

Understanding Visitor Perceptions in Multisensory Wine Tourism - A Sociodemographic Analysis in Portugal*

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Abstract

Wine tourism has emerged as a key segment of experiential tourism, where multisensory engagement plays a central role in shaping visitor experiences. Despite its growing relevance, existing research has largely focused on motivations, destination development, and economic impacts, overlooking how different sociodemographic groups perceive these sensory-rich experiences. Addressing this gap is essential for developing more targeted and inclusive tourism strategies. This study examines how visitors' sociodemographic characteristics, namely gender, educational background, and residential environment, influence perceptions of multisensory wine tourism experiences in Portugal. A quantitative approach was adopted using a structured questionnaire administered to individuals who had participated in at least one wine tourism activity in the previous year, yielding 342 valid responses. Data were analyzed through non-parametric statistical techniques, specifically the Mann–Whitney U and Kruskal–Wallis tests, to identify differences across groups. The findings reveal statistically significant differences across four dimensions: multisensory wine elements, multisensory experiential elements, sustainability attitudes, and visitor satisfaction. Gender emerges as the most consistent differentiating factor, with male respondents reporting higher evaluations across all constructs. Educational background also influences perceptions, particularly regarding experiential and sustainability-related aspects, whereas residential environment showed limited impact. These results highlight the importance of visitor heterogeneity and provide practical insights for designing more tailored and inclusive wine tourism experiences. These results highlight visitor heterogeneity and suggest that wineries and destination managers should adopt more targeted and inclusive experiential strategies to improve satisfaction and destination competitiveness.

Keywords: Wine tourism; Multisensory experience; Sociodemographic differences; Visitor satisfaction.

Introduction

The wine industry has undergone significant transformations in recent years as producers and destinations adapt to evolving consumer expectations. Contemporary consumers are no longer solely interested in wine as a product; instead, they seek authentic, immersive, and memorable experiences that allow them to connect with wine culture, production methods, and the territories where wine is produced. This shift has driven the rapid growth of wine tourism as a key segment of experiential tourism, offering visitors opportunities to engage with vineyards, wineries, and local traditions (Carlsen and Boksberger, 2013; Santos, 2021).

Wine tourism increasingly integrates cultural, gastronomic, environmental, and social dimensions, allowing visitors to interact with landscapes, heritage, cuisine, and local narratives while strengthening emotional connections with destinations (Boniface, 2017). As a result, wine tourism has become an important strategy for regional development, destination differentiation, and the promotion of territorial identity.

A distinctive characteristic of wine tourism is its strong multisensory nature. Activities such as vineyard visits, wine tastings, cellar tours, and participation in harvest stimulate multiple senses simultaneously, shaping visitors' perceptions of authenticity, quality, and satisfaction (Agapito et al., 2014; Spence, 2020; Torabi et al., 2021).

Sensory-rich environments contribute to emotional engagement and to the creation of memorable tourism experiences, reinforcing visitors' attachment to both the product and the destination.

However, visitor perceptions of these experiences are not homogeneous. Consumer behavior research suggests that sociodemographic characteristics, such as gender, educational background, and residential environment, may influence how individuals perceive and evaluate tourism experiences. Among these characteristics, gender has been identified as an important factor affecting attitudes, preferences, and emotional responses in consumption contexts (Bruwer and McCutcheon, 2017). At the same time, education and residential context may shape individuals' ability to interpret sensory stimuli and evaluate experiential and sustainability-related attributes.

Despite growing interest in sensory tourism experiences, limited research has examined whether visitors perceive multisensory wine tourism experiences differently across sociodemographic characteristics. Most existing studies focus on visitor motivations, destination development, and economic impacts rather than on how visitors interpret the sensory dimensions of wine tourism offerings and how these perceptions vary across different visitor profiles.

Understanding these perceptions is essential for designing experiences that align with the expectations and preferences of diverse visitor groups. Accordingly, this study investigates whether visitors' sociodemographic characteristics—namely gender, educational background, and residential environment—influence perceptions of multisensory wine tourism experiences in Portugal. The analysis is based on survey data collected from wine tourists who participated in wine tourism activities across Portuguese wine regions.

The remainder of this paper is organized as follows. The next section reviews the literature on wine tourism, multisensory experiences, visitor satisfaction, and gender differences in tourism behavior. The following section explains the data and methodology used in the study. The subsequent section presents the empirical results, followed by the final section, which discusses the findings and their implications.

Literature Review

The concept of wine tourism

Wine tourism is widely recognized as a multifaceted concept that extends beyond wine consumption and encompasses economic, cultural, social, and territorial dimensions. It attracts visitors interested not only in wine tasting and purchasing but also in exploring wine-producing landscapes, local heritage, gastronomy, traditions, and the distinctive identity of wine regions (Byrd et al., 2016; Carvalho et al., 2021c; Graça et al., 2023). In this sense, wine tourism is increasingly understood as experiential tourism that connects visitors to the broader cultural and symbolic context of wine production.

Despite its growing relevance, there is still no single universally accepted definition of wine tourism. The literature demonstrates a gradual evolution of the concept. Early approaches defined wine tourism more narrowly, focusing on visits to vineyards, wineries, wine festivals, and other wine-related events, primarily for tasting, purchasing, or leisure (Hall, 1996; Hall et al., 1997; Simões, 2008). Later contributions broadened this perspective by emphasizing the experiential nature of wine tourism and its connections to gastronomy, education, the arts, landscape, and regional culture (Dowling, 1998; Getz, 2000; Williams and Kelly, 2001).

More recent studies have adopted a broader interpretation, framing wine tourism as an integrated territorial experience that combines material and immaterial wine heritage, local identity, environmental resources, and

community development (Boniface, 2017; Santos, 2017). From this perspective, wine tourism extends beyond visiting wineries to encompass immersion in the winescape, terroir, cultural narratives, and the lifestyle of wine-producing regions. It can therefore play an important role in destination differentiation, regional development, job creation, and the promotion of more sustainable forms of tourism, particularly in rural areas (Inácio, 2010; Kastenholz et al., 2022; Sekhniashvili and Bujdosó, 2023). Accordingly, this study adopts a broad experiential definition of wine tourism as a tourism activity centered on wine-related experiences that integrate sensory, cultural, gastronomic, environmental, and territorial dimensions. This perspective is particularly appropriate for the present research because it reflects the multisensory nature of wine tourism and acknowledges that visitors engage not only with wine as a product but also with the broader experiential environment in which it is produced and consumed.

Wine tourism in Portugal

Portugal provides a particularly relevant context for studying wine tourism experiences. Wine tourism holds special significance in the country due to its rich wine heritage and the diversity of its wine regions, which are characterized by distinct landscapes, grape varieties, and cultural identities (Cunha et al., 2022).

The wine industry plays a key role in the Portuguese economy, accounting for approximately 2.7% of GDP and 3.4% of total employment, representing around 168,000 jobs (Duarte et al., 2022). In addition, nearly 10% of domestic travelers report wine-related motivations for their trips.

In Portugal, wine is not only an economic commodity but also an important cultural symbol that reflects regional traditions, historical continuity, and local identities (Caldeira et al., 2021). Wine tourism, therefore, contributes to the preservation of cultural heritage while simultaneously fostering economic and social development in wine-producing areas (Santos, 2021). It also promotes economic diversification by creating direct marketing channels for wineries and reducing tourism seasonality through year-round experiential activities (Carneiro et al., 2022). This is particularly relevant in rural and low-density areas, where wine tourism can stimulate economic revitalization and help counteract rural depopulation (Kastenholz et al., 2022).

In Portugal, wine tourism is structured through wine routes established in 1993 under the European Union's Dyonisios Programme. Approximately twelve wine routes connect wineries, gastronomy, landscapes, and cultural heritage, creating integrated tourism experiences that strengthen destination attractiveness (Cunha et al., 2022). Portugal currently has fourteen wine regions and thirty-one Protected Designations of Origin, with the Douro and Alentejo regions standing out internationally for both wine production and tourism development. As a result, Portuguese wine regions offer rich, diverse environments for analyzing how visitors experience and evaluate wine tourism activities.

Within this experiential framework, understanding how visitors perceive and interpret wine tourism experiences becomes essential for tourism marketing, destination management, and the development of more differentiated and competitive wine tourism offerings.

The Multisensory Experience in Wine Tourism

Wine tourism is widely recognized as a highly experiential form of travel, in which sensory stimulation and emotional engagement play central roles. Activities such as vineyard visits, wine tastings, harvest participation, and winery tours simultaneously engage the five human senses.

These stimuli foster immersive experiences that allow visitors to interact with landscapes, aromas, textures, and sounds associated with wine culture, strengthening emotional bonds with destinations (Kastenholz et al., 2020; Kotur, 2023). The multisensory nature of wine tourism extends beyond the act of wine tasting itself. Visual elements such as vineyard landscapes, cellar architecture, and the color and presentation of wine shape visitors' expectations, while aromas and flavors are fundamental to wine evaluation. In addition, tactile and auditory cues—such as the feel of glassware, the texture of barrels, or the sound of wine being poured—further enhance immersion and engagement, contributing to a richer and more memorable experience (Campo et al., 2021; Santos et al., 2023).

When sensory elements are combined with local culture, gastronomy, and landscapes, they strengthen perceptions of authenticity, emotional involvement, and experiential value (Agapito et al., 2017). Consequently,

multisensory experiences have become a central component of wine tourism, fostering emotional connections, positive word of mouth, visitor satisfaction, and long-term loyalty (Brochado et al., 2019; Torabi et al., 2021).

Visitor Satisfaction in Wine Tourism

Visitor satisfaction is a critical determinant of tourism success, as it influences repeat visitation, recommendations, and long-term loyalty (Torabi et al., 2021). In wine tourism, satisfaction is particularly complex because the experience combines sensory, emotional, educational, cultural, and symbolic dimensions (Králíková et al., 2025).

The evaluation of wine tourism experiences depends on several factors, including wine quality, service interactions, environmental atmosphere, authenticity, and emotional engagement (Dias et al., 2024). Given the inherently multisensory nature of these experiences, visitors are exposed to a wide range of stimuli that shape their perceptions of quality and overall satisfaction (Verhoef et al., 2009).

Emotional attachment and memorable experiences also play an important role in determining satisfaction and subsequent behavioral intentions, such as post-visit engagement, recommendations, and intentions to revisit (Králíková et al., 2025). Furthermore, expectation–confirmation theory suggests that satisfaction occurs when perceived performance meets or exceeds visitors’ prior expectations, reinforcing positive evaluations and future loyalty behaviors (Zhan and Shi, 2024).

Sociodemographic Differences in Tourism and Wine Consumption

Research on consumer behavior shows that sociodemographic characteristics, including gender, educational background, and residential context, can influence how individuals perceive and evaluate products and experiences.

In tourism, gender differences have been identified in travel motivations, emotional responses, and assessments of sensory attributes. At the same time, other sociodemographic factors have also been associated with variations in experience evaluation and perception.

In the wine industry, research indicates that men and women may display different patterns of wine consumption, purchasing behavior, and involvement in wine-related activities (Bruwer and McCutcheon, 2017). Female consumers are often associated with greater interest in the experiential and emotional dimensions of wine consumption. In contrast, male consumers tend to place more emphasis on functional and technical product attributes. Empirical studies support these distinctions, showing that women frequently associate wine consumption with social interaction, atmosphere, and experiential enjoyment. In contrast, men often show a stronger interest in grape varieties, production methods, and technical wine characteristics (Bruwer and McCutcheon, 2017). At the same time, educational background has been linked to differences in knowledge, information processing, and the evaluation of wine experiences, with more highly educated individuals demonstrating a greater ability to interpret product attributes and experiential elements (Eusébio et al., 2023).

Gender differences may also influence sensory perception. Research in sensory marketing suggests that women often exhibit greater sensitivity to aromas, flavors, and environmental cues (Spence, 2020). Since wine tourism experiences depend heavily on multisensory engagement—including taste, smell, visual aesthetics, and environmental atmosphere—such perceptual differences may shape how visitors assess these experiences.

In addition to gender, education has been associated with differences in cognitive processing, environmental awareness, and the evaluation of tourism experiences. More highly educated individuals tend to demonstrate greater ability to interpret complex experiential stimuli and higher awareness of sustainability practices (Eusébio et al., 2023). This suggests that educational background may influence perceptions of multisensory elements and attitudes toward sustainability in wine tourism contexts.

Similarly, the residential environment may shape how individuals perceive and interpret tourism experiences. Differences between urban and rural residents have been observed in environmental familiarity, lifestyle patterns, and expectations for tourism experiences (Kastenholz et al., 2022). These differences may influence how visitors engage with sensory stimuli, landscapes, and cultural elements, potentially affecting their evaluation of multisensory experiences.

Despite the increasing relevance of multisensory tourism experiences, research on sociodemographic differences in wine tourism remains limited. Although several studies have examined motivations, satisfaction, and memorable experiences in wine tourism (Torabi et al., 2021), comparatively few have explored whether visitors from different sociodemographic groups differ in their perceptions of the sensory attributes that characterize wine tourism environments. In particular, the influence of gender, education, and residential context on multisensory perceptions, sustainability attitudes, and visitor satisfaction remains underexplored.

To address this gap, the present study investigates whether gender, educational background, and residential environment (rural versus urban) influence how visitors perceive variables related to the multisensory wine tourism experience, including sensory attributes, sustainability attitudes, and overall satisfaction.

Data and Methodology

This study employs a quantitative research design to examine differences in perceptions of the multisensory wine tourism experience across sociodemographic characteristics—namely, gender, educational background, and residential environment. Data were collected through a structured questionnaire administered to individuals who had participated in at least one wine tourism activity during the previous year.

Questionnaire-based surveys are widely used in tourism and consumer behavior research because they enable the systematic collection of comparable data on perceptions, attitudes, and experiences from large samples. This approach is particularly suitable for studies that seek to identify patterns of perception across different visitor profiles and to assess statistically significant differences between groups.

The research design is exploratory and descriptive, aimed at analyzing differences in visitors' perceptions of key aspects of the wine tourism experience across sociodemographic characteristics. These aspects include multisensory elements related to wine, multisensory components of the tourism experience, attitudes toward sustainability, and overall visitor satisfaction.

The following subsections present the research hypotheses and describe the questionnaire development process.

Research hypotheses

The hypotheses were developed from the theoretical framework outlined in the literature review and aim to determine whether sociodemographic characteristics of visitors, namely gender, educational background, and residential environment (rural versus urban), differ in their perceptions of key aspects of wine tourism experiences.

The first hypothesis focuses on the multisensory aspects of wine. Wine tasting involves a complex array of sensory stimuli, including taste, aroma, color, texture, and temperature, which affect visitors' perceptions of authenticity and enjoyment (Agapito et al., 2014; Ali et al., 2018). Previous research highlights the importance of aromas and sensory cues in shaping tasting experiences and boosting emotional engagement (Agapito et al., 2014). Moreover, the simultaneous activation of multiple senses enhances immersive and memorable experiences in wine tourism contexts (Torabi et al., 2021; Kastenholz et al., 2020). However, individuals may perceive these stimuli differently because of variations in sensory sensitivity, wine knowledge, and sociodemographic characteristics such as gender and education (Spence, 2020). Accordingly, the following hypothesis is proposed:

H1: The multisensory elements associated with wine differ across visitors' sociodemographic characteristics.

The second hypothesis addresses the broader multisensory components of the wine tourism experience. Beyond wine tasting, wine tourism includes experiential stimuli such as vineyard landscapes, winery environments, and cultural stories that engage multiple senses simultaneously, creating immersive tourism experiences (Agapito et al., 2014; Campo et al., 2021). These elements form part of the overall experiential environment in which visitors interact with wine regions and may be perceived differently depending on visitors' gender and backgrounds, including educational qualifications and levels of familiarity with such settings. Thus, the following hypothesis is proposed:

H2: The multisensory elements associated with the wine tourism experience differ across visitors' sociodemographic characteristics.

The third hypothesis relates to attitudes toward sustainability in wine tourism. Sustainability has become an increasingly important aspect in both the wine and tourism industries, affecting production methods and visitor expectations (Carneiro et al., 2022; Eusébio et al., 2023). Previous studies indicate that perceptions of sustainability may vary across sociodemographic groups, including gender and educational background (Bruwer and McCutcheon, 2017). Therefore, the following hypothesis is proposed:

H3: Attitudes toward sustainability in wine tourism differ across visitors' sociodemographic characteristics.

The fourth hypothesis explores visitor satisfaction with the wine tourism experience. Satisfaction is widely recognized as a major outcome of tourism and influences behaviors such as revisiting and recommending destinations (Torabi et al., 2021). Since satisfaction is shaped by the evaluation of sensory, experiential, and contextual attributes, differences in how these elements are perceived may lead to variations in satisfaction among visitors with different sociodemographic characteristics. Based on the literature, the following hypothesis is proposed:

H4: Satisfaction with the wine tourism experience differs across visitors' sociodemographic characteristics.

Questionnaire Design

Data were collected through a structured questionnaire based on previously validated measurement scales adapted to the context of wine tourism (Torabi et al., 2021).

The questionnaire was distributed via Google Forms through both online and in-person channels. Participants were recruited through wineries, wine tourism events, wine festivals, tourism associations, university networks, and social media platforms for wine tourism communities.

In some cases, respondents were approached directly during wine tourism activities, such as winery visits and tasting events. At the same time, broader online dissemination reached individuals who had recently participated in wine tourism experiences across different Portuguese wine regions. Participation was voluntary and based on informed consent.

An inclusion criterion required participants to have engaged in at least one wine tourism activity in the previous year (2024–2025), such as winery visits, wine tastings, vineyard tours, harvest participation, wine festivals, and other wine-related sensory experiences.

The questionnaire consisted of 25 items divided into three sections. The first section included two items about informed consent and the inclusion criteria. The second section collected sociodemographic data. The third section had 16 items measuring four aspects of the wine tourism experience: multisensory elements of wine (EV), multisensory elements of the experience (EA), attitudes toward sustainability (AT), and satisfaction with the experience (SE).

Perceptual variables were assessed with a five-point Likert scale, from 1 (Strongly Disagree) to 5 (Strongly Agree). To ensure clarity and linguistic quality, a pre-test was conducted on 9 April 2025, using the think-aloud technique proposed by Ericsson and Simon (1984). Based on participant feedback, minor adjustments were made to improve the clarity and structure of the questionnaire before the final data collection phase.

Description Of the Respondent Sample

The sample includes 342 valid responses from participants who provided informed consent and reported participating in at least one wine tourism activity during the previous year. Data were collected between April 10 and May 22, 2025, through a questionnaire distributed both online and in person to adult participants.

The sample shows a relatively balanced gender distribution: 50.9% male, 48.8% female, and 0.3% identifying as other. Regarding age, the largest group is those aged 35–44 years (24.6%), followed by 45–54 years (22.5%)

and 25–34 years (20.5%). Participants aged 18–24 years make up 16.4%, while those 65 and older account for 3.2%, suggesting the sample mainly consists of working-age adults.

Regarding educational attainment, respondents exhibit relatively high levels of education. Bachelor's degrees make up 42.1% of the sample, followed by master's degrees at 22.2% and doctoral degrees at 4.4%. Secondary and vocational education account for 24.3%, while 1.2% report primary education as their highest level of schooling.

From a geographic perspective, most respondents reside in the Central Region of Portugal (42.1%), followed by the North (25.7%) and Lisbon and Tagus Valley region (19.6%). The remaining respondents are spread across other Portuguese regions, including Alentejo, Algarve, the Azores, and Madeira, while 2.9% live in other EU countries and 1.8% outside the EU.

Regarding income, 36.5% of respondents report incomes below the national average, 36.5% report incomes near the average, and 26.9% report incomes above the average, showing a relatively diverse economic profile.

Overall, the sample consists mainly of educated, professionally active adults, most of whom are between 25 and 54 years old (67.6%). The majority are employed (74.8%), including 57.3% with formal employment contracts and 17.5% who are self-employed, indicating a socially and economically active group with both the ability and interest in participating in wine tourism experiences.

Figure 1 presents the results from the descriptive analysis of the sample's sociodemographic characteristics, including gender, age, education, and income distribution.

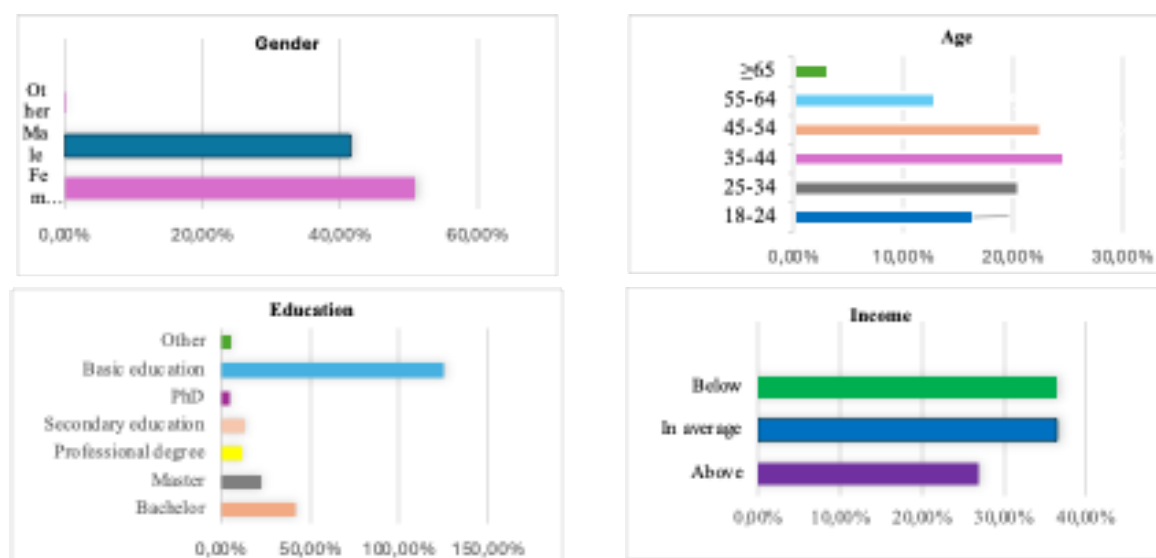


Fig 1. Respondents' characterization.

Source: Authors' data.

Statistical Techniques Employed

Non-parametric statistical methods were employed to analyze the data and test the research hypotheses. Before hypothesis testing, the Kolmogorov–Smirnov test was performed to evaluate the normality of the latent variables. The results showed that the normality assumption was not met, warranting the use of nonparametric tests.

The Mann–Whitney U test was used to compare two independent groups, especially when the variables were dichotomous, such as gender. For variables with more than two categories, the Kruskal–Wallis test was employed to detect statistically significant differences between groups.

The internal consistency of the latent variables was evaluated using Cronbach's alpha coefficient, with values above 0.70 indicating acceptable reliability (Hair et al., 2021). All statistical analyses were performed using IBM SPSS Statistics (Version 29).

Results

The analysis started by examining the internal consistency of the latent variables in this study. Reliability was measured using Cronbach's alpha coefficient. The four variables showed acceptable reliability levels, with Cronbach's alpha coefficients above 0.70 for most constructs, specifically EA (0.790), AT (0.871), and SE (0.921). The EV variable had a slightly lower value (0.636); however, this is close to the recommended cutoff and can still be considered acceptable in exploratory research. Overall, these findings suggest that the measurement scales used in the study are acceptably reliable, indicating that the data collected with the research instrument are suitable for further statistical analysis.

Table 1 presents the results from the Kolmogorov–Smirnov test used to evaluate the normality of the variables studied.

Table 1: Kolmogorov–Smirnov test results

Variable	Statistic	DF	p-value
EV	0.113	342	< 0.001
EA	0.142	342	< 0.001
AT	0.150	342	< 0.001
SE	0.219	342	< 0.001

Source: Authors' data

Based on the results in Table 1, the variables analyzed do not follow a normal distribution. The p-values for all variables are lower than the conventional significance level of 0.05, leading to rejection of the null hypothesis of normality. Consequently, the assumption of normality is not satisfied, which justifies the use of non-parametric statistical techniques to test the formulated hypotheses.

Table 2 presents the results of the Mann–Whitney test for the two dichotomous variables in the analysis: gender (male vs. female) and the environment in which respondents live (rural vs. urban).

Table 2: Mann–Whitney test results

Hypothesis	Variable	Statistic (U)	p-value
H1	Gender	-2.702	0.007*
	Area	-1.902	0.057***
H2	Gender	-2.143	0.032**
	Area	-0.524	0.600
H3	Gender	-4.408	< 0.001*
	Area	-0.382	0.702
H4	Gender	-3.268	0.001*
	Area	-0.039	0.969

* $p < 0.01$, ** $p < 0.05$, *** $p < 0.10$; *Source: Authors' data*

Analysis of the results in Table 2 indicates that gender has a statistically significant effect on all the formulated hypotheses. Specifically, the p-values are lower than 1% for EV, AT, and SE, and lower than 5% for EA. These results indicate that there are statistically significant differences between men and women in all the dependent variables examined.

Across all hypotheses (H1–H4), men obtained significantly higher scores than women. This finding suggests that gender is consistently associated with the dependent variables, with male respondents reporting higher perceptions than female respondents across the four latent variables.

Regarding the environment in which participants live, the results indicate a statistically significant difference only for H1 at the 10% significance level. For the remaining hypotheses, the environment variable does not show statistically significant differences. Therefore, there is no strong evidence that the residential environment (rural or urban) influences the variables analyzed in this study. Next, the Kruskal–Wallis test was performed to examine whether differences exist across respondents' academic qualifications. For analytical purposes, this variable was grouped into four categories:

- (1) up to secondary education (50 participants);
- (2) vocational course (41 participants);
- (3) bachelor's/licentiate degree (151 participants);
- (4) master's or doctoral degree (100 participants).

The results obtained are presented in Table 3.

Table 3: Kruskal–Wallis test results

Hypothesis	Education	n	Mean rank	Statistic H	df	p-value
H1	1	50	150.03	7.064	3	0.070***
	2	41	180.94			
	3	151	164.11			
	4	100	189.52			
H2	1	50	142.98	10.239	3	0.017**
	2	41	186.55			
	3	151	163.90			
	4	100	191.07			
H3	1	50	159.27	12.567	3	0.006*
	2	41	158.70			
	3	151	159.82			
	4	100	200.50			
H4	1	50	165.03	3.001	3	0.391
	2	41	170.10			
	3	151	165.00			
	4	100	185.13			

* $p < 0.01$, ** $p < 0.05$, *** $p < 0.10$; Source: Authors' data

The analysis of the results in Table 3 indicates that there is a statistically significant difference, at the 10% significance level, in the EV variable when considering academic background. The results suggest that participants with higher academic qualifications (group 4) tend to exhibit higher values on the EV variable, while respondents with lower educational levels tend to exhibit lower values.

Regarding the EA variable, the results indicate a statistically significant difference between the academic qualification groups ($p < 0.05$). Groups 4 and 2 score higher than groups 1 and 3, indicating that perceptions of the multisensory elements of the wine tourism experience are influenced by educational background.

For the AT variable, the difference between groups is highly statistically significant ($p < 0.01$). Group 4 clearly stands out with a substantially higher mean rank, while groups 1, 2, and 3 show relatively similar values. This indicates that respondents with higher educational qualifications exhibit stronger attitudes toward sustainability.

Finally, the SE variable shows no statistically significant differences among the academic qualification groups, indicating that satisfaction with the wine tourism experience does not vary by respondents' educational backgrounds.

Discussion

This study aimed to examine whether sociodemographic characteristics influence the perception of variables associated with multisensory wine tourism experiences. The findings provide clear evidence that visitor perceptions are not homogeneous and that individual characteristics—particularly gender and educational background—play a significant role in shaping how wine tourism experiences are evaluated.

Overall, the results indicate that gender is consistently associated with differences across all four dimensions analyzed: multisensory wine elements (EV), multisensory experiential elements (EA), sustainability attitudes (AT), and satisfaction (SE). In all cases, male respondents reported higher evaluations than female respondents. This pattern suggests that gender represents a relevant segmentation variable in the context of experiential tourism, reinforcing the idea that tourism experiences are interpreted differently across visitor groups.

Regarding H1, which focuses on multisensory elements associated with wine, the results show that male respondents reported significantly higher evaluations of sensory attributes, including taste, aroma, color, and texture. This finding contrasts with prior research suggesting that women tend to show greater sensory sensitivity, particularly in taste and olfactory perception (Spence, 2020). This finding is particularly relevant because it challenges part of the existing literature, which often associates stronger sensory sensitivity with female consumers. One possible explanation for this apparent contradiction is that the observed differences reflect variations in confidence, familiarity, or involvement in wine-related activities rather than actual sensory capacity. Male respondents may be more accustomed to evaluating wine in structured contexts or may feel more confident in expressing judgments about technical attributes. Additionally, the marginally significant effect of education suggests that cognitive and experiential factors also play a role, as individuals with higher levels of education may possess a greater ability to interpret and articulate sensory cues. In contrast, the residential environment appears to have a limited influence on this dimension, suggesting that familiarity with rural or urban settings does not substantially affect sensory evaluations in this context.

For H2, which examines the multisensory elements of the broader wine tourism experience, the results again reveal significant gender differences, with male respondents reporting higher evaluations of experiential attributes such as landscapes, winery environments, and cultural narratives. This finding suggests that gender differences extend beyond product-related sensory perceptions to encompass the overall experiential environment. In addition, educational background emerges as a significant factor, indicating that more highly educated visitors may be better equipped to interpret and appreciate complex experiential stimuli. This aligns with the existing literature, which suggests that higher levels of education are associated with enhanced cognitive processing and greater engagement with the experiential and cultural dimensions of tourism. Conversely, the absence of significant differences related to residential environment suggests that prior familiarity with rural or urban contexts does not strongly shape perceptions of experiential elements, reinforcing the idea that such evaluations are more closely linked to individual-level characteristics than to place of residence.

The results for H3, which addresses attitudes toward sustainability, indicate that both gender and education significantly influence perceptions of sustainability practices in wine tourism contexts. Male respondents reported higher evaluations, while individuals with higher educational attainment demonstrated stronger sustainability awareness and more positive attitudes. The strong effect of education is consistent with prior research linking higher educational attainment to greater environmental awareness and a more informed evaluation of sustainability-related practices. However, the finding that male respondents reported higher sustainability scores is less consistent with some existing studies, which often associate pro-environmental attitudes more strongly with female consumers.

This finding is particularly relevant because it challenges part of the existing literature and suggests that sustainability perceptions in wine tourism may depend not only on general attitudes but also on how sustainability is communicated and experienced within the tourism setting. The residential environment, once again, does not appear to exert a significant influence, suggesting that sustainability perceptions are more closely related to cognitive and individual factors than to geographic context.

Regarding H4, which focuses on satisfaction, the results show that gender differences remain significant, with male respondents reporting higher satisfaction than female respondents. This finding may suggest that current wine tourism experiences are more closely aligned with the expectations, preferences, or evaluative frameworks of male visitors. Alternatively, it may indicate that female visitors apply more critical standards when assessing experiential quality. Notably, no significant differences were found in relation to educational background or residential environment, suggesting that satisfaction may be influenced more by individual expectations and subjective experience alignment than by sociodemographic factors such as knowledge or place of residence. This reinforces the idea that satisfaction is a complex and multidimensional construct that cannot be fully explained by structural characteristics alone.

From a theoretical perspective, this study contributes to the literature on wine tourism and experiential tourism by demonstrating that multisensory experiences are not universally perceived but are instead filtered through individual characteristics. While previous research has emphasized the importance of sensory stimulation and emotional engagement in shaping tourism experiences, the present findings extend this perspective by highlighting the roles of gender and education in shaping how these stimuli are interpreted and evaluated. In particular, the results suggest that differences in perception may be driven not only by sensory processes but also by cognitive, experiential, and contextual factors, underscoring the importance of adopting a more nuanced, segmented approach to the study of tourism experiences.

Although the findings provide important insights into visitors' perceptions of multisensory wine tourism experiences, they should be interpreted with caution given the geographic concentration of the sample. A substantial proportion of respondents are from the Central Region of Portugal, which may reflect region-specific patterns of wine consumption, tourism behavior, and familiarity with wine-related activities. Different Portuguese wine regions, such as the Douro, Alentejo, and Lisbon, may present distinct cultural contexts, destination structures, and visitor expectations that could influence perceptions of wine tourism experiences. Therefore, the results may be more representative of the regional context studied than of Portugal as a whole.

From a managerial perspective, the findings have important implications for wineries, tourism operators, and destination managers. Given that visitors differ in how they perceive and evaluate wine tourism experiences, a one-size-fits-all approach to experience design may be insufficient. Instead, tourism providers should consider developing more differentiated and inclusive experiential strategies that account for the diversity of visitor profiles. This may involve enhancing interpretive communication, tailoring storytelling approaches, and designing sensory environments that accommodate different levels of knowledge, engagement, and expectation. In particular, improving the inclusiveness and accessibility of wine tourism experiences may help address potential gaps in satisfaction and perception across different visitor groups. These implications may be particularly relevant for wine tourism stakeholders operating in the Central Region of Portugal, where the majority of the sample was concentrated. However, they may also offer useful insights for other Portuguese wine destinations with similar tourism structures.

Overall, the results underscore the importance of recognizing visitor heterogeneity in experiential tourism contexts. By acknowledging that perceptions of multisensory experiences vary across individuals, wine tourism stakeholders can develop more targeted and effective strategies to enhance visitor engagement, satisfaction, and long-term loyalty.

Conclusion

This study examined whether sociodemographic differences exist in perceptions of variables associated with the multisensory wine tourism experience in Portugal, with particular attention to gender, educational background, and residential environment. Using survey data collected from 342 wine tourists, the analysis focused on four key dimensions of the wine tourism experience: multisensory elements associated with wine, multisensory elements of the tourism experience, attitudes toward sustainability, and overall satisfaction.

The findings demonstrate that gender significantly influences how visitors evaluate these experiential dimensions. Male respondents consistently reported higher evaluations across all constructs analyzed, indicating that gender plays an important role in shaping visitors' perceptions of wine tourism experiences. These results highlight that wine tourism experiences are not uniformly perceived among visitors and that sociodemographic characteristics can influence how sensory and experiential elements are interpreted.

The analysis also revealed that the residential environment has only a limited influence on perceptions of wine tourism experiences. In contrast, educational background contributes to differences in perceptions of sensory and sustainability-related attributes. Respondents with higher levels of education reported stronger perceptions of sensory elements and greater awareness of sustainability practices. The results also suggest that education may enhance visitors' ability to interpret and appreciate the more complex experiential attributes of wine tourism.

This study contributes to the literature by extending existing research on wine tourism beyond visitor motivations and destination management, focusing specifically on how sociodemographic characteristics shape the perception of multisensory tourism experiences. While previous studies have emphasized sensory engagement and visitor satisfaction, limited attention has been given to how these perceptions vary across different visitor profiles. By demonstrating the significant influence of gender and educational background on sensory evaluation, sustainability attitudes, and satisfaction, this research provides new empirical evidence on visitor heterogeneity in wine tourism contexts. These findings support the need for more segmented and personalized experiential strategies in destination management and wine tourism marketing.

These findings underscore the importance of accounting for visitor heterogeneity when analyzing experiential tourism contexts. Wineries and tourism operators should recognize that visitors do not uniformly perceive wine tourism experiences. Designing more differentiated and inclusive experiential strategies—particularly regarding sensory elements, environmental atmosphere, interpretive communication, and the communication of sustainability practices—may therefore enhance visitor engagement and satisfaction.

Despite these contributions, several limitations should be acknowledged. First, the study relies on self-reported perceptions collected via a questionnaire, which may introduce response bias. Second, the cross-sectional nature of the data limits the ability to establish causal relationships among the variables analyzed. Third, although respondents were drawn from different Portuguese regions, the sample is geographically concentrated in the Central Region of Portugal, which may limit the generalizability of the findings at the national level. Different wine regions may exhibit distinct cultural dynamics, tourism structures, and visitor behavior patterns, potentially influencing perceptions of wine tourism experiences. Therefore, the results should be interpreted with caution and primarily understood within the regional context represented by the sample.

Future research should examine additional variables, including wine knowledge, travel motivations, and frequency of participation. Cross-regional or international comparative studies would also help clarify whether these patterns are specific to Portugal or applicable to other wine tourism destinations. Ultimately, these findings reinforce the need to address sociodemographic diversity to develop more targeted, inclusive, and sustainable wine tourism strategies.

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