Food Quality and Preference 113 (2024) 105062

Contents lists available at ScienceDirect

Food Quality and Preference

journal homepage: www.elsevier.com/locate/foodqual

Exploring the effect of naturalness on consumer wine choices: Evidence from a survey in Italy

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ARTICLE INFO

Keywords:
Beliefs
Choice experiment
Consumer perception
Natural wine
Willingness to pay
Wine attributes

ABSTRACT

Although wine consumers are increasingly interested in natural wine, the definition of natural wine is still unclear. Thus, scholars argue that consumer understanding of natural wine characteristics might be vague and, therefore, natural wine perception can be heterogeneous among consumers. Accordingly, in this study, we question whether the perception of what is natural, or not, may affect consumer wine choice behaviour, by focusing on those attributes consumers may use to infer the naturalness of a wine. We present results from a survey conducted in Italy on 340 red wine consumers, which allowed us to determine drivers of wine consumption frequency and wine preference structure. By means of a choice experiment, we investigate the effect of a natural wine claim ('objective naturalness') and the effect of personal perceptions of naturalness ('subjective naturalness') on consumer evaluation for attributes that are generally linked to natural wine production. We find that consumers mostly associate natural wine with "artisanal" wine-making techniques and that wine choice behaviour can be affected by whether a wine is perceived as natural or not. However, we observe contrasting results when controlling for the effect of 'objective' and 'subjective' wine naturalness. Finally, results show that respondents are willing to pay a price premium for the attributes linked to natural wine production, such as ecological certifications and wine-making techniques, but not for the "natural wine" claim. This suggests researchers should disentangle the different aspects of natural wine when exploring consumer preferences for this product.

1. Introduction

Nowadays, a growing number of consumers demand natural foods, and this also is the case for wine (Dominick et al., 2018; Evans et al., 2010). Although demand for natural wine is an emerging and fast-growing trend in the wine industry (Alonso González & Parga-Dans, 2020), the definition of a wine as "natural" is still vague among consumers (Moscovici & Reed, 2018; Parga-Dans et al., 2023). This might be explained, on one hand, by the fact that consumers perceive wine as a natural product itself (Grunert et al., 2018), and on the other, by the lack of universal standards regulating the production of this type of wine. In fact, even wine experts do not agree on what natural wine is (Fuentes-Fernández & Gilinsky, 2022; Uncorkd, 2016) and, so far, mostly voluntary regulations have been promoted by individual associations of winegrowers. France is the only country where a private "natural wine" label, the "Vin Méthode Nature", has been recognized at the national level by the National Institute for Origins and Quality (INAO), the French Ministry for Agriculture and the French Fraud Control Office (Alonso González et al., 2022).

The growing number of international associations with different interpretations of natural wine may further confound consumers' understanding and perception of the sensory and production attributes that characterize natural wine (Alonso González & Parga-Dans, 2020; Parga-Dans et al., 2023). This might then make troublesome for natural wine producers to identify consumers' needs and therefore, to develop tailored marketing and communication strategies.

Past studies observed significant heterogeneity in how consumers would perceive naturalness in wine (Vecchio et al., 2023a). To illustrate, Urdapilleta et al. (2021) showed that French consumers tended to perceive natural wines as wines without added sulphites, fungicides and pesticides, and therefore as healthier and more environment-friendly wines than the conventional ones. On the other hand, in a study in New Zealand, consumers tended to perceive natural wines as wines with lower quality organoleptic properties (Urdapilleta et al., 2021). Specifically, they observed that the interviewed consumers tended to use the word "cloudy" to describe the natural wine sensory experience.

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https://doi.org/10.1016/j.foodqual.2023.105062
Received 21 April 2023; Received in revised form 15 November 2023; Accepted 24 November 2023
Available online 1 December 2023

Similarly, Vecchio et al. (2021) found that Italian consumers mainly perceived natural wine as an ecological wine, without additives and added sulphites. Staub et al. (2020) found that Swiss and Australian wine consumers considered additives such as sugar to be the least natural wine ingredients, followed by selected yeasts and the use of wine-making technologies such as mechanical filtration. Scholars also observed a strong connection between naturalness and tradition, associating wine attributes such as origin from the "old world", aged in barriques or sealed with a cork, and with hand-picked grapes with naturalness (Siegrist & Sütterlin, 2017; Dominici et al., 2019; Staub et al., 2020). Furthermore, previous studies showed that consumers tended to associate organic and biodynamic production practices with the concept of natural and clean wine (Delmas & Lessem, 2017; Sogari et al., 2016).

While natural wine perception has gained attention among several scholars, studies investigating the demand for natural wine are still scant and there is a need to better understand the specific target of consumers who may be interested in this type of product. Generally, a price premium for wines labelled as "natural" was observed. However, to our knowledge, a limited number of studies explored how consumers evaluate natural wine (Galati et al., 2019; Migliore et al., 2020; Vecchio et al., 2023a, 2023b). Hence, our study seeks to investigate consumer preference structure for natural wine within a decision-making process that encompasses various alternatives of wine products.

As Lusk et al. (2014) argued, when estimating consumer preference structure for product characteristics, researchers should take into account personal perceptions (or beliefs). Personal perceptions or beliefs are more malleable constructs than preferences and can be distorted from reality, yielding, eventually, to inaccurate demand estimates (Gutman, 1982; Lusk et al., 2014; Pappalardo & Lusk, 2016; Malone & Lusk, 2017). In the context of natural wine, authors agree on the fact that consumers may misread, hence, misperceive the meaning of this wine (Alonso González & Parga-Dans, 2020). However, to our knowledge, no existing research has investigated whether the perception of what is natural, or not, may affect consumer wine choice behaviour. To illustrate, given the increasing appeal towards natural products, a question would be whether consumers value more a certain product characteristic because they think it is more "natural" than others. For example, would consumers drink more and value more organic wine because they think organic wine is natural?

In light of this, in the present work, we rely on data from a survey conducted on 340 wine consumers in Italy in order to investigate whether the consumption frequency of a wine with certain attributes may be affected by the belief these attributes are associated with natural wine or not. Moreover, by means of a hypothetical Choice Experiment (CE) approach, we explore consumer marginal willingness to pay for attributes describing production techniques that are generally linked to natural wine production. Specifically, we focus on ecological certifications and on vineyard and wine-making techniques that the existing literature relates to natural wine (Staub et al., 2020) and that are proposed in the "natural wine" protocol promoted by the Italian association VinNatur®. We then test the effect of a natural wine claim ('objective naturalness') as well as the effect of personal perceptions of naturalness ('subjective naturalness') on individual preference structure for the selected attributes, with the scope of advancing the debate about consumer behaviour towards products that are claimed as natural and products that are perceived as natural (Lunardo & Saintives, 2013).

In summary, this study could contribute to uncovering new insights into one of the main current trends of the food and wine market, such as that of natural food, attempting to individuate the most appropriate marketing and communication actions for the wineries producing natural wines and also for those that would like to highlight the naturalness of their wines.

In the next section, we develop our research hypotheses in light of previous studies on consumer attitudes and preference structure for natural wine. Then, we present research data and methods, while the results are shown in the subsequent section. In the last two sections, we first discuss our findings and their implications for wine producers, and then we conclude with some final observations, study limitations and future research directions.

2. Literature review and research hypotheses

In the real world, consumers generally make decisions with partial information available, relying on expectations and beliefs to bridge the information gap with real choice situations (Bertrand & Mullainathan, 2001; Manski, 2004). Since choice behaviour is a combination of preferences and beliefs, neglecting consumer beliefs can lead to inaccurate welfare estimates (Adamowicz et al., 1994; Marette et al., 2012; Malone & Lusk, 2017 Costanigro & Onozaka, 2020). Accordingly, the role played by perceptions and beliefs in consumer food choices has received particular attention in the food economics literature (Costanigro et al., 2015; Lusk et al., 2014; Santosa et al., 2013; Scarpa et al., 2021).

Perceived naturalness can be defined as a heuristic that consumers may use as an indicator of food quality (Rozin et al., 1999), influencing product acceptance behaviour (Siegrist & Sütterlin, 2017). This can also happen in the case of wine. To illustrate, Grunert et al. (2018) showed that consumers tended to perceive wine as a natural and ecological product, as they generally believed it only included grapes. Alternatively, studies showed that perceiving a wine as sustainable positively affected consumer preference due to the inference of the environmental and health benefits this type of wine can provide (Sogari et al., 2015; Bonn et al., 2016; D'Amico et al., 2016; Pomarici et al., 2016; Sogari et al., 2016; Sellers-Rubio & Nicolau-Gonzalbez, 2016; Schäufele & Hamm, 2017).

With regard to natural wine consumption patterns, previous studies have focused on the investigation of attitudinal and socio-demographic information. They observed that wine involvement, wine knowledge, pro-environmental attitude and health consciousness were significant drivers of natural wine consumption frequency (Migliore et al., 2020; Galati et al., 2019), as well as being younger and male consumers (Vecchio et al., 2021). The existing literature generally found a positive relationship between perceived naturalness and perceived quality (Etale & Siegrist, 2021). However, the effect of naturalness belief or perception on wine consumption has not been explored in its full explanatory potential. We then test the following hypothesis:

H_1: Perceiving a wine attribute as natural positively affects the consumption frequency of a wine characterized by this attribute.

Furthermore, the existing literature suggests that consumers tend to have a positive marginal WTP for wines that are claimed as "natural" (Galati et al., 2019; Migliore et al., 2020). Vecchio et al. (2023a) also compared consumer willingness to pay for natural over organic and biodynamic wines. They observed that consumers were willing to pay a higher price premium for natural wine than biodynamic wine, but, on average, respondents revealed the highest willingness to pay values for organic wines. However, to our knowledge, no study has yet explored whether claiming a wine attribute as natural positively affects consumer preference structure for that specific attribute. Therefore, we test the following hypothesis:

H_2: Marginal willingness to pay (mWTP) for a wine attribute increases when the wine attribute is claimed as natural (objective naturalness).

Likewise in the examination of natural wine consumption patterns, the existing literature has so far examined how WTP for natural wine is affected by consumer attitudinal and socio-demographic variables (Galati et al., 2019; Migliore et al., 2020; Vecchio et al., 2021; Vecchio et al., 2023b). However, the impact of beliefs or perceptions on shaping preferences for natural wine remains unexamined. This could be particularly relevant for a product as a natural wine from which consumers may infer symbolic meanings according to its specific characteristics (Siegrist & Sütterlin, 2017), and go beyond the real benefits supplied. To illustrate, information on ingredients and production methods, such as the no-added sulphites, or organic or biodynamic

farming, can generate heuristics of naturalness and, therefore, influence consumer preference for the wine attributes (Siegrist & Sütterlin, 2017). We then test the following hypothesis:

H_3: Marginal willingness to pay (mWTP) for a wine attribute increases when the wine attribute is perceived as natural (subjective naturalness).

In order to test the three hypotheses, we have conducted an online survey where ad-hoc questions were proposed.

3. Data and method

3.1. Data gathering

The survey was distributed through social media (i.e., WhatsApp, Facebook and LinkedIn) as these channels are accessible to a wide range of consumers. Specifically, the 'river' sampling strategy was used, since it is suitable for exploratory studies with sub-populations, such as red wine drinkers (Lehdonvirta et al., 2021). The dissemination period was Spring 2021, using social media accounts of the researchers. Consumers who entered the questionnaire were informed of the respect for privacy and the anonymity of their answers. They were also informed of the time required to complete the survey (about 12 min) and that it would have been on a voluntary basis.

The respondents were selected through screening questions before starting the questionnaire. The "*conditio sine qua non*" were: (1) the legal drinking age in Italy (at least 18 years old), (2) the consumption of red wine at least once a month, and (3) the purchase of a bottle of red wine in the last six months from completing the questionnaire. If only one of these conditions was not met, the respondent was excluded from the survey. Only red wine consumers have been recruited since the CE consisted of hypothetical purchase scenarios of red wine bottles. A number of 350 Italian red wine consumers completed the questionnaire. However, ten respondents did not disclose relevant information (i.e. socio-demographic information) and for this reason they have been excluded in the analysis.

The survey was dedicated, on the one hand, to the collection of information on consumer perceptions towards natural wine, and, on the other, to the elicitation of consumer preferences for natural red wine by means of a choice experiment.

The survey also included questions concerning some consumer attitudes:

- conventional, natural, organic and biodynamic red wine consumption frequencies;
- wine involvement (using a scale adapted from Bruwer and Huang (2012) for the Italian context);
- health consciousness (the items developed by Gould (1988) were implemented in the survey, but, following Michaelidou and Hassan (2008), we limited to the use of six out of nine items);
- pro-environmental behaviour through the New Environmental Paradigm (NEP) scale (Dunlap et al., 2000);
- knowledge of the wine attributes used in the CE.

Finally, the questionnaire contained questions that were aimed to collect some socio-demographic information of respondents.

The names and descriptions of variables, together with their descriptive statistics, used in the choice experiment modelling and subsequent analyses are presented in the Appendix (Table A1). The sample is mainly composed of male individuals (67.06%) and millennials (43.53%). About 60% of the sample has a university degree and the highest percentage of the sample has declared to have an annual gross family income between 30,001 and 70,000 Euros.

3.2. Elicitation of consumer preference structure: The choice experiment

Choice experiments are one of the most popular methods used in food and wine marketing to elicit individual's preference and WTPs for a certain good or service (Caputo & Scarpa, 2022).

In the design of CEs, there are different steps to follow: (1) the definition of the product in question; (2) the identification of the attributes which need to be meaningful and important to the respondents; (3) the identification of levels which should be plausible and actionable to the respondents, and which should be constructed so that the respondents are willing to make trade-offs between combinations of attributes; (4) the generation of the hypothetical choice sets.

The first step in our experimental design was to select a bottle of red wine as the product under investigation. Participants were asked to picture being in a purchasing situation and having to buy a 750 ml bottle of Italian red wine for a consumption situation that was usual to them. In order to avoid any kind of undesired quality inference, a red wine without Designation of Origin or Indication of Origin was selected. For the same reason, the interviewees were not provided with further information on the brand, the grape variety, and the sensory characteristics. As a second step, the attributes and attribute levels were selected. These are presented in Table 1.

Table 1
Attributes and attribute levels.

Attributes	Attribute levels
VinNatur® label	- VinNatur®  - No label
Eco-friendly wine labels	- Demeter®  - Organic  - No label
Natural wine	- Natural wine claim  - No information
Vineyard techniques	- Hand-picked grapes ("Uva raccolta a mano" in Italian language) - No information
Winemaking techniques	- No clarification ("Non chiarificato" in Italian language) - No added sulphites ("Senza solfiti aggiunti" in Italian language) - Spontaneous fermentation ("Fermentazione spontanea" in Italian language) - Unfiltered ("Non filtrato" in Italian language) - No information
Price	- €4.99 - €10.99 - €16.99 - €22.99 - €28.99

In order to include the concept of natural in the design, we referred to production process techniques which were described in previous studies on natural wine consumption (Staub et al., 2020) and in the "natural wine protocol" promoted by VinNatur®. Hence, these were the basis for the selection of our attributes and attribute levels.

Specifically, we have included the VinNatur® logo and the claim "natural wine" in the design. It is important to point out that, while the VinNatur® logo is a claim assuring the respect of a specific production protocol, the natural wine claim cannot be used in Italy as part of the wine bottle packaging. However, it is possible to find it as a piece of information given by the store manager or the restaurateur. Accordingly, the natural wine claim is represented in the experiment as a "tag" placed on the neck of the bottle included by the store manager.

Furthermore, we have selected two production schemes as representative of eco-friendly wine: organic production represented by the "European Leaf" label, and biodynamic production represented by the "Demeter®" label; a third attribute level is the absence of any logo. We included the organic and biodynamic certifications because they represent the most popular methods of sustainable production in the Italian wine system (Moscovici et al., 2022; Scozzafava et al., 2021). Then, we have taken into account both the vineyard and the wine-making process techniques. Specifically, as an indicator of a natural vineyard technique "hand-picked grapes" was used, while as wine-making techniques, we selected "no clarification", "no added sulphites", "spontaneous fermentation", "unfiltered", and "no information" attribute levels. Finally, the price attribute was composed of five levels: €4.99, €10.99, €16.99, €22.99, and €28.99. The price range was assessed using secondary data information (Ismea, 2020) and analysing prices for a 750 ml red wine bottle in different physical and online wine stores in Italy. We chose to use a wide price range, in an attempt to mirror the possible price alternatives of a bottle of red table wine in the Italian market, including also higher price values, which may resemble a limited share of the market prices for red table wine in Italy.

Finally, the experimental choice tasks have been designed. Each choice task involved two options of a red wine bottle and an 'opt out' option. The 'opt out' option has been added as an attempt to mimic the decision process in a real purchasing scenario (Lusk & Anderson, 2004). The allocation of attributes and attribute levels to product alternatives has been designed by employing an efficient design approach in order to minimize the D-error (ChoiceMetrics, 2018; Rose & Bliemer, 2009; Scarpa & Rose, 2008). Interaction effects between the natural claim and the non-price attributes were included in the experimental design. Finally, the choice design resulted in thirty choice tasks. In order to reduce respondents' fatigue, the thirty choice tasks have been divided into five groups, so that each respondent received six choice tasks. Fig. 1 illustrates an example of the choice task.

As the literature suggests, our CE was introduced by a brief description of the choice mechanism, the attributes and the attribute levels (Van Loo et al., 2011; Bazzani et al., 2019). Furthermore, due to the fact that one of the most criticised aspects of stated preference methods is that these are hypothetical and hence may suffer from hypothetical bias, we used the "cheap talk" approach[1], based on Cummings and Taylor's (1999) recommendation, making respondents aware of the potential problem of overstating their willingness to pay before answering the CE questions.

3.3. Elicitation of perceived naturalness

We implemented itemized ratings scale questions to elicit[1] consumers' perceptions towards naturalness of wine. These questions followed the CE. Respondents were introduced to different wine attributes and they were asked to indicate on a scale from 1 (not at all) to 5 (a lot) how much they associated each attribute with natural wine. The exact question was: "*How much do you associate the following wine attribute with natural wine?*". The respondent could answer: "*I do not associate it at all*", "*I do not associate it*", "*Indifferent*", "*I associate it*", "*I associate it a lot*". Then, for the data analysis, a dummy variable was generated in a way that the categories "*I associate it*", and "*I associate it a lot*" have been coded with value of 1, the remaining three categories have been coded with value of 0.

The questions were formulated for each quality attribute level used in the CE, namely VinNatur® label, Demeter® certification, organic production certification, hand-picked grapes, no clarification, no added sulphites, spontaneous fermentation, and unfiltered wine. Moreover, we used adjectives that are generally linked to the concept of naturalness in the wine and food sector: 'authentic', 'traditional', 'artisanal', 'genuine', 'clean', 'safe', 'sustainable' and 'healthy' (Staub et al., 2020; Etale & Siegrist, 2021).

4. Results

4.1. Perception of natural wine

In Fig. 2 we report the proportion (%) of the individuals associating each attribute with natural wine (section 3.3). Specifically, we use the dummy variable taking value of 1 if the individual perceived the selected attribute as associated with natural wine, 0 otherwise.

First, we observe that respondents perceive natural wine mainly as a non-manipulated product. The production methods with the highest proportions of association are: spontaneous fermentations, no added sulphites, and artisanal wine. Then natural wine is mostly perceived by respondents as sustainable. On the other hand, natural wine is less associated with production method labels/certifications, such as organic and biodynamic certifications. This may suggest that consumers generally associate the concept of natural wine more with production techniques rather than with the certification and labelling status. Indeed, all the attributes concerning wine production techniques are on average more associated with natural wine than the ecological certifications. The only exemption is the VinNatur® label that is characterized by a higher score of association than the hand picked grapes attribute.

4.2. Perceived naturalness and wine consumption

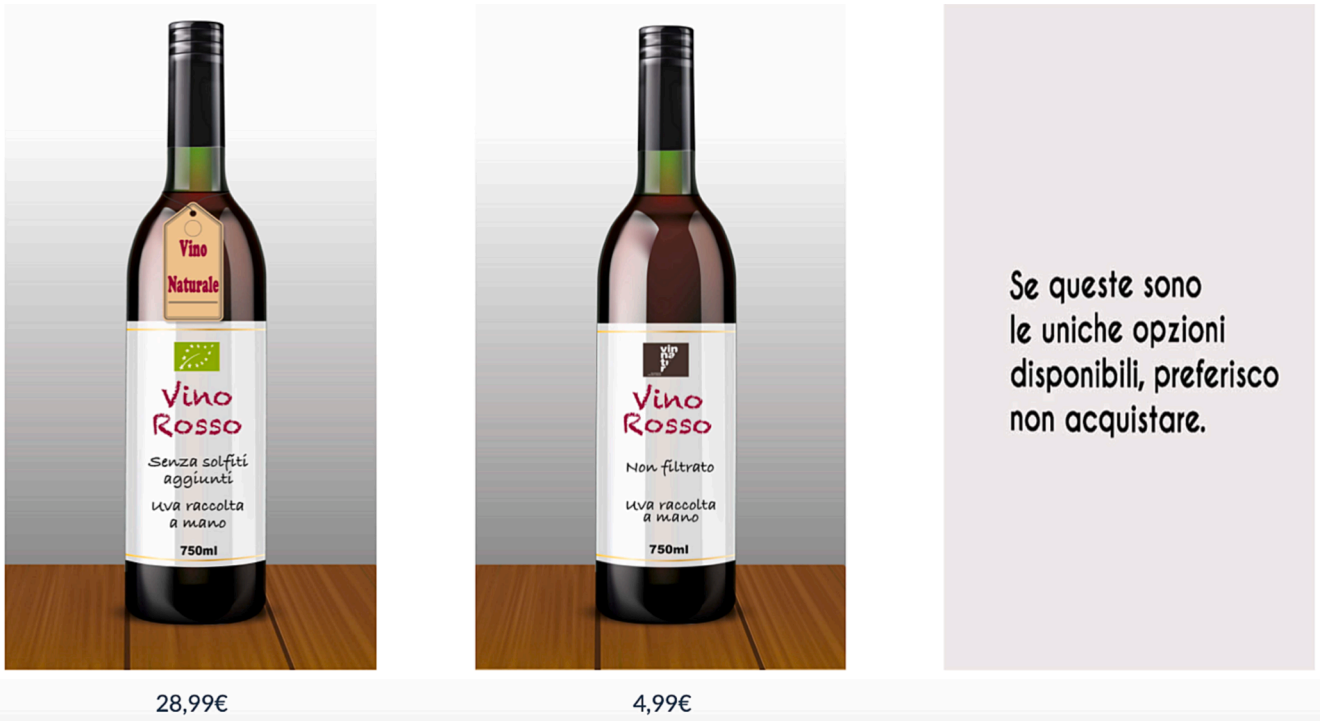
In this section we aim at testing H_1, namely whether perceiving a wine attribute as natural positively affects the consumption frequency of a wine characterized by this attribute.

Specifically, three ordered logit models are estimated: (1) in Model 1 organic wine consumption frequency (*FrBio*) is included as the dependent variable; (2) in Model 2 the dependent variable is biodynamic wine consumption frequency (*FrBiodyn*); (3) in Model 3 the dependent variable is natural wine consumption frequency (*FrNat*). Stata, version 17 software package was used to estimate all three models. In Model 1 and Model 2, we include as explanatory variable, the dummy variable capturing the association with natural wine, namely the perceived naturalness of organic (*NatBio*) and biodynamic certification (*NatBiodyn*) respectively. Moreover, we include socio-demographic and attitudinal variables in the regressions to control for potential drivers of natural, organic and biodynamic wine consumption. These latter explanatory variables have also been used to estimate Model 3. Results from the three ordered logit model estimations are reported as odds ratios with 95% confidence intervals in Table 2.

A value of the odds ratio greater than one indicates a higher likelihood of belonging to a higher category of the wine consumption frequency. On the other hand, an odds ratio equal or lower than 1 indicates a higher likelihood of participants to be in the current consumption frequency level or lower.

Our results show that perceiving biodynamic (*NatBiodyn)* or organic

[1] Respondents were randomly assigned to two types of cheap talk, differing in terms of decision consequentiality. This, however did not affect consumer mWTP structure. Results are available from the authors.



Note: in the first alternative from left to right, the bottle of wine is characterized by Natural wine claim, Organic certification label, No added sulphites, Hand-picked grapes and price of 28.99 Euros. In the second alternative, the bottle of wine is with the VinNatur® label, Unfiltered, Hand-picked grapes and price of 4.99 Euros. The third alternative is the opt-out alternative that reads: "If these are the only available alternatives, I prefer not purchasing either of them".

Fig. 1. An example of the choice task from the CE.

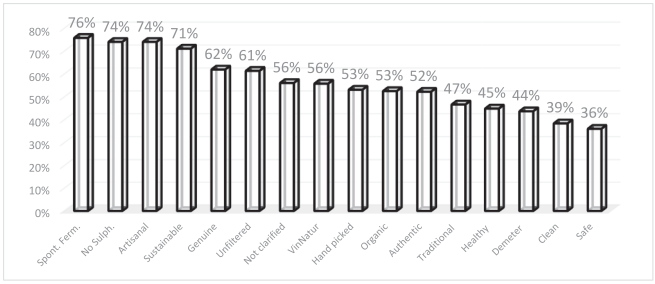


Fig. 2. Perception of the selected wine attributes as associated with natural wine (%, n = 340).

(*NatBio)* wines as natural significantly increases the consumption frequency of these two types of wine. This indicates that hypothesis H_1 fails to be rejected. With regard to the other explanatory variables, we observe that knowledge is a significant determinant of consumption frequency. Knowing organic and biodynamic production methods (*KnBio* and *KnBiodyn*) positively impacts organic and biodynamic wine drinking frequency respectively, while knowledge of natural wine production method (*KnNat*) is positively linked to both natural and biodynamic wine drinking frequency. Being a woman (*Female*) has a significant positive effect on organic wine consumption, but it has no significant effect on biodynamic and natural wine consumption. With regard to organic wine, having an education level higher than primary school decreases (*Edu3, Edu4* and *Edu5*) or does not affect *(Edu6)* the likelihood that an individual consumes organic wine more frequently. This can also be observed in the case of the biodynamic wine model (Model 2), where statistically significant odds ratio parameters with value lower the 1 are the ones defining individuals with graduate university or post university degree. Interestingly, the pro-environment attitude (*Nep*) increases the consumption frequency of natural wine, while it does not generate any significant impact on organic and biodynamic wine drinking. Health consciousness (*Health*) does not seem to be playing any significant role in the consumption frequency for all investigated wines. As regards the remaining socio-demographic and attitudinal variables, we do not observe statistically significant effects. Red wine consumption frequency is statistically significant in the case of organic and biodynamic wine, but not in the case of natural wine. Specifically, individuals who consume red wine more than once a week (*FrRed4, FrRed5* and *FrRed6*) tend to consume organic wine more often and individuals who consume red wine more than twice a week (*FrRed5* and *FrRed6*) tend to consume biodynamic wine with more frequency.

4.3. *Effect of naturalness on wine preference structure*

In order to answer the hypotheses related to preference structure (H_2 "*mWTP for a wine attribute increases when the wine attribute is claimed as natural*" and H_3 "*mWTP for a wine attribute increases when the wine attribute is perceived as natural*"), we use data from the choice experiment. CE data can be estimated using Discrete Choice Models, which are consistent with long-standing theories of consumer choice behaviour, namely random Utility Theory and the Lancaster theory (Lancaster, 1966; McFadden, 1974). Specifically, we estimate a Mixed Logit Model in WTP space with Error Component (MXL-EC) for panel data (Scarpa et al., 2005). Models with WTP space specifications offer a natural and intuitive way to test whether differences in WTP for specific attributes exist as they estimate directly marginal WTP values (Scarpa et al., 2008; Train & Weeks, 2005). The specification of random parameters allows for taking into account heterogeneity in consumer preferences (Louviere et al., 2000; Train, 2009). Moreover, the inclusion of the error component particularly fits our experimental design since it considers that the two purchasing alternatives vary over all choice tasks, while the no-buy alternative remains fixed (Scarpa, et al., 2005; Scarpa et al., 2007).

Table 2
Drivers of organic, biodynamic and natural wine consumption frequency (Odds ratios, n = 340).

Variables	Model 1 (FrBio)	Model 2 (FrBiodyn)	Model 3 (FrNat)
NatBio	**2.043*****	–	–
	(0.434)		
NatBiodyn	–	**2.185*****	–
		(0.475)	
KnBio	**1.309****	–	–
	(0.151)		
KnBiodyn	–	**1.847*****	–
		(0.204)	
KnNat	1.121	**1.584*****	**2.641*****
	(0.113)	**(0.184)**	**(0.273)**
Nep	0.756	0.959	**1.495****
	(0.144)	(0.188)	**(0.284)**
Health	1.139	1.171	1.202
	(0.225)	(0.235)	(0.239)
Involvement	1.064	1.195	0.990
	(0.161)	(0.185)	(0.145)
Female	**1.599****	0.855	0.870
	(0.373)	(0.204)	(0.202)
Edu3	**0.368***	0.600	1.289
	(0.196)	(0.324)	(0.679)
Edu4	**0.305****	0.391	0.696
	(0.174)	(0.223)	(0.393)
Edu5	**0.296****	**0.388***	0.672
	(0.163)	**(0.216)**	(0.363)
Edu6	0.414	**0.377***	0.928
	(0.241)	**(0.221)**	(0.531)
Millennials	0.988	1.062	1.263
	(0.211)	(0.231)	(0.269)
FrRed2	0.885	0.793	0.437
	(0.430)	(0.428)	(0.222)
FrRed3	1.427	2.263	0.911
	(0.656)	(1.146)	(0.437)
FrRed4	**2.506****	1.940	0.827
	(1.144)	(0.976)	(0.393)
FrRed5	**2.613****	**3.412****	1.586
	(1.255)	**(1.772)**	(0.783)
FrRed6	**3.066****	**5.075*****	1.179
	(1.721)	**(3.081)**	(0.677)
Cut1 (Coeff.)	−1.759	**2.733****	**2.953*****
	(1.173)	**(1.130)**	**(1.106)**
Cut2 (Coeff.)	0.004	**4.530*****	**4.398*****
	(1.165)	**(1.142)**	**(1.114)**
Cut3 (Coeff.)	1.763	**6.328*****	**5.986*****
	(1.169)	**(1.171)**	**(1.134)**
Cut4 (Coeff.)	**3.985*****	**8.634*****	**7.681*****
	(1.188)	**(1.219)**	**(1.163)**
Model Fit statistics			
Observations	340	340	340
Log-Likelihood	−453.4	−410.9	−455.4
Chi-square test	51.85	210.4	161.8
Prob > chi2	<0.001	<0.001	<0.001
Pseudo R-squared	0.054	0.204	0.151

***, **, * indicate significance at 1%, 5% and 10% level. Numbers in parenthesis are standard errors. Cuts labeled as Cut 1, Cut 2, Cut 3, and Cut 4 are the estimated threshold parameters (cut-off points) of the latent variable.
Note: All the implemented explanatory variables are described in the Appendix (Table A1).

In accordance with Lancaster's theory (Lancaster, 1966) , discrete choice models assume that the total utility that consumers gain from a product can be segregated into the marginal utilities given by the attributes of the product. Therefore, in our main effects model, the measurement of the utility (U) that individual n derives from choosing option j in choice situation t can be specified as follows:

$$U_{njt} = a_n\big[NOBUY - PRICE_{njt} + \vartheta_{1n}VINNATUR_{njt} + \vartheta_{2n}BIODYNAMIC_{njt} + \vartheta_{3n}ORGANIC_{njt} + \vartheta_{4n}NATURAL_{njt} + \vartheta_{5n}HANDPICKED_{njt} + \vartheta_{6n}NOCLARIFICATION_{njt} + \vartheta_{7n}NOADDEDSULPHITES_{njt} + \vartheta_{8n}SPONTANEOUSFERMENTATION_{njt} + \vartheta_{9n}UNFILTERED_{njt} + 1_j(\eta_{nt})\big] + \in_{njt} \quad (1)$$

where a_n is the price/scale parameter that is assumed to be random and to follow a log-normal distribution; the *NOBUY* is the alternative specific constant representative of the opt-out option choice, that takes value of 1 if no bottle option is present, 0 otherwise; the $PRICE_{njt}$ attribute is represented by five experimentally defined price levels (€4.99, €10.99, €16.99, €22.99, €28.99); $VINNATUR_{njt}$ is dummy-coded variable related to VinNatur® label, where a value of 1 indicates it is present in option j, 0 otherwise; $BIODYNAMIC_{njt}$ and $ORGANIC_{njt}$ are dummy-coded attribute level variables related to these wine certifications, where a value of 1 indicates they are present in option j, 0 otherwise, respectively ; $NATURAL_{njt}$ is a dummy variable for the claim about natural wine, taking the value of 1 if the "tag" placed on the neck of the bottle by the store manager is reported, 0 otherwise; $HANDPICKED_{njt}$ is a dummy variable representing the vineyard technique related to the handpicked grapes, taking the value 1 if it is "handpicked", 0 otherwise; $NOCLARIFICATION_{njt}$, $NOADDEDSULPHITES_{njt}$, $SPONTANEOUS FERMENTATION_{njt}$, $UNFILTERED_{njt}$ are dummy-coded attribute level variables related to winemaking techniques, where a value of 1 indicates they are present in option j, 0 otherwise, respectively; ϑ_{1n}, ϑ_{2n}, ϑ_{3n}, ϑ_{4n}, ϑ_{5n}, ϑ_{6n}, ϑ_{7n}, ϑ_{8n}, and ϑ_{9n}, are the coefficients of estimated mWTP values; $1_j(\cdot)$ is an indicator function that takes the value of 1 for experimentally designed wine bottles, while η_{nt} is the respondent-specific idiosyncratic error component associated only with the two experimentally designed product profiles. Finally, $\in_{njt}$ is an unobserved random term that is distributed following an extreme value type I (Gumbel) distribution, independent and identically distributed over alternatives. Specifically, in order to test the two hypotheses, we use two modelling approaches. First, we account for the interaction effect of the natural wine claim with each of the quality attributes, to test whether the mWTP for a wine attribute increases when the wine is claimed as natural (H_2). Adding the interaction effects to Equation 1, we estimate the following model:

$$U_{njt} = a_n\Big[NOBUY - PRICE_{njt} + \vartheta_{1n}VINNATUR_{njt} + \vartheta_{2n}BIODYNAMIC_{njt} + \vartheta_{3n}ORGANIC_{njt} + \vartheta_{4n}NATURAL_{njt} + \vartheta_{5n}HANDPICKED_{njt} + \vartheta_{6n}NOCLARIFICATION_{njt} + \vartheta_{7n}NOADDEDSULPHITES_{njt} + \vartheta_{8n}SPONTANEOUSFERMENTATION_{njt} + \vartheta_{9n}UNFILTERED_{njt} + \delta_1(VINNATUR \times NATURAL)_{njt} + \delta_2(BIODYNAMIC \times NATURAL)_{njt} + \delta_3(ORGANIC \times NATURAL)_{njt} + \delta_4(HANDPICKED \times NATURAL)_{njt} + \delta_5(NOCLARIFICATION \times NATURAL)_{njt} + \delta_6(NOADDEDSULPHITES \times NATURAL)_{njt} + \delta_7(SPONTANEOUSFERMENTATION \times NATURAL)_{njt} + \delta_8(UNFILTERED \times NATURAL)_{njt} + 1_j(\eta_{nt})\Big] + \in_{njt} \quad (2)$$

where δ_1, δ_2, δ_3, δ_4, δ_5, δ_6, δ_7, δ_8 represent the interaction effects between the natural wine claim and the non-price attributes. The rest of the variables and the parameters are the same as in equation (1). The significance and the sign of the estimated δ_s establish the effect of the

interaction between the natural wine claim and the attribute under investigation. Specifically, a positive (negative) sign indicates a complementary (substitution) effect between the natural wine and the quality attribute (Atallah et al., 2021; Gracia et al., 2014; Meas et al. 2015; Syrengelas et al., 2018). The reasoning is that the natural wine claim infers an objective naturalness perception of the attributes under consideration. A positive interaction effect would then indicate that signaling a wine attribute as natural would increase the probability of consumers to pay more for the attribute in question (H_2).

On the other hand, to account for the subjective perception of naturalness (H_3), the estimated WTP coefficients from the model specified in equation 2 are used to derive 'individual-specific' marginal WTPs (Train, 2009). The 'individual-specific' marginal WTPs are then used to estimate Ordinary Least Square (OLS) regressions to determine how the marginal WTP for each attribute varies depending on the subjective natural perception variable (Caputo, 2020). In this case, the reasoning is that the subjective perception of naturalness for a wine attribute can affect the willingness to pay for that attribute.

Therefore, we estimate two distinct models: (1) the Main Effects Model where the mWTPs for each attribute and attribute level are estimated (equation 1); and (2) the Interaction Effects Model where interaction effects between the natural wine claim and the non-price attributes are also estimated (equation 2). Results of the two models are reported in Table 3. Both models have been estimated using Nlogit software, version 6.

First, we observe that the standard deviations are statistically significant in both models and for all attributes under investigation, confirming a significant presence of preference heterogeneity.

The results of the Main Effects Model show that the *NOBUY* option estimate is negative and statistically significant, indicating that consumers reduce their utility by choosing the opt-out alternative. We observe the highest mWTP price premiums for *NO ADDED SULPHITES* and *SPONTANEOUS FERMENTATION*. Additionally, we observe significant mWTP premium prices for the *HAND PICKED*, *VINNATUR®*, *ORGANIC* and *BIODYNAMIC* attributes. On the other hand, *NO CLARIFICATION, NATURAL* and *UNFILTERED* attributes are not statistically significant at 10% level. The fourth column of Table 3 reports mWTP values for the Interaction Effects Model. Also in this model, the *NOBUY* option is negative and statistically significant. When considering the interaction effect model parameters, we observe organic certification being the most valued attribute, in contrast with the estimates from the main effects model. This can be explained by the negative interaction effect between the organic production attribute and the natural wine claim, suggesting that when organic wine is labelled as natural, the mWTP decreases. This is also the case of *HAND PICKED* and *BIODYNAMIC* attributes. Hence, these results suggest the rejection of H_2 in the case of *ORGANIC*, *HAND PICKED* and *BIODYNAMIC* attributes. For the remaining wine attributes, no statistically significant interaction with the natural claim emerges. This finding may suggest that consumers tend to have a higher mWTP for these attributes on their own without the necessity of additional claims. This can be especially the case of *NO ADDED SULPHITES* and *SPONTANEOUS FERMENTATION* which emerged to be the mostly associated attributes with natural wine (see Fig. 2).

Finally, in order to test the third and last hypothesis, we use the 'individual-specific' marginal WTPs as the dependent variable of OLS regressions to determine how mWTP for the different attributes varies according to the perceived naturalness. As in the ordered logistic regressions (Table 2), we include socio-demographic and attitudinal variables in the OLS regressions to control for potential drivers of preference structure for wine characteristics. Results are shown in Table 4. Specifically, the *NATATT* variable is the dummy variable that for each model takes the value of 1 if the individual perceives the respective wine attribute as associated with natural wine, 0 otherwise; *KNATT* is the degree of subjective knowledge about the wine attribute under investigation in the respective model. The remaining variables are the same that have been implemented in the ordered logistic regressions reported in Table 2. All the linear regressions have been estimated using Stata Software package, version 17.

Results show that H_3 fails to be rejected in the case of *UNFILTERED*

Table 3
Estimates from Main Effects and Interaction MXL-EC Models in WTP space.

Variable	WTP parameters	Main Effects Model	Interaction Effects Model
VINNATUR®	μ	3.850**	1.908
		(1.98)	(0.91)
	σ	23.098***	22.036***
		(7.03)	(8.19)
BIODYNAMIC	μ	6.348***	7.146***
		(3.09)	(3.05)
	σ	10.086***	11.404***
		(3.12)	(3.52)
ORGANIC	μ	6.839 ***	9.939***
		(2.99)	(4.11)
	σ	13.388***	11.404***
		(3.09)	(3.52)
NATURAL	μ	0.732	2.226
		(0.34)	(0.82)
	σ	19.726***	18.260***
		(5.78)	(6.14)
HAND PICKED	μ	8.460 ***	8.757***
		(4.36)	(4.49)
	σ	16.271***	11.972***
		(5.51)	(4.61)
NO CLARIFICATION	μ	3.221	− 0.586
		(1.04)	(0.16)
	σ	22.464***	19.460***
		(4.46)	(4.23)
NO ADDED SULPHITES	μ	10.845***	8.158***
		(3.77)	(2.95)
	σ	19.552***	18.863***
		(4.43)	(4.43)
SPONTANEOUS FERMENTATION	μ	12.559***	8.258***
		(4.36)	(2.62)
	σ	16.078***	14.302***
		(2.78)	(2.87)
UNFILTERED	μ	−2.004	−3.370
		(0.70)	(1.15)
	σ	18.483***	14.304***
		(3.37)	(4.10)
η_{nt}	σ	19.022***	23.105***
		(4.59)	(5.84)
VINNATUR® x NATURAL	μ	–	0.258
			(1.34)
BIODYNAMIC x NATURAL	μ	–	−0.526*
			(1.96)
ORGANIC x NATURAL	μ	–	−0.835***
			(2.93)
HAND PICKED x NATURAL	μ	–	−0.320*
			(1.70)
NO CLARIFICATION x NATURAL	μ	–	0.426
			(1.32)
NO ADDED SULPHITES x NATURAL	μ	–	0.304
			(1.00)
SPONTANEOUS FERMENTATION x NATURAL	μ	–	0.176
			(0.52)
UNFILTERED x NATURAL	μ	–	0.364
			(1.21)
NOBUY	μ	−0.405**	−0.478**
		(2.29)	(2.55)
Model fit statistics			
N. obs.		2040	2040
LogL		−1924.813	−1916.96
AIC		3981.9	3981.6
AIC/N		1.952	1.952

***, **, * indicate significance at 1%, 5% and 10% level respectively. Numbers in parenthesis are |T-statistics|.

Table 4
Drivers of mWTP structure for wine attributes.

VARIABLES	Model *HAND PICKED*	Model *ORGANIC*	Model *BIODYN.*	Model *SPONT. FERMENTATION*	Model *UNFILTERED*	Model *NO ADDED SULPHITES*	Model *NO CLARIFIED*	Model *VINNATUR®*	Model *NATURAL*
NATATT	**1.854****	−0.239	0.747	0.280	**2.508*****	−1.597	0.497	−0.488	–
	(0.798)	(0.714)	(0.759)	(0.918)	(0.936)	(1.588)	(1.363)	(1.809)	
KNATT	−0.623	0.562	−0.354	0.135	**−0.842***	0.323	0.457	−0.106	–
	(0.389)	(0.432)	(0.342)	(0.430)	(0.444)	(0.780)	(0.673)	(0.852)	
KnNat	**0.663***	0.0890	**0.955****	**0.846****	0.0932	**1.369****	0.513	**1.746***	**1.487****
	(0.350)	(0.337)	(0.369)	(0.372)	(0.425)	(0.645)	(0.659)	(0.895)	(0.617)
Nep	0.822	1.043	0.933	1.079	**1.399***	**4.031*****	1.256	**6.867*****	**5.581*****
	(0.673)	(0.647)	(0.689)	(0.656)	(0.713)	(1.294)	(1.150)	(1.542)	(1.269)
Health	−0.489	**2.019*****	**1.336***	−0.0273	**−1.958****	**3.268****	0.879	**4.251****	**2.395***
	(0.742)	(0.718)	(0.734)	(0.809)	(0.806)	(1.383)	(1.229)	(1.651)	(1.352)
Involvement	0.861	0.197	0.317	−0.124	0.531	0.862	0.732	1.633	1.658
	(0.577)	(0.590)	(0.527)	(0.552)	(0.590)	(0.950)	(0.974)	(1.261)	(1.023)
Female	−0.588	−0.0774	−1.286	0.459	−0.102	−1.387	−0.149	**−4.165****	**−3.440****
	(0.925)	(0.876)	(0.813)	(0.860)	(0.990)	(1.537)	(1.443)	(1.929)	(1.592)
Edu3	1.165	−2.111	−0.598	−1.632	1.863	−2.615	0.0504	−1.213	0.228
	(1.883)	(1.611)	(2.021)	(1.836)	(1.715)	(4.082)	(3.264)	(4.362)	(3.602)
Edu4	−2.437	−0.634	−1.390	−1.810	0.0459	−3.248	−3.467	−1.230	−2.693
	(2.016)	(1.669)	(2.095)	(1.957)	(1.827)	(4.253)	(3.452)	(4.624)	(3.814)
Edu5	−0.469	−2.208	−2.618	−2.483	1.735	−6.611	−5.350	−3.335	−2.491
	(1.925)	(1.688)	(2.091)	(1.846)	(1.766)	(4.151)	(3.351)	(4.487)	(3.700)
Edu6	1.906	−1.396	−1.055	1.207	2.908	−0.440	0.243	0.666	2.205
	(2.142)	(1.839)	(2.176)	(1.976)	(2.012)	(4.357)	(3.565)	(4.775)	(3.936)
Millennials	**2.745*****	**1.661****	**1.432***	0.124	−1.358	**2.534***	**2.604***	2.071	**3.132****
	(0.836)	(0.763)	(0.746)	(0.810)	(0.895)	(1.373)	(1.330)	(1.786)	(1.467)
FrRed2	−0.503	−1.574	0.662	1.261	1.674	−0.419	−3.284	1.157	0.792
	(2.006)	(1.997)	(1.966)	(1.751)	(2.219)	(3.590)	(3.093)	(4.135)	(3.411)
FrRed3	1.674	−2.516	0.256	0.434	2.368	−1.738	−2.241	0.0445	1.475
	(1.879)	(1.883)	(1.856)	(1.825)	(2.100)	(3.483)	(2.954)	(3.945)	(3.253)
FrRed4	−0.530	**−3.196***	−1.142	0.217	1.907	−4.843	−4.045	−5.549	−4.142
	(1.866)	(1.900)	(1.836)	(1.662)	(2.101)	(3.402)	(2.907)	(3.879)	(3.197)
FrRed5	0.370	−3.095	−1.770	0.812	3.460	−4.195	−4.875	−3.577	−2.016
	(1.983)	(1.974)	(1.923)	(1.758)	(2.213)	(3.596)	(3.064)	(4.092)	(3.371)
FrRed6	−1.397	−0.360	−0.0861	−0.120	1.568	1.847	0.204	4.646	2.726
	(2.303)	(2.130)	(2.354)	(1.903)	(2.651)	(3.774)	(3.595)	(4.813)	(3.970)
Constant	2.049	−1.372	−3.824	2.271	−4.827	**−22.21*****	−10.55	**−48.96*****	**−38.50*****
	(4.401)	(3.683)	(4.047)	(3.464)	(4.263)	(7.478)	(6.751)	(9.031)	(7.451)
Model fit Statistics									
Observations	340	340	340	340	340	340	340	340	340
R-squared	0.128	0.105	0.105	0.070	0.073	0.172	0.094	0.195	0.209
Prob > chi2	2.40e-05	0.00111	0.00245	0.0231	0.0259	3.61e-08	0.0129	1.21e-08	2.00e-10

***, **, * indicate statistical significance at 1%, 5% and 10% level.
Note: *NATATT* = attribute under investigation in the respective model perceived as associated with natural wine; *KNATT* = subjective knowledge about the wine attribute under investigation in the respective model; all the remaining variables are described in the Appendix (Table A1).

and *HAND PICKED* attributes, given the significant and positive effect of perceived naturalness (*NATATT* for the respective models) on the mWTP estimates. Regarding the remaining drivers of mWTP structure, at first, we observe that wine consumption frequency (*FrRed*) does not significantly affect the willingness to pay for wine attributes, as well as involvement with wine (*Involvement*). The level of knowledge about the respective model attribute does not seem playing a relevant role on the mWTP structure either. It is statistically significant only in the case of *UNFILTERED* with a negative sign. These findings may indicate a different role played by the perception of naturalness and subjective knowledge of wine attributes in shaping willingness to pay for this type of products. On the other hand, the knowledge of natural wine has a positive, statistically significant effect on most of the mWTP for the attributes defining wine characteristics (namely, no added sulphites, spontaneous fermentation, hand-picked grapes) and wine labelling (namely, biodynamic certification, VinNatur® protocol and natural claim). Similarly, health consciousness (*Health*) has a positive effect on mWTP for several attributes under consideration, namely *ORGANIC, BIODYNAMIC, NO ADDED SULPHITES, VINNATUR®* and *NATURAL,* while we observe a negative sign in the case of the *UNFILTERED* model.

On the other hand, pro-environment attitude (*Nep*) has a significant and positive effect on mWTP for *NATURAL*, *VINNATUR®*, *UNFILTERED* and *NO ADDED SULPHITES* attributes; while it is not statistically significant for the rest of the models.

With regard to socio-demographic variables, our results show a positive effect of being a Millennial on the mWTP for *HAND PICKED*, *ORGANIC, BIODYNAMIC, NO ADDED SULPHITES, NO CLARIFICATION* and *NATURAL* attributes. Women demonstrate lower mWTP for *NATURAL* and *VINNATUR®* attributes than men, while we do not observe any statistically significant effect of education level.

5. Discussion

The purpose of this study was to understand how consumers perceive natural wine and whether perceiving a wine as natural increases consumption frequency and mWTP. Specifically, three hypotheses have been tested: (1) the consumption of a wine increases if this is perceived as natural (H_1); (2) when the naturalness of a wine attribute is declared by the producer/distributor (objective naturalness), the mWTP for wine attribute increases (H_2); (3) when a wine attribute is perceived natural (subjective naturalness), consumers are willing to pay a higher price for the wine attribute under consideration (H_3).

First, results from this study show that respondents generally associate the concept of natural wine more with production techniques than

with production certifications. Probably, this could be explained by the fact that consumers feel more knowledgeable about some oenological techniques rather than about certifications (Schäufele & Hamm, 2017; Scozzafava et al., 2021). The attributes mostly perceived as natural are "no added sulphites" and "spontaneous fermentation". This is consistent with the studies of Staub et al. (2020) and Vecchio et al. (2021), which show that additives and added sulphites are not associated with natural wine. Second, our results show that perceived naturalness affects wine consumption frequency and, specifically, if a wine is perceived as natural, its consumption frequency increases. This confirms our conjecture, i.e. H_1. On the other hand, we have to reject our second hypothesis. Indeed, we observe that the natural wine claim has no significant effect on most of the attributes and plays a substitution effect on the organic, biodynamic and hand-picked attributes, indicating that wines characterized by these attributes can be less valued when they are claimed as natural wines. This finding may suggest that consumers tend to consider ecologically labeled wine and natural wines as two distinct product categories. Moreover, this latter finding seems to differ from some previous studies highlighting that winegrowing techniques (in the case hand-picked grapes and organic farming) can be associated with traditionality (Dominici et al., 2019) and, in turn, with a natural wine (Delmas & Lessem, 2017; Sogari et al., 2016, D'Amico et al., 2016).

When it comes to the effect of perceived naturalness (subjective naturalness) on mWTP structure (H_3), the results from the linear regressions (Table 4) are more in line with the results from the ordered logit regressions, related to the consumption behaviour towards organic and biodynamic wine. Perceived naturalness has no significant effect on individual mWTP for most of the attributes under consideration. However, when the parameter of the regressions is statistically significant at more than the 10% level, a complementary effect is observed. This is the case of mWTP for unfiltered and hand-picked attributes. Hence, H_3 partially fails to be rejected.

These contrasting results between 'objective' and 'subjective' wine naturalness, support evidence from the existing literature that individuals may distort the given 'objective' information (Lunardo & Saintives, 2013; Lusk et al., 2014; Costanigro et al., 2015; Costanigro & Onozaka, 2020). To illustrate, while the subjective naturalness has a positive effect on mWTP for the hand-picked grapes claim (Table 4), the interaction effect between the natural wine claim, namely the 'objective' naturalness, and this attribute has a negative sign (Table 3). Hence, our results highlight that it is worthwhile to elicit individual perceptions to better understand consumer preference structure for product information. It is also surprising that, on average, the natural wine claim has not a significant positive value on consumer valuation. However, the attributes mostly perceived as linked to natural wine, such as "Spontaneous Fermentation" and "No added sulphites", reveal the highest average mWTP values in the main effects model. This finding might then encourage producers to communicate the features of their products in a way that consumers perceive them as natural, instead of claiming that their products are natural. Hence, the contrast of our results with the findings from previous studies (Galati et al., 2019; Migliore et al., 2020; Vecchio et al., 2023a, 2023b) might also be explained by the use in our CE of multiple attributes that are generally linked to natural wine. In the previous studies, the authors limited to elicit WTP for natural wine, without considering further product information. The observed WTP premium for natural wine might be explained by the aggregation of the mWTP for the different attributes embedded in natural wine. Indeed, we do not observe any statistically significant interaction terms between the natural wine claim and the attributes mostly perceived as natural (i.e., Spontaneous fermentation, No added sulphites, Unfiltered, No clarification, VinNatur® logo).

Our results on the gender effect, are in contrast with the recent work from Parga-Dans et al. (2023), since we observe a negative effect of being a woman on mWTP for natural wine. However, they are consistent with the studies from Migliore et al., 2020 and Vecchio et al., 2021. Moreover, we similarly observe a positive effect of being a Millennial, knowledgeable about natural wine and having pro-environmental behaviour. Surprisingly, we observed a positive and significant effect of pro-environmental behaviour on mWTP for some attributes concerning natural wine (i.e. VinNatur® label, natural wine claim, no-added sulphites and unfiltered) instead of organic and biodynamic certifications. On the other hand, in line with previous research (Staub et al., 2020), the health consciousness attitude of consumers increases mWTP for most of the attributes under investigation, implying that the concern of a clean production from additives is a consolidated determinant of wine consumer willingness to pay (Staub et al., 2020).

6. Conclusions

Results from this study suggest that Italian consumers generally tend to associate the concept of natural wine with production techniques rather than sustainable production certifications. Our findings stress the importance of understanding how individuals perceive natural wine since we have observed that wine choice behaviour can be affected by whether a wine is perceived as natural or not. Accordingly, we support the existing literature in calling for the need for clarity in the natural wine definition. Moreover, to our knowledge, this is the first study testing the effect of a natural wine claim on attributes that can be linked to the "natural wine" philosophy. Given the significantly higher mWTP for the wine attributes (i.e. wine-making techniques and ecological certification) rather than for the extrinsic natural wine claim, we highlight the importance of disentangling the different aspects of natural wine. We believe this finding can be of interest to wineries producing natural wine or focusing on the naturalness of their wines, suggesting that the communication content, and specifically the combination of product information, could play a pivotal role in activating consumer perception of wine naturalness and therefore the willingness to pay structure for natural wines.

The main limitation of this study is related to the convenience nature of the sample, which might be caused by the use of Social Network platforms as sampling procedure. Readers should, then, be cautious in generalizing results from this study to the entire Italian population and beyond Italy. Hence, for future research, we recommend implementing probabilistic sampling methods, such as, for instance, through professional panel providers. Especially, we recommend repeating the experiment in a non-hypothetical context, with real economic incentives and real wine products. Moreover, as some research highlights, the selection of the price vector might influence mWTP derived from CEs (Contini et al., 2019; Glenk et al., 2019). Therefore, in order to corroborate mWTP estimates obtained from this study, future research should also test the use of different price vectors, accounting for segments of consumers with diverging reference prices for a bottle of wine (Piracci et al., 2022).

We also suggest that future research may focus on different geographical areas with a comparison between countries. Furthermore, we suggest expanding the analysis by taking into account additional wine attributes, such as brand, medals/awards, expert ratings, designations of origin, which are wine attributes that individuals commonly trade-off when making wine choices (Corsi et al., 2022). In future studies, more attention should also be given to the sensory properties of natural wine and how these can influence consumer preference structure for natural wine. Indeed, to our knowledge, only the study from Urdapilleta et al. (2021) has explored consumer perception towards organoleptic properties of natural wine, while most of the existing literature has focused on wine production techniques. Additionally, the trust effect towards the winery and the difference between small and large companies in consumer perception of naturalness should be investigated.

CRediT authorship contribution statement

Claudia Bazzani: Conceptualization, Data curation, Formal analysis, Investigation, Project administration, Methodology, Software,

Writing – original draft, Writing – review & editing. **Giulia Maesano:** Software, Investigation, Writing – original draft, Writing – review & editing. **Diego Begalli:** Conceptualization, Writing – review & editing. **Roberta Capitello:** Conceptualization, Supervision, Writing – review & editing.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

Acknowledgements

G.M. acknowledges the financial support of the Italian Ministry of University and Research in the framework of "Fondo per la promozione e lo sviluppo delle politiche del programma nazionale per la ricerca in favore delle università" DM 737/21. The authors would like to acknowledge the association VinNatur® for granting permission to use their logo in this research. A special thank goes to Pietro Margotti for his help in the data collection.

Appendix A

Table A1
Descriptive statistics of observed variables used in study analysis.

Variable	Variable Description	Scale	Min	Max	Mean	Median	%
Millennials	Respondent belongs to the millennials generation category = 1, 0 otherwise	0–1	0	1	0.435	–	43.53
Female	Respondent belongs to gender female category = 1, 0 otherwise	0–1	0	1	0.329	–	32.94
Edu1	Maximum level of education degree is Elementary School = 1, 0 otherwise	0–1	0	1	0	–	0
*Edu2**	Maximum level of education degree is Primary School = 1, 0 otherwise	0–1	0	1	0.044	–	4.41
Edu3	Maximum level of education degree is High School = 1, 0 otherwise	0–1	0	1	0.347	–	34.71
Edu4	Maximum level of education undergraduate University Degree = 1, 0 otherwise	0–1	0	1	0.473	–	20.29
Edu5	Maximum level of education graduate University Degree = 1, 0 otherwise	0–1	0	1	0.271	–	27.06
Edu6	Maximum level of education degree is Post University Degree = 1, 0 otherwise	0–1	0	1	0.135	–	13.53
FrRed1	Consumption of red wine once a month or less = 1, 0 otherwise	0–1	0	1	0.062	–	6.18
FrRed2	Consumption of red wine two–three times a month = 1, 0 otherwise	0–1	0	1	0.141	–	14.12
*FrRed3**	Consumption of red wine once a week = 1, 0 otherwise	0–1	0	1	0.235	–	23.53
FrRed4	Consumption of red wine twice a week = 1, 0 otherwise	0–1	0	1	0.300	–	30.00
FrRed5	Consumption of red wine more than three times a week = 1, 0 otherwise	0–1	0	1	0.185	–	18.53
FrRed6	Consumption of red wine every day/almost every day = 1, 0 otherwise	0–1	0	1	0.077	–	7.65
FrBio	Frequency of organic wine consumption	1–5	1	5	3.103	3	–
FrBiodyn	Frequency of biodynamic wine consumption	1–5	1	5	2.638	3	–
FrNat	Frequency of natural wine consumption	1–5	1	5	2.962	3	–
Involvement	Degree of wine involvement (mean score of four items)	1–5	1	5	4.117	–	–
Nep	Degree of pro-environment behaviour (mean score of 15 items)	1–5	1	5	3.729	–	–
Health	Degree of health consciousness (mean score of six items)	1–5	1	5	4.064	–	–
KnBio	Knowledge degree about organic production	1–5	1	5	3.497	4	–
KnBiodyn	Knowledge degree about biodynamic production	1–5	1	5	2.857	3	–
KnHand	Knowledge degree about hand-picked grape harvest	1–5	1	5	3.812	4	–
KnFerm	Knowledge degree about spontaneous fermentation	1–5	1	5	3.441	4	–
KnFil	Knowledge degree about filtration technique	1–5	1	5	3.367	4	–
KnSulf	Knowledge degree about sulphites	1–5	1	5	3.812	4	–
KnChia	Knowledge degree about clarification technique	1–5	1	5	3.176	3	–
KnVinnatur	Knowledge degree about Vinnatur® Label	1–5	1	5	2.679	3	–
KnNat	Knowledge degree about natural wine	1–5	1	5	3.197	3	–
NatBio	Perception of wine with organic certification attribute as associated with natural wine = 1,0 otherwise	0–1	0	1	0.526	–	52.65
NatBiodyn	Perception of biodynamic attribute as associated with natural wine = 1,0 otherwise	0–1	0	1	0.438	–	43.82
NatHand	Perception of the hand-picked grape attribute as associated with natural wine = 1, 0 otherwise	0–1	0	1	0.532	–	53.23
NatFerm	Perception of the spontaneous fermentation attribute as associated with natural wine = 1, 0 otherwise	0–1	0	1	0.759	–	75.88
NatFil	Perception of unfiltered attribute as associated with natural wine = 1, 0 otherwise	0–1	0	1	0.615	–	61.47
NatSulf	Perception of no added sulphites attribute as associated with natural wine = 1, 0 otherwise	0–1	0	1	0.741	–	74.11
NatChia	Perception of unclarified attribute as associated with natural wine = 1, 0 otherwise	0–1	0	1	0.562	–	56.17
NatVinnatur	Perception of VinNatur® attribute as associated with natural wine = 1, 0 otherwise	0–1	0	1	0.559	–	55.88

*The asterisk indicates the dummy variables that were dropped in the estimation process. These are the base categories.

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