Uncorking the virtual frontier of wine experiences: interest drivers and potential consumers’ profile

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Abstract

Purpose – Virtual wine experiences (VWEs) replaced in-person wine experiences during the Covid-19 pandemic and continue to be offered by some actors. This study aims to investigate the factors driving interest in VWEs and identify relevant traits of potential consumers to help assess VWEs long-term potential.

Design/methodology/approach – A representative sample of 399 Oregon and California wine consumers answered a structured online survey. The authors combine ordered logistic regression and qualitative techniques to analyze the data.

Findings – VWEs may effectively attract potential wine consumers and tourists. High interest in VWEs is associated with strong wine involvement and intentions to visit wine regions. Digitization, aversion to travel-related risk and convenience are other relevant drivers of VWE interest. The segmentation analysis revealed that consumers with a potentially higher interest in VWE have distinct traits.

Practical implications – Wineries and wine tourism destinations could leverage VWEs to attract wine tourists and consumers. The authors discuss specific characteristics of high-interest consumers.

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Originality/value – Participants in VWEs interact with hosts and explore products in real time. This engagement has long-term marketing potential for attracting them as customers or visitors. The study provides strategic information for practitioners and academics on VWE interest drivers and potential demand, which is currently missing from the literature.

Keywords Virtual tourism experience, Virtual wine tasting, Ordered logit, Wine consumers, Wine tourism

Paper type Research paper

Introduction

Immersive interactions between customers and hosts, collaboratively experiencing an activity, location or destination synchronously via live stream technology define virtual tourism experiences (VTEs) (Wei et al., 2023). Through virtual wine tourism experiences (VWEs), wine consumers can virtually explore wineries and wine regions partaking in a variety of activities (e.g. wine tastings, winery tours and masterclasses) in different orientations (educational, entertaining, aesthetic and escapist).

The diffusion of technology-based or technology-enhanced tourism experiences started before the COVID-19 pandemic. Neuhofer et al. (2014) noted an increasing demand for technology-enhanced tourism experiences, concluding that the development of tourism experiences where technology is essential to enjoy them was inevitable. The pandemic has accelerated this process, imposing constraints on travel and in-person assembly, thereby fueling the digital transformation and alternative ways to experience destinations. Although tourism and hospitality tend to favor traditional face-to-face interaction (Lu et al., 2022), rapid technological innovations have significantly transformed the sector (Ozdemir et al., 2023). Moreover, the pandemic accelerated e-commerce. Available 2023 US data highlight that e-commerce has reached 15% of total retail sales, preserving the pandemic-driven move toward online retail (U.S. Census Bureau, 2023 [1]). Gastaldello et al. (2021) record that almost 16% of Italian consumers purchased wine online during the first lockdown (+43% to pre-Covid), 43% of which were first-time online buyers. Many wine businesses also started to offer VWE, which are perceived as a significant business asset and likely to stay (Szolnoki et al., 2021).

VTEs range from virtual reality (VR) experiences with complex 3D-generated environments requiring special equipment to more mundane experiences facilitated through online conferencing or learning tools (Verma et al., 2022; Wei et al., 2023). VWEs (tastings and tours) are currently available at different prices and formats (e.g. Wine path, Chumnderhof [2]). The specific characteristics consumers seek in VTEs depend highly on their underlying interests and goals. Existing research identifies a knowledge gap on the interaction between consumer characteristics and interest in VTEs (Verma et al., 2022).

To understand the interest in VWE, it is necessary to consider their unique characteristics, especially compared to wine-themed onsite experiences. Primarily, VWEs do not require physical travel and can be enjoyed at a desired/available time and/or place. However, the virtual environment of VWE lacks critical components of the “wine-scape” including real vineyards or tasting rooms. As Wei et al. (2023) emphasize, virtually engaging in an activity away from its usual environment while still interacting in real time with a provider, results in a partial asymmetry with a distinct stimulus, organism and response (S–O–R) dynamic. This applies to virtual wine tastings, when participants engage and interact online with the provider and product as they would onsite. These interactions represent a novel departure from widespread passive VWE such as 360-degree winery tours. Szolnoki et al. (2021) argue that for some providers interactions, tasting content and knowledge transfer is comparable to onsite experiences and may to attract consumers to a brand or region later for the “full” experience. However, the existing
literature lacks detail on consumer motivations regarding VWEs. The impulse to engage in a virtual experience can be identified as a stimulus (Mehrabian and Russell, 1974), which is influenced by motivations driving consumer behavior towards VWEs. Motivations are defined as a state of tension arising from a need for something (Schiffman et al., 2011). Interest per se is a strong motivational process (Renninger and Hidi, 2016) and an attitudinal trait that predicts consumer behavioral intentions toward a product or service (Robichaud and Yu, 2022). Our study contributes to understand the factors driving interest in VWEs, providing insights into potential motivations for participating in similar experiences. Moreover, the profile of potential VWE seekers may impact their purchase and consumption patterns and their expectations about the experience. However, the literature in this respect is largely exploratory. Consequently, our study also contributes to provide a profile of potential VWE seekers.

We analyze a representative sample of consumers from two wine tourism destinations in the USA, California and Oregon, considering a rich set of variables including attitudinal traits, sociodemographic characteristics, wine consumption patterns and past wine tourism experiences and habits. Our results offer a comprehensive profile of consumers interested in VWE and it provides valuable insights about their motivations and preferences as potential customers and visitors. Next, we review the literature on virtual tourism and wine tourism experiences, as well as research tourist traits to highlight existing knowledge gaps.

**Literature review**

*The key traits of virtual wine experiences and in-person wine tourism experience participants*

Market segmentation detects homogeneous groups of consumers based on product-specific or consumer-specific criteria (Grunert, 2019) and will be used to derive wine tourists’ profiles. To date, there is limited research profiling VWE consumers and identifying potential market segments. An exploratory study by Lease et al. (2023) surveyed 261 US wine consumers who attended at least one virtual wine tasting. The authors provide preliminary evidence of VWE characteristics that appeal to different consumer segments, but little insight into consumer sociodemographic characteristics or past experiences and habits.

Segmentation analyses often include involvement, an unobservable state of interest, motivation or arousal toward a product (Havitz and Dimanche, 1997). Wine involvement (WI) is a crucial factor in wine tourism research, extensively used in segmentation studies (e.g. Santos et al., 2020; Nella and Christou, 2014) and it is linked to consumer choices including purchase frequency, volume and willingness to pay (Lockshin et al., 2001). Moreover, existing research considered the effects of WI dimensions such as product interest and knowledge on consumer behavior (e.g. Molina et al., 2015; Famularo et al., 2010; Charters and Ali-Knight, 2002). Other relevant criteria to profile wine tourists are their consumption and purchase habits (Szolnoki and Hoffmann, 2014), provenance (López-Guzmán, et al., 2014), socio-demographics (e.g. education and income) and any constraints to visit wine regions (Cho et al., 2017).

According to the literature, wine tourists are increasingly heterogeneous (Sigala and Robinson, 2019). Individual wine experience seekers may be wealthier wine lovers and enthusiasts, typically aged 30–50, highly educated and involved in wine, drinking frequently and spending more on wine. But they can also be cultural tourists drinking less frequently with an interest in wine and its connection to the place they are visiting (Molina et al., 2015; Alebaki and Iakovidou, 2011). Moreover, in the New World, female wine tourists tend to prevail compared to Old World regions (Alebaki and Iakovidou, 2011). The centrality of wine in VWEs may also depend on visitors’ profiles. For example, different age groups may have different wine consumption and purchase patterns (e.g. older consumers drink and spend more on wine; Bruwer and Rueger-Muck, 2019).
It is unclear to what extent these profiles persist in virtual environments. Hence, we evaluate the characteristics of VWE seekers (Research Question 1, RQ1) to profile them as potential wine tourists and winery customers and assess VWE capability to attract interesting market segments for wineries and wine regions. Next, we discuss the relevant literature on VTEs and identify the main factors affecting interest in similar services.

State of the art on virtual (wine) tourism experiences and their motivational forces
Understanding the forces influencing interest in VWEs (RQ2) helps to unveil what impacts the stimulus to participate in a similar experience and how it is processed. Conventional wine experience research concentrates on participation and travel motives, while virtual experience research either focuses on generic VTEs or adopts an exploratory approach to VWEs.

Wei et al. (2023) find multifaceted motivations to engage in a VTE, including the desire to connect, to learn about destination culture, its food and beverage tradition, the search for personal development, pure entertainment as well as aesthetics and escapism from daily life. Based on Pine and Gilmore (1999), Paluch and Wittkop (2021) find that sense of community is a key aspect of virtual wine tastings. Thus, socialization may be a key driver for some groups like people living alone (e.g. single adults or widowers). Huang (2023) analyzes consumer behavioral intentions toward VR tourism experiences in Taiwan combining the unified theory of acceptance and use of technology and the theory of planned behavior (TPB). Other studies based on TPB explore consumer behavior toward virtual communities, virtual worlds (Mäntymäki et al., 2014) and virtual grocery shopping (Thomas-Francois et al., 2023).

Findings from studies on conventional wine experiences and wine travel motives share some similarities with VWE and VTE research. Bruwer and Rueger-Muck (2019) identify experience atmosphere and desire to learn about the product as key wine tourism motivations. Bruwer et al. (2013) highlight the importance of product-related motivations. Escapism, socialization and entertainment-related motivations are also present (Bruwer and Rueger-Muck, 2019). While elements of the winery environment may be lost in a virtual environment, other participation drivers like escapism, entertainment, socialization and product interest may also apply to VWEs.

Gastaldello et al. (2022) perform an exploratory analysis of interest drivers in VWEs among Italian wine tourists and find that VWE interest was determined by two main factors: personal WI and COVID-19 fear and anxiety or Covid-19 phobia (CPH). VWEs can be seen as a safe alternative to actual travel for risk-averse individuals, avoiding uncontrolled contact. Subawa et al., 2021 suggest that VR may help travelers to avoid pandemic-related risks. Luo and Lam (2020) find that risk attitude (RA) negatively mediates CPH effects on travel intentions toward Covid-safe “travel bubble” destinations while Gastaldello, et al. (2023) obtain comparable results for wine tourism destinations. Thus, existing research suggests that fear, anxiety and RAs are important constructs to be considered in a risk-affected choice environment.

VWEs might offer convenience in requiring less time and financial resources than actual wine travel while providing access to comparable content and information. Hence, VWEs may offer advantages related to multiple dimensions of convenience as in online shopping (Chaparro-Pelaez et al., 2016), like time saving (Ganesh et al., 2010), flexibility and ubiquity (Chang et al., 2010) and lower cognitive effort to retrieve relevant information (Bosnjak, et al., 2007). This feature can make VWEs more attractive to wine consumers with less travel time or a lower household income. VWEs may also be an interesting option for parents of young children pursuing their wine interests. Indeed, wine tourism activities often neglect the needs of families with children (Malerba, et al., 2023).

Finally, VWEs require the use of technology like streaming platforms. Thus, digital skills may contribute to explain the attractiveness of actives related to VWE. Ng (2012)
confirms that higher levels of digital literacy reduce the cognitive load often associated with technology use for education. Individuals who are already using digital tools related to wine may be more inclined to try VWEs, as they are already familiar with and comfortable using similar technologies. Bilynets et al. (2023) find that hedonic motivations (i.e. the enjoyment of using technology) predict stronger VTE intentions. Both wine apps and online purchases predict a greater interest in VWEs in Gastaldello et al. (2022). The literature has also explored VWEs in other dimensions. For instance, Amarendra and Das (2022) examine supply characteristics of VWEs performing a comparative analysis with cellar-door visitations and Kruse and Drechsler (2022) discuss strategies how to effectively digitalize wine tastings.

While we discuss how VTE research insights might apply to VWEs, targeted research on VWEs characteristics and their attractiveness to potential wine tourists or consumers is scant. Our study addresses this relevant knowledge gap by exploring the connection between consumer socio-demographic characteristics, shopping habits, wine preferences and their interest in VWEs. The next section presents the details of the questionnaire design and data analysis.

Materials and methods

Survey

The structured survey developed for data collection included three sections:

1. psychographic scales;
2. sociodemographic information and wine consumption habits; and
3. interest in VWEs.

Section 1 captured constructs for WI, future wine tourism intentions (wtourint), CPH and RA, adapted from existing literature and measured through seven-point Likert scales (1 – strongly disagree to 7 – strongly agree).

Brown et al. (2007) 14-item scale was selected for WI (as in Santos et al., 2020), with high scores representing higher involvement with wine.

An item adapted from Sparks (2007) captured wtourint in the next 12 months.

Fear and anxiety toward COVID-19 were captured by adapting the CPH scale developed by Arpaci et al. (2020). The first three items by factor loading of the psychological and social dimensions were included, capturing fear and anxiety connected to a potential infection and contact with others. The psycho-somatic and economic dimensions were excluded since they focused on medical phobia manifestations and food security concerns.

Respondents’ willingness to avoid wine travel-related connected to COVID-19 was measured by adapting Zhu and Deng’s (2020) three-item RA scale. Appendix Table A1 provides details on all scales included in the final analysis.

Section 2 included sociodemographic and wine consumption habits. In this study, children are household members below 10 years old [3]. Household income was presented through descriptions adapted from the Istat 2018 [4] survey on living conditions (from EU-SILC) with an additional level for the wealthier population. The four levels reflected an insufficient, just sufficient, sufficient (or medium) and good family income situation. The first two categories were further grouped into a low-income group due to low numerosity. For the segmentation, age groups were further recoded into generational cohorts following the classification from University of Southern California Research Guides [5] (GenZ below 30 y.o.; Millennials 30–40 y.o.; GenX 41–60 y.o.; Baby boomers above 60 y.o.). For consumption habits, we captured wine consumption frequency, average bottle expenditure,
usual place of consumption and the number of bottles purchased monthly. We also included two dummy variables identifying wine app users (wapp) and online wine buyers (buywonline) as indicators of wine technology familiarity. Similar approaches have been used in research on wine consumer preferences (e.g. Streletskaya et al., 2023). Moreover, one variable captured the average length of stay at a wine region when visiting (lostwr).

Finally, Section 3 included three items measuring the level of interest for virtual-guided winery tours, virtual wine tastings and virtual oenogastronomic events on a seven-point agree-disagree Likert scale. These questions were added based on the meta-review of current literature on VTEs and the recommended focus for future research (Verma et al., 2022).

**Data collection and sample characteristics**

Data were collected through a computer-assisted Web survey conducted by Qualtrics using a quota sampling method. The procedure was performed in line with the Declaration of Helsinki, participants were presented with information about the aims and scope of the data collection, potential risks and data processing (i.e. information collected anonymously, exclusively used for scientific research and disclosed in aggregated form). Respondents could freely refuse to proceed with the survey.

The target were wine consumers above the legal drinking age from California and Oregon having past wine tourism experience, and the sample is representative in terms of age and gender. The choice to focus on two states was budget-related, but the states chosen are key US wine tourism regions with a comparable evolution of the COVID-19 pandemic in terms of severity and time. The latter characteristic was relevant due to the inclusion of constructs related to pandemic risks (i.e. CPH and RA). Incomplete surveys and answers from people who do not buy, or drink wine were removed, leaving the final sample with 385 observations. Most respondents declared to have either a bachelor’s degree (33.2%), an associate degree or an equivalent title (24.7%), while 19.7% are postgraduate. Most of the sample is married or in a relationship (67.3%), has no children (60.5%) and benefits from a good household income (49.9%). Appendix Table A2 presents descriptive statistics for the sample.

**Methodology**

The study has two objectives. First, to identify the profile of potential VWE users (RQ1; objective 1), and second, to identify drivers of distinct levels of interest in VWEs (RQ2; objective 2). The early stage of VWEs lifecycle at the time of data collection makes referring to actual product consumption limiting. Accordingly, Robichaud and Yu (2022) identified product interest as an attitudinal dimension which significantly predicts intentions. Other dimensions of attitude considered by them do not apply in our context. Therefore, we chose product interest (VWEint) as an outcome variable being a key antecedent of behavioral intentions:

**RQ1.** What are the characteristics of potential customers of VWEs?

We reached objective (1) by characterizing three consumer segments as having a high, medium and low VWEint. We applied descriptive techniques such as ANOVA and post hoc tests for continuous variables as well as cross-tabulation and $\chi^2$-tests for categorical variables. We used a combination of socio-demographics, psychographics and consumption-related variables useful to characterize potential VWE users as wine customers. For descriptive purposes, we recoded information on average prices per bottle following the
classification by Wine Folly (as Terziyska, 2017): value wines (<7 €/bottle); popular premium (7–14 €/bottle); premium (15–20 €/bottle); super premium (21–30 €/bottle); ultra-premium (>30€/bottle). We also include variables reflecting habits and membership classes of wine tourists from the analysis of Streletskaya et al. (2022). The three classes (Class 1 = COVID-19-measures appreciative, Class 2 = COVID-19-measures averse and Class 3 = Boutique wine experience seekers) were defined through a choice experiment on post-COVID-19 preferences for winery tourism experiences (Streletskaya et al., 2022). Their profile is described in Appendix Table A2:

RQ2: What makes a wine consumer interested in VWEs?

To answer RQ2, we applied ordered logistic regression (OLOGIT) on VWEint using Stata 17 software. As VWEint was captured by three items, a preliminary exploratory factor analysis was run using the principal components extraction method and varimax rotation. Results confirmed the three items load on a single factor explaining 83% of the variance, and scale reliability was good (Cronbach’s α = 0.90; Hair et al., 2019). We then created the VWEint summated scale and recoded it into three levels representing a low (VWEint = 1–3; 36.9%), medium (VWEint = 4; 15.6%) and high interest (VWEint = 5–7; 47.5%), respectively.

Scales for WI, travel-related risk aversion (RA) and COVID-19 phobia (CPH) constructs showed excellent reliability (Cronbach’s α WI = 0.94; RA = 0.93; CPH = 0.95; Appendix Table A1). Initial diagnostics revealed a strong correlation between CPH and RA (0.74). Therefore, the two constructs seem to overlap conceptually. We retain only RA considering its strong mediating effect on CPH emerging in past studies (Luo and Lam, 2020; Gastaldello et al., 2023), and emphasize its theoretical relevance. We then run a OLOGIT model with maximum-likelihood estimation on the three-point ordered-response VWEint scale as dependent variable (DV).

We tested the proportional odds assumption using Stata’s omodel command. The $\chi^2$-test is nonsignificant [$\chi^2 (15) = 11.88; p = 0.537$], confirming that the effects of the explanatory variables are consistent across different DV categories.

We further obtained β coefficients and cut values of the DV at each cut-point. β coefficients provide information on whether the DV increases or decreases under the influence of the regressors considered (Cameron and Trivedi, 2005). We then tested whether the cut-values obtained for the 3 DV levels are statistically significant: if not, similar categories of the DV should be merged as they are indistinguishable (Cameron and Trivedi, 2005). Instead, all cut values significantly differ from each other with a 5% probability (i.e. at $p < 0.05$).

Based on the OLOGIT model results, we further calculated the predicted probabilities of respondents’ likelihood to have a high, medium or low interest in VWE if all covariates are at their sample mean. Predicted probabilities of each DV category should sum to one (Cameron and Trivedi, 2005). Finally, we computed marginal effects for each regressor to evaluate their effect size and direction for each category of the DV. These marginal effects should sum to zero (Cameron and Trivedi, 2005).

Results

Analysis of potential virtual wine experience consumer’s profile

Table 1 presents the results of the three VWEint segments analysis. The findings confirm significant differences in exists in terms of average WI, wtourint, wbot1m across the different VWEint groups. The high VWEint group exhibits higher WI (5.4) and wtourint (5.4) compared to all other groups. In addition, they purchase more wine bottles per month
## Table 1.

Characterization of different VWEint segments

<table>
<thead>
<tr>
<th>Variable</th>
<th>Low VWEint (1)</th>
<th>Medium VWEint (2)</th>
<th>High VWEint (3)</th>
<th>ANOVA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td>WI</td>
<td>3.9&lt;sup&gt;3&lt;/sup&gt;</td>
<td>1.13</td>
<td>4.5&lt;sup&gt;3&lt;/sup&gt;</td>
<td>0.90</td>
</tr>
<tr>
<td>Wbot1m</td>
<td>5.0&lt;sup&gt;3&lt;/sup&gt;</td>
<td>6.76</td>
<td>6.5&lt;sup&gt;3&lt;/sup&gt;</td>
<td>5.46</td>
</tr>
<tr>
<td>Wtourint</td>
<td>3.9&lt;sup&gt;2,3&lt;/sup&gt;</td>
<td>1.79</td>
<td>4.7&lt;sup&gt;1,3&lt;/sup&gt;</td>
<td>1.50</td>
</tr>
</tbody>
</table>

Pearson’s $\chi^2$

<table>
<thead>
<tr>
<th>Consfreq&lt;sup&gt;a&lt;/sup&gt;</th>
<th>n.</th>
<th>%</th>
<th>n.</th>
<th>%</th>
<th>n.</th>
<th>%</th>
<th>$\chi^2$</th>
<th>Sign.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2–3 times/year</td>
<td>9</td>
<td>6.34</td>
<td>1</td>
<td>1.67</td>
<td>10</td>
<td>5.46</td>
<td>20.77***</td>
<td></td>
</tr>
<tr>
<td>Once a month</td>
<td>21</td>
<td>14.79</td>
<td>5</td>
<td>8.33</td>
<td>21</td>
<td>11.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2–3 times/month</td>
<td>57</td>
<td>40.14</td>
<td>21</td>
<td>35.00</td>
<td>42</td>
<td>22.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2–3 times/week</td>
<td>36</td>
<td>25.35</td>
<td>26</td>
<td>43.33</td>
<td>83</td>
<td>45.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Every day or almost</td>
<td>19</td>
<td>13.38</td>
<td>7</td>
<td>11.67</td>
<td>27</td>
<td>14.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Arbotexp

| Value                        | 16 | 11.35 | 4  | 7.02 | 5  | 3.29 | 25.13***|
| Popular-premium              | 50 | 35.46 | 15 | 26.32 | 39 | 25.66|
| Premium                      | 43 | 30.50 | 17 | 29.82 | 35 | 23.03|
| Super-premium                | 21 | 14.89 | 16 | 28.07 | 47 | 30.92|
| Ultra-premium                | 11 | 7.80  | 5  | 8.77  | 26 | 17.11|

Usual place of consumption

| Home (1 = yes)               | 116 | 81.69 | 49 | 81.67 | 126 | 68.85 | 8.57**  |
| Restaurant (1 = yes)         | 50  | 35.21 | 32 | 33.33 | 89  | 48.63 | 8.12**  |
| Get-outs (1 = yes)           | 19  | 13.38 | 15 | 15.00 | 54  | 29.51 | 14.09***|
| Wapp (1 = yes)               | 4   | 2.80  | 6  | 10.00 | 85  | 46.40 | 90.13***|
| Buywonline (1 = yes)         | 18  | 12.70 | 18 | 30.00 | 89  | 65.60 | 96.09***|
| Oregon resident (1 = yes)    | 86  | 60.60 | 36 | 60.00 | 89  | 65.60 | 96.09***|
| Children (1 = yes)           | 27  | 19.00 | 16 | 26.70 | 109 | 59.60 | 59.91***|

Age cohort

| GenZ (≤30)                   | 23  | 16.20 | 9  | 15.00 | 32  | 17.49 | 0.23  |
| Millennials (30–40)          | 19  | 13.38 | 9  | 15.00 | 50  | 27.32 | 10.84***|
| GenX (41–60)                 | 36  | 25.35 | 16 | 26.67 | 71  | 38.80 | 7.56** |
| Babyboomer (≥60)             | 64  | 45.07 | 26 | 43.33 | 30  | 16.39 | 35.55***|

Lostw

| Daytrip (1)                  | 79  | 55.63 | 37 | 61.67 | 52  | 28.89 | 43.63***|
| 2–3 days (2)                 | 55  | 38.73 | 19 | 31.67 | 87  | 48.33|
| 4–7 days (3)                 | 4   | 2.82  | 3  | 5.00  | 34  | 18.89|
| >7 days (4)                  | 4   | 2.82  | 1  | 1.67  | 7   | 3.89  |

Class

| Covid-19 measures appreciative (1) | 84  | 37.80 | 42 | 41.20 | 204 | 63.00 | 57.39***|
| Covid-19 measures averse (2)       | 66  | 29.70 | 33 | 32.40 | 90  | 27.80|
| Boutique wine experience seeker (3) | 72  | 32.40 | 27 | 26.50 | 30  | 9.30  |

Notes: $n = 385; *p < 0.01; **p < 0.05; ***p < 0.001$. Significant differences between groups at $p < 0.05$ identified through post hoc test are reported as superscripts on the mean group values. The table presents only statistically significant results. Differences related to gender, marital status, income and education were tested but found to be insignificant.

Source: Authors’ own creation
than low VWEint subjects (7 on average, as shown in Table 1). However, WI levels are high for all groups.

Sociodemographic characteristics and wine consumption patterns also differ among the groups. The majority of high VWEint subjects are regular wine consumers, with 60% of them drinking wine at least two to three times a week. However, the medium VWEint group also includes a remarkable share of regular wine drinkers (55%). In addition, the high VWEint group shows distinct consumption patterns: they prefer to drink on-premises and during social occasions rather than at home. Information on the average bottle expenditure (avbotexp) reveals that high VWE respondents are strongly oriented to supe-premium and ultra-premium wines, capturing 48% of group components. Such polarization moves toward cheaper bottles as lower VWEint levels are considered. Respondents falling in the high VWEint group tend to be younger Californian residents: 44% are Millennials and GenZ (i.e. 40 y.o. or younger), with 39% of GenX. Lower VWEint segments are mainly represented by older generations from Oregon, with 70% being above 40 years old and 40% being over 60. Accordingly, most high VWEint respondents buy wine online and a considerable 46% have a wine app, while these shares drop for lower interest subjects. The same is observed for family structure, where 60% of high VWEint respondents declared to have children (Table 1).

No noteworthy discrepancies emerged in terms of education, income or marital status. In conclusion, the high VWEint segment displays distinct wine tourism traits. Most of the group is COVID-19-measures appreciative (i.e. less sensitive to winery tour prices and enjoy smaller scale experiences from small wineries). Conversely, the medium and low VWEint segments exhibit a higher proportion of older boutique wine experience seekers (i.e. more price-sensitive and preferring small-group experiences upon reservation). The high VWEint segment also shows a lower percentage of day-trippers to wine regions, opting instead for stays lasting from two to three days up to a week.

**Analysis of the drivers of interest in virtual wine experiences (VWEint)**

Table 2 presents the results of the OLOGIT analysis. Coefficient signs indicate if the DV increases or decreases due to the regressor. The estimation reveals a good predictive power (Pseudo R-squared = 0.33), and the significant $\chi^2$-statistic ($p < 0.001$) leads to reject the null hypothesis that model coefficients are simultaneously equal to zero.

The factors increasing the likelihood of higher VWEint are RA, WI, wtourint, wapp and buywonline (Table 2). Among the convenience-related dimensions, having children (childy) positively affects VWEint levels at 5% probability. Weakly significant positive coefficient is also observed for low-income subjects compared to sufficient income ones, while a reduced travel budget (red_trav$€$) impacts VWEint negatively. The effect of a reduced travel time (red_travtime) was not significant.

Predicted probabilities for each VWEint outcome reveal that high VWEint shows the greatest predicted probability (51%), while low and medium VWEint record comparable probability values of 23% and 26%, respectively.

Table 3 presents the marginal effects of regressors at different DV levels, allowing to evaluate the sign and magnitude of the regressors effect on the response categories. Wapp records the greatest impact on VWEint levels, as being a wine app user generates a 36.6% greater likelihood of high VWEint. A one unit increase in WI by one raises high VWEint likelihood by 18.8% while reducing that of a low VWEint. A comparable effect is observed for buywonline. Furthermore, childy raises the probability of a high VWEint by almost 16%. Conversely, the negative effect of red_trav$€$ shrinks high VWEint probability by 16.6%. Low-income subjects show a 15% lower likelihood of a
high VWEint, and a 12.5% significantly greater probability to classify as low VWEint. Diversely from the previous regressors, the latter’s effect on middle VWEint is not significant. To conclude, smaller but highly significant positive effects on high VWEint are associated to RA (+ 9.5%) and wtourint (8.8%). Their impact grows negatively for as the level of VWEint decreases.
Discussion

The profile of virtual wine experience-interested consumers

When analyzing the profile of different VWEint segments (RQ1), strongly interested subjects exhibit peculiar traits compared to the medium and especially the low interest groups. Some of the VWEint group characteristics resemble those commonly attributed to wine tourists and wine festival visitors. For example, WI levels and drinking frequency vary significantly across segments with different VWEint levels. Particularly, strong VWEint subjects have greater WI compared to medium and low VWEint ones, tend to drink wine on a regular basis and spend more per bottle. Moreover, the average bottle expenditure and consumption frequency decrease for less VWEs-interested groups. This variability aligns with past wine tourism research profiling cellar visitors in Portugal (Santos et al., 2020), Greece (Nella and Christou, 2014) and Canada (Brown, et al., 2007). Furthermore, it suggests the capability of VWEs to attract interesting customers for wineries, supporting VWEs marketing potential underlined by several authors (e.g. Gastaldello et al., 2022; Szolnoki et al., 2021).

Strong VWEint participants, who correspond to high WI consumers, fall into the young and middle-aged group. Such characteristic also emerged in Santos et al.’s (2020) high WI wine tourists’ group, but in contrast our study reveals that this group has the lowest percentage of older adults (aged over 60). An explanation could be the digital nature of VWEs, which may be more appealing to younger generations. Coherently, most of high VWEint respondents use wine-related technological tools such as wine apps or e-commerce. This finding suggests structural differences between regular wine tourists and potential consumers of VWEs, who seem to be a subset of the former. High VWEint respondents are strongly oriented to drinking on-premises or away from home and may place more importance to social aspects of wine consumption. Hence, the social and entertainment dimensions may be particularly relevant for VWEs development, as emerging literature on the topic has already emphasized (Wei et al., 2023; Paluch and Wittkop, 2021).

VWEs can attract specific wine tourists as high VWEint subjects have stronger intentions to plan wine trips and typically stay overnight when visiting wine regions. Travel intention is a strong characterizing factors differing significantly between all segments. Thus, VWEs might present a marketing opportunity for operators in renowned wine regions (Amarendra and Das, 2022).

In addition, the high VWEint segment further shows distinct wine tourism traits. Indeed, the group contains a significantly lower share of boutique wine experience seekers which prefer upon-reservation cellar door experiences in small-scale wineries, and it is more sensitive to their prices (Streletskaya et al., 2022) (see Appendix Table A2). Instead, the most common type found in the high VWEint group is COVID-19 measures appreciative, who enjoys small-group winery experiences, prefers open-air options and is less price-sensitive.

Furthermore, we find that the high VWEint group consists of California rather than Oregon residents suggesting that VWEs may be more appealing to and/or more broadly diffused among California residents. Further research is needed to reliably assess this conclusion, with a focus on the respondents’ cultural context, habits and attitudes in relation to virtual experiences and digital tools.

The drivers of interest in virtual wine experiences (VWEint)

The analysis of VWEint drivers (RQ2) identified usage of digital wine tools as a primary factor explaining a high interest in VWEs. Indeed, both purchasing wine online and using of wine apps led to significantly greater probability of high VWEint which aligns with findings by Gastaldello et al. (2022) for VWE diffusion in Italy. The magnitude of this
positive relationship may be the result of increased use of digital tools triggered by COVID-19 constraints. Indeed, several studies found a general push toward e-commerce after the pandemic outbreak (Gastaldello et al., 2021; Jílková and Králová, 2021). Moreover, the direction of the effect is consistent with research on online sales showing that familiarity with product-related digital tools positively influences people’s e-commerce behavior (i.e. purchases) for the same product (Gefen, 2000). If familiarity with wine digital tools has a remarkable influence on interest for VWEs, the repeated use of them is likely to be even more impactful in the long run. Coherently, Limayema and Cheung (2008) found that habits and past behavior play a significant role in affecting the long-term intention to use internet-based learning systems. However, this topic would call for further exploration in future research.

The second major factor contributing to high VWEs attractiveness is WI which confirms the theoretical relevance of the construct in explaining wine consumer behavior in general as noted by many other studies (e.g. Gastaldello et al., 2023; Sparks, 2007; Brown et al., 2007).

Coherently with past studies on e-commerce (Chaparro-Peláez et al., 2016), convenience is the third most relevant driver of a strong VWEint, especially being parents of young children. This result suggests VWEs may help stakeholders in reaching market segments interested in wine who are often excluded from in-presence wine experiences due to parenthood (Malerba et al., 2023). Interestingly, findings from Cho et al. (2017) identified family togetherness as the largest constraints-based cluster when it comes to traveling to wine regions, although the same group declared strong wine tourism intentions. Researchers could further explore the viability of targeting VWEs to this specific group and unveil their characteristics and specific needs or preferences for similar services.

Respondents who experienced adverse economic effects (lower travel budgets) are surprisingly less likely to be highly interested in VWEs. This result seems unexpected because VWEs could be a more affordable way to (virtually) visit other places away from home. One explanation may be that consumers with lower budgets due to Covid may feel powerless when trying to satisfy their travel needs. Powerlessness is an actual or perceived loss of control connected to uncertainty, leading to a compensatory process weakening the deficit-feeling (Rucker and Galinsky, 2008). Recent marketing research shows that powerlessness leads to preferences for nostalgic goods (Bi et al., 2023). Thus, VWEs novelty may explain the negative relation between a high VWEint and adverse economic effects, but clarifying this would require more research.

Greater risk avoidance (RA) and future wine tourism intentions (wtourint) also increase the probability of expressing a higher VWEint but with smaller effect sizes than the previous variables discussed. The direction of the RA effect is opposite to previous studies analyzing the willingness to travel to wine regions (Gastaldello, et al., 2023) or to bubble destinations (Luo and Lam, 2020). Thus, it is reasonable to believe that VWEs may represent a safe means for risk-averse people to still engage with wine activities during health crises like the COVID-19 pandemic, where regular travels would be logistically complex and potentially health threatening.

Moreover, respondents planning a wine experience are more likely to be attracted by VWEs which can be connected to convenience in travel planning, lowering the cost of gathering information about places to visit (Chang, et al., 2010). Dedicated research is necessary to assess whether attendance at VWEs can influence destination choices during the initial stages of travel planning.
Conclusions
COVID-19 and accelerating digitalization have a significant impact on the wine sector, diffusing VWE as a temporary alternative or as a potential complement to onsite experiences. The virtual “service-scape” allows to explore and interact with producers and wines while overcoming budgetary and spatial constraints. It may allow wineries and destinations to connect with new and existing customers and/or visitors. However, research on VWEs is mostly exploratory and limited in scope not providing proper insights on VWE demand to justify and channel potential long-term efforts in this area. Our research aims to fill this gap by relying on a large, representative sample of US wine consumers from Oregon and California. We unveil the profile of potential users of VWE and identify the main factors that explain a greater interest in them, drawing upon existing research on wine tourism, virtual experiences and e-commerce behavior to provide a more comprehensive understanding of VWEs.

Theoretical implications
This study contributes to the scarce literature on the consumption of virtual (wine) tourism experiences through a detailed VWE demand analysis based on a rich set of psychographic and sociodemographic factors.

The key role of personal WI in determining high VWEint levels confirms that the constructs remain highly pertinent to predicting consumer behavior even in a virtual environment. The segmentation analysis highlighted that high VWEint consumers have peculiar traits compared to conventional wine tourist’ traits identified in the literature, such as digital familiarity, consumption habits and age. Hence, existing knowledge on wine tourist prototypical profiles (e.g. Molina et al., 2015; Alebaki and Iakovidou, 2011) may not be fully transferable to VWEs, and our findings support necessary adjustments. Knowing VWEint segment’s traits is relevant as it may lead to diverse needs and expectations when joining an VWE. For example, wine educational content and social aspects of VWEs might be particularly important as the high VWEint group exhibits greater WI as well as social consumption habits.

Moreover, our research identified the main drivers of VWEs interest, namely, digital familiarity (wapp and buywonline), WI, wine tourism intentions (wtourint), parenthood (childy) and health-related RA. Since interest is an attitudinal dimension predicting intentions (Robichaud and Yu, 2022), these variables provide a theoretically relevant ground for extending consumer behavior models like the theory of reasoned action (TRA) or the TPB either as modeling constructs or as moderators to better capture the peculiarities of VWEs. The significant impact of RA on VWE interest suggests that it may be an antecedent of VWE intention in both the TPB and the TRA model. Similarly, WI could predict VWE intentions. In fact, WI reflects interest, symbolic centrality and arousal toward wine (Brown et al., 2007), which are the core theme of VWEs. Attitude reflects the tendency to respond positively or negatively to VWEs (Vargas-Sánchez et al., 2016). Thus, it is reasonable to assume that a stronger WI can positively affect attitudes toward a wine-themed service like VWE. Likewise, digital literacy may influence both attitude and intentions toward VWE due to its significant impact on interest in VWE. This hypothesis could be explored in future studies. Finally, future research could introduce parenthood as a control variable or a potential moderator for a multi-group analysis. Indeed, evidence suggests that parenthood can affect other constructs, such as RA (Görlich and Tamm, 2020). To date, the TPB has only been applied to VR tourism experiences (Huang, 2023), virtual worlds (Mäntymäki et al., 2014) and virtual grocery shopping (Thomas-Francois et al., 2023), calling for an application on VWEs.
Information on VWEint drivers also provide useful hints to explore extrinsic (related to instrumental values) and intrinsic (related to inherent enjoyment of VWEs) motivations of VWE consumers (Deci and Ryan, 2000). Zhan and Shi (2024) demonstrate that motivations positively affect tourists’ satisfaction relying on self-determination theory (SDT). STD links satisfaction with motivations for engaging in an activity to satisfy a psychological need, categorizing motivations as either extrinsic or intrinsic. Extrinsic motivations are external to the subject and are then internalized, while intrinsic motivations reflect inherent enjoyment (Deci and Ryan, 2000). In wine tourism, intrinsic motivations may include product interest and experience novelty (Bruwer and Alant, 2009). Combined with our findings, SDT may offer a good conceptual framework to look at what makes a VWE attractive. Indeed, we provide a first overview of the factors that affect wine consumers’ interest in joining a VWE as a behavioral intention antecedent, shedding light on potential intrinsic (e.g. WI) and extrinsic (e.g. travel intentions, convenience aspects) motivational forces. This also constitutes a basis for investigating the relationships between motivational factors, VWE satisfaction and loyalty, as well as VWE expectations and satisfaction. These relationships can inform the effective design and implementation of similar services in a virtual environment.

Similarly, we grant insights on potential factors affecting the S–O–R pattern in VWEs, a framework that could be applied to guide VWEs design and development. S–O–R models (Mehrabian and Russell, 1974) postulate that the environment generates stimuli (S) that are internally processed by the organism (O) leading to a behavioral response (R). For VWEs, stimuli are impulses for participation and purchase intentions are potential responses (Wei et al., 2023). Several of the forces driving interest in VWE emerged in this study may impact the stimulus to participate in a VWE and how it is processed, potentially affecting the subject’s behavioral response. For example, Wen and Leung (2021) explored the effect of online and offline embodiment on wine purchase decisions during virtual wine tours and tastings comparing traditional videos and VR. Their findings reveal that product knowledge (connected to product involvement) significantly impacts how different stimuli in a virtual tasting environment are processed. Thus, researchers could explore the role of WI as an attitudinal trait affecting the organism. The same can apply to RA. Furthermore, academics could assess the role of wtourint, parenthood, digital familiarity or financial constraints as motivational forces shaping the stimulus.

Finally, our findings may also extend to VTEs beyond wine. Particularly, they support the role of digital familiarity in promoting interest in virtual experiences. This outcome corroborates exploratory findings on Italian wine consumers (Gastaldello et al., 2022), it underpins the hypothesis that a greater knowledge of digital tools can facilitate their use in educational contexts (Ng, 2012) and it underlines the theoretical importance of digital literacy and skills in the digital era.

Practical implications
The data from our study may support stakeholders wishing to implement similar services and developing them effectively, both operationally and in terms of marketing.

The positive role of RA determining high VWEint confirms that VWEs are a successful resilience strategy. However, VWEs may not be a desirable option for consumers whose travel budget is reduced as a result, despite the potential benefits of VWEs as virtual mean to visit places.

The study found that VWEs are particularly effective in attracting highly wine involved, financially healthy consumers who regularly drink wine. The group with high VWEint showed a clear orientation toward high value wines. Their high volume of monthly
Virtual frontier of wine experiences

purchases also emphasizes the commercial benefits VWEs could generate for wine producers such as gaining new customers and promoting loyalty among existing customers. For the latter, VWEs offer wine producers a way to actively engage with them beyond special promotions and newsletters. The large share of GenZ and Millennials in the high VWEint segment suggest that VWEs may be leveraged to establish early supplier–consumer relationships, leading to long term benefits for wine producers.

On a practical note, VWEs may allow young parents to engage in wine activities. In fact, in-presence wine activities and trips are often not child-friendly unless specific solutions are offered. Therefore, VWEs could be used to build and maintain consumer relationships with young, wine enthusiastic parents. Since most high VWEint subjects use wine apps and buy wine online, they may be effective means to promote winery products and services. This finding also suggests that high interest VWE participants are potentially more likely to purchase wine through e-commerce after a virtual experience. Future research could quantify the extent of this conversion.

Finally, study results suggest that VWEs could be effective for destination marketing in the view of attracting future visitors. Indeed, the segment with a high interest in VWEs exhibits the strongest wine tourism intentions, and its members are more likely to stay longer in wine regions. In addition, most of these consumers are less price-sensitive when it comes to wine tourism experiences.

Limitations and future research
A first limitation of this study is the use of VWE interest as an outcome variable, which can only be an indicator of consumers behavior. Therefore, dedicated research considering VWE participants is needed to validate our results and provide information on their motivations and preferences. Furthermore, our study does not explore the role of RA beyond health risks. It is important to consider the potential impact of RAs on the use of VWEs as these online services are relatively new.

Our research is conducted in only two US states, so it cannot be considered representative of the US population. Further studies extending to other states are required. Moreover, the survey does not capture residents in wine regions or how far participants live from one, which could potentially affect their attitude toward VWEs and the perceived usefulness of the service.

Finally, this study solely focuses on VWEs business-to-consumer use while their business-to-business potential is neglected. This application of VWEs was also prompted by the pandemic (e.g. see Temperini et al., 2022) and could be investigated considering its ability to establish business relationships at limited costs.

Notes
3. Children are defined as being below 10 years of age as it is the legal age to leave children home alone in Oregon. (Children’s Bureau, 2018. www.childwelfare.gov/pubpdfs/homealone.pdf). California does not have similar specifications, so we considered the most conservative regulation.
4. Available at: www.istat.it/it/archivio/212385
5. Available at: https://libguides.usc.edu/busdem/age
References


Further reading

## Appendix

<table>
<thead>
<tr>
<th>Scale</th>
<th>Item description</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude toward covid-related risk in wine tourism (RA)</td>
<td>Due to the risks connected with the Covid pandemic, I cannot accept going to travel to a wine region with family and friends Due to the risks connected with the Covid pandemic, I cannot accept that local friends and relatives travel to wine regions I will avoid eating with local friends and relatives after their trip to a wine region</td>
<td>0.93</td>
</tr>
<tr>
<td>Wine involvement (WI)</td>
<td>I like to purchase wine to match the occasion Many of my friends share my interest in wine Deciding which wine to buy is an important decision I like to gain the health benefits associated with drinking wine For me, drinking wine is a particularly pleasurable experience I wish to learn more about wine I have a strong interest in wine My interest in wine has been very rewarding My interest in wine makes me want to visit wine regions I am knowledgeable about wine People come to me for advice about wine Much of my leisure time is devoted to wine-related activities I have invested a great deal in my interest in wine Wine represents a central life interest for me</td>
<td>0.94</td>
</tr>
<tr>
<td>Interest in virtual wine experiences (VWEint)</td>
<td>I am interested in attending a virtual guided tour of a winery</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>I am interested in taking part to online wine tastings I am interested in taking part to online oeno-gastronomic experiences</td>
<td></td>
</tr>
</tbody>
</table>

**Table A1.** Description and reliability of the scales included in the final analysis

*Source:* Authors’ own creation
Virtual frontier of wine experiences

Variable n. %
---
Oregon 190 49.4
California 195 50.6
Female 191 49.6
Age
1 a week 120 31.2
21–29 (1) 64 16.6
30–39 (2) 78 20.3
40–49 (3) 73 19.0
50–59 (4) 50 13.0
60–69 (5) 57 14.8
Over 70 (6) 63 16.4
Education
Premium 95 27.1
High school or lower (1) 45 11.7
Associate degree/college (2) 95 24.7
Bachelor’s degree (3) 128 33.2
Graduate degree (4) 40 10.4
Postgraduate (5) 76 19.7
Marital status (marstat)
Married or in a domestic partnership 259 67.3
Single 61 15.8
Dating 19 4.9
Separated/divorced 35 9.1
Widowed 11 2.9
Family with children (childy) 152 39.5
Income
Low (1) 62 16.1
Sufficient or medium (2) 131 34
Good (3) 192 49.9
Wine bottles purchased monthly (wbot1m) 6.4 7.98
Wine involvement (WI) 4.7 1.19
Interest in online wine experiences (intVWE) 4 1.73
Risk attitude (RA) 3.6 1.85
Intention to visit a wine region in the next 12 months (wtourint) 4.7 1.68

<table>
<thead>
<tr>
<th>Wine tourist classes</th>
<th>Class</th>
<th>Group name</th>
<th>%</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 1</td>
<td>Covid-19 measures appreciative</td>
<td>50.1</td>
<td>Prefer tastings from small wineries and in small groups with outdoor tasting options. The least price-sensitive when paying for a wine tourism experience</td>
<td></td>
</tr>
<tr>
<td>Class 2</td>
<td>Covid-19 measures averse</td>
<td>32.2</td>
<td>Dislike the need for a reservation and outdoor tastings. Prefer large group experiences</td>
<td></td>
</tr>
<tr>
<td>Class 3</td>
<td>Boutique wine experience seekers</td>
<td>17.7</td>
<td>Strongly prefer winery tours upon reservation, limited-size tasting groups and small, family-run wineries. No significant preference for outdoor tastings. The most sensitive to wine tourism experiences price</td>
<td></td>
</tr>
</tbody>
</table>

Source: Authors’ own creation

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