of adoption (percentage of wineries certified) would impact the results. Next, it would be thought provoking if consumers, in the same countries, were resurveyed every five to ten years to determine if a changes in the industry are translating to consumers behavior and/or if societal trends in sustainability are impacting purchasing behaviors. Finally, while consumers behavior is very interesting for sustainably certified wine, there is very little research on the motivations for certification adoption from the winery perspective. It is possible that consumers are not going to lead the needed changes to increase sustainability and that this paradigm shift must come from the producers themselves.

#### **DATA AVAILABILITY**

The dataset of the study is available from the authors upon reasonable request.

#### **AUTHORS' CONTRIBUTIONS**

DM, JG, LV, AAU, and RM designed the study and conducted the data collection. RR, JG, and DM analyzed the data. DM and JG wrote the paper with input from all authors.

#### **CONFLICTS OF INTEREST**

The authors declare that they have no conflicts of interest.

#### **REFERENCES**

1. Moscovici D, Reed A. Comparing wine sustainability certifications around the world: history, status and opportunity. *J Wine Res.* 2018;29(1):1-25.



2. Gow J, Rana RH, Moscovici D, Ugaglia AA, Valenzuela L, Mihailescu R, et al. Australian consumers and environmental characteristics of wine: Price premium indications. *Int J Wine Bus Res.* 2022;34(1):542-66.
3. Sogari G, Pucci T, Aquilani B, Zanni L. Millennial generation and environmental sustainability: the role of social media in the consumer purchasing behavior for wine. *Sustainability.* 2017;9(10):1911.
4. Casini L, Corsi AM, Goodman S. Consumer preferences of wine in Italy applying best-worst scaling. *Int J Wine Bus Res.* 2009;21(1):64-78.
5. Bruwer J, Lesschaeve I, Campbell BL. Consumption dynamics and demographics of Canadian wine consumers: Retailing insights from the tasting room channel. *J Retail Consum Serv.* 2012;19(1):45-58.
6. Villanueva E, Castillo-Valero J, García-Cortijo M. Who is drinking wine in the United States? The demographic and socio-economic profile of US wine consumers (1972–2012). *Int Food Agribus Man.* 2015;18(1):39-60.
7. Ritchie C. Young adult interaction with wine in the UK. *Int J Contemp Hosp M.* 2011;23(1):99-114.
8. Tait P, Saunders C, Dalziel P, Rutherford P, Driver T, Guenther M. Estimating wine consumer preferences for sustainability attributes: A discrete choice experiment of Californian Sauvignon blanc purchasers. *J Clean Prod.* 2019;233(1):412-20.
9. Maesano G, Carra G, Peri I. How Do Consumers Perceive Sustainable Wine? A Review. *Qual Access Success.* 2019;20(2):351-7.
10. Di Vita G, Pappalardo G, Chinnici G, La Via G, D'Amico M. Not everything has been still explored: further thoughts on additional price for the organic wine. *J Clean Prod.* 2019;231(1):530-28.
11. Pomarici E, Asioli D, Vecchio R, Næs T. Young consumers' preferences for water-saving wines: An experimental study. *Wine Econ Policy.* 2018;7(1):65-76.
12. Schäufele I, Hamm U. Consumers' perceptions, preferences and willingness-to-pay for wine with sustainability characteristics: A review. *J Clean Prod.* 2017;147(1):379-94.
13. Pomarici E, Vecchio R. Millennial generation attitudes to sustainable wine: an exploratory study on Italian consumers. *J Clean Prod.* 2014;66(1):537-45.
14. Menozzi D, Sogari G, Mora C. Explaining vegetable consumption among young adults: an application of the theory of planned behaviour. *Nutrients.* 2015;7(1):7633-50.
15. Chrysochou P, Krystallis A, Mocanu A, Lewis R. Generation Y preferences for wine. *Brit Food J.* 2012;114(4):516-28.
16. Lunardo R, Guerinot R. The influence of label on wine consumption: its effects on young consumers' perception of authenticity and purchasing behavior. Available from: <https://ageconsearch.umn.edu/record/7847/?v=pdf>. Accessed on 13 Aug 2024.
17. Teagle J, Mueller S, Lockshin L. How do millennials' wine attitudes and behaviour differ from older generations? Available from: <http://academyofwinebusiness.com/wp-content/uploads/2010/04/Teagle-How-do-millennials-wine-and-behavior-differ.pdf>. Accessed on 13 Aug 2024.

18. Thach E, Olsen J. Market segment analysis to target young adult wine drinkers. *Agribusiness*. 2006;22(3):307-22.
19. Barber N, Almanza B, Donovan J. Motivational factors of gender, income and age on selecting a bottle of wine. *Int J Wine Market*. 2006;18(3):218-32.
20. Baudry J, Mejean C, Alles B, Peneau S, Touvier M, Hercberg S, et al. Contribution of organic food to the diet in a large sample of French adults (the NutriNet-Sant'e cohort study). *Nutrients*. 2015;7(10):8615-32.
21. Caracciolo F, Furno M, D'Amico M, Califano G, Di Vita G. Variety seeking behavior in the wine domain: A consumers segmentation using big data. *Food Qual Prefer*. 2022;97(1):104481.
22. Atkin T, Thach L. Millennial wine consumers: Risk perception and information search. *Wine Econ Policy*. 2012;1(1):54-62.
23. Karl A. Attitudes toward sustainable New Zealand wine held by millennials in the United States [dissertation]. Christchurch (New Zealand): University of Canterbury; 2018.
24. Gazzola P, Grechi D, Pavione E, Gilardoni G. Italian wine sustainability: new trends in consumer behaviours for the millennial generation. *Brit Food J*. 2022;124(11):4103-21.
25. Gustafson C, Lybbert T, Sumner D. Consumer knowledge affects valuation of product attributes: Experimental results for wine. *J Behav Exp Econ*. 2016;65(1):85-94.
26. Vecchio R. Determinants of Willingness-to-Pay for Sustainable Wine: Evidence from Experimental Auctions. *Wine Econ Policy*. 2013;2(2):85-92.
27. Nassivera F, Gallenti G, Troiano S, Marangon F, Cosmina M, Bogoni P, et al. Italian millennials' preferences for wine: an exploratory study. *Brit Food J*. 2020;122(8):2403-23.
28. Stockl AF, Moscovici D, Tischler S, Eitle MW, Dolezal C. Consumer Knowledge and Preferences for Organic and Sustainably Certified Wines: Lessons from the DACH Region—Germany, Austria, and Switzerland. *Sustainability*. 2024;16(11):4464.
29. Sellers-Rubio R, Nicolau-Gonzalbez J. Estimating the willingness to pay for a sustainable wine using a Heckit model. *Wine Econ Policy*. 2016;5(2):96-104.
30. Delmas M, Gergaud O. Sustainable practices and product quality: Is there value in eco-label certification? The case of wine. *Ecol Econ*. 2021;183(1):106953.
31. Moscovici D, Gow J, Alonso Ugaglia A, Rana R, Valenzuela L, Mihailescu R. Consumer preferences for organic wine—Global analysis of people and place. *J Clean Prod*. 2022;368(1):133215.
32. Zucca G, Smith D, Mitry D. Sustainable viticulture and winery practices in California: What is it, and do customers care? *Int J Wine Res*. 2009;2(1):189-94.
33. Schäufele I, Janssen M. How and why does the attitude-behavior gap differ between product categories of sustainable food? Analysis of organic food purchases based on household panel data. *Front Psychol*. 2021;12(1):595636.

34. Szolnoki G, Hoffmann D. Online, face-to-face and telephone surveys—Comparing different sampling methods in wine consumer research. *Wine Econ Policy*. 2013;2(2):57-66.

How to cite this article:

Moscovici D, Gow J, Valenzuela L, Rana R, Ugaglia AA, Mihailescu R. Assessing the Age Effect on Consumer Attitudes and Willingness to Pay for Sustainably Produced Wine: A Transnational Analysis. *J Sustain Res*. 2024;6(3):e240048.

<https://doi.org/10.20900/jsr20240048>