



A cross-cultural study on consumer preferences for olive oil

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ABSTRACT

In this paper, we study consumer preferences for olive oil across four countries (Denmark, France, Tunisia, and the US). Based on a large-scale study with olive oil consumers (N = 3,462), we use the Best-Worst Scaling method to measure perceived importance for product attributes known to influence consumer choice. Our results show that consumers across all countries rate type, price, prior experience, and country of origin as important product attributes. On the other hand, packaging, label design, and brands are considered as less important product attributes. While the perceived importance for olive oil attributes differs across countries, the order of importance is almost similar for all countries. We further derive a three-segment solution and describe each segment based on its attitudinal beliefs, usage, and socio-demographic profile. We discuss implications for the study of consumer preferences for olive oil and provide managerial insights.

1. Introduction

Olive oil is an agricultural product produced mainly in countries of the Mediterranean basin, and an integral component of the so-called Mediterranean diet (Willett et al., 1995). The EU produces roughly 67% of the world's olive oil, while it accounts for around 53% of the world's consumption (European Commission, 2021). Global demand for olive oil steadily increases, with a forecasted annual growth of 3.2% (Fortune Business Insights, 2021). The reason behind this growth is the increased consumer awareness of the health benefits of olive oil, coupled with a shift in consumer demand for healthier diets. In fact, the health-promoting benefits of olive oil are well known (Fabiani, 2016; Gorzynik-Debicka et al., 2018).

To sustain such growth, studying consumer preferences for olive oil is essential and it has been the topic of several earlier studies (e.g., Dekhili, Sirieix, & Cohen, 2011; Krystallis & Ness, 2005; Peršurić, 2020; van der Lans, van Ittersum, De Cicco, & Loseby, 2001). Consumer-related factors (e.g., varying levels of knowledge, involvement, and usage), as well as market-related factors (e.g., price, origin, and branding) may result in segmented consumer preferences not only across countries but also within countries. Few attempts have been made to segment consumers based on their preferences for olive oil (Dekhili et al., 2011; Di Vita et al., 2021; Peršurić, 2020), and most of these have

been carried out with consumers in olive oil producing countries. Besides, attempts to explore cross-cultural differences are even fewer (Baourakis & Baltas, 2003; Dekhili et al., 2011; Nielsen, Bech-Larsen, & Grunert, 1998).

The overall objective of this paper is to explore consumer preferences for olive oil. Using the Best-Worst Scaling (BWS) method, we measure the relative perceived importance consumers assign to product attributes used as choice criteria for olive oil. Based on a large-scale sample (N = 3,462) across four countries (Denmark, France, Tunisia, and the US), we assess consumer preferences for olive oil in each country, and compare their perceived importance and ranking across countries. We then segment consumers using a Latent Class Analysis (LCA) and derive a three-segment solution: "Quality Seekers", "Price Conscious Consumers", and "Guarantee Seekers". We assess their prevalence in each country and describe each segment based on consumers' background. Our study is the first to offer a consistent analysis of consumer preferences on olive oil across four countries, based on a method that is suitable for cross-cultural food consumer research (Ares, 2018) and international segmentation (Grunert, 2019).

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2. Background

2.1. Drivers of consumer preferences for olive oil

The study of consumer preferences for olive oil has been a topic of research interest especially in countries in the Mediterranean Basin, where most of the production and consumption takes place (Del Giudice, Cavallo, Caracciolo, & Cicia, 2015). A large number of product attributes are known to drive consumer preferences for olive oil, such as type of olive oil (i.e., extra virgin, virgin, refined), price, country/region of origin, taste, color, certification, production method (e.g., organic), packaging, and brand (Dekhili et al., 2011). Some of those product attributes are more relevant in specific countries due to market-related conditions, culinary practices, and overall consumer familiarity with olive oil. Below a short review of those product attributes that were included in our study is provided. Our review goes beyond the measure consumer preferences, by including the impact of those product attributes on consumer choices for olive oil, willingness to pay, and actual purchase.

One of the most important product attributes that drives consumer preferences for olive oil is type (Dekhili et al., 2011; Jiménez-Guerrero, Gázquez-Abad, Mondéjar-Jiménez, & Huertas-García, 2012; Mtimet, Zaiet, Zairi, & Hzami, 2013; Perito et al., 2019), with extra-virgin olive oil being the element that consumers are willing to pay more for (Mtimet et al., 2013). Given the superiority of extra virgin olive oil, the majority of studies deal with preference for this type of olive oil (Del Giudice et al., 2015). While studies in France (Dekhili et al., 2011) and Italy (Perito et al., 2019) find that the type of olive oil is the most important product attribute, a study in Tunisia (Dekhili et al., 2011) finds type as less important. Besides, Mtimet, Kashiwagi, Zaiet, and Masakazu (2008) find that Japanese consumers evaluate type as a less important product attribute, while they have higher preferences for refined oil, compared to extra virgin or virgin olive oil. Thus, the type of olive oil is an important product attribute but not across all countries.

Given that olive oil is linked to countries and certain regions in the Mediterranean basin, country and region of origin are important product attributes (Del Giudice et al., 2015; Jiménez-Guerrero et al., 2012; Perito et al., 2019). Origin labels drive consumer preferences for olive oil, who use them as quality cues (Del Giudice et al., 2015). Region of origin is more important for consumers in producing countries who have more knowledge of these regions and their typical varieties (Perito et al., 2019), whereas for consumers in non-producing countries the country of origin is more important (Del Giudice et al., 2015; van der Lans et al., 2001). Geographical origin certification (i.e., PDO/PGI labels) is common for olive oil products (Krystallis, Chrysochou, Perrea, & Tzagarakis, 2017). Such labels are important determinants of consumer preferences (Cavallo, Caracciolo, Cicia, & Del Giudice, 2018; Erraach, Sayadi, Gomez, & Parra-Lopez, 2014; Fotopoulos & Krystallis, 2001; Panico, Del Giudice, & Caracciolo, 2014), and have supported the promotion of awareness of producing regions.

Price is a decisive product attribute for the purchase of olive oil (Baourakis & Baltas, 2003; Del Giudice et al., 2015; Gázquez-Abad & Sánchez-Pérez, 2009). Price acts as a quality cue (Del Giudice et al., 2015; Di Vita et al., 2021; Martínez, Aragonés, & Poole, 2002), and is an important driver of choice among consumers with knowledge about olive oil (Gil & Soler, 2006). Compared to other product attributes (e.g., taste, country of origin, labels), price is however a less important driver of consumer preferences (Dekhili & d'Hauteville, 2009; Tempesta & Vecchiato, 2019).

While the brand is an essential marketing tool and driver of consumer choice, the olive oil sector consists of brands that the majority of consumers are less familiar with (Martínez et al., 2002). Thus, it is of no surprise that earlier studies find that brands are less important drivers for consumer preferences for olive oil (Dekhili et al., 2011; Tempesta & Vecchiato, 2019). However, brands are related to price of olive oil (Roselli, Carlucci, & De Gennaro, 2016), and positively impact

consumers' willingness to pay (Del Giudice et al., 2015). Besides, other product attributes of olive oil serve the role of quality cues, such as country of origin and origin certification, and such product attributes are often considered as brands in some studies (Espejel, Fandos, & Flavián, 2008).

Another important marketing tool is type of packaging (e.g. glass, tin, plastic), which increases consumer willingness to pay for olive oil (Delgado, Gómez-Rico, & Guinard, 2013), and has a significant impact on the price of olive oil (Roselli et al., 2016). Considering which type of packaging, glass is more preferred (Peršurić, 2020), since it is considered a quality cue. In studies that assess the perceived importance of packaging as a driver of consumer preferences, the packaging is ranked as the least important product attribute that drives consumer preferences (Dekhili et al., 2011; Perito et al., 2019). A possible reason for this finding is that a cognitive approach in rating product attributes underestimates the perceived importance of product attributes that affect consumers implicitly, such as packaging.

Two additional characteristics that are not heavily discussed in the earlier studies on olive oil preferences are label design and prior experience. Both these characteristics are considered in earlier studies that measure consumer preferences for wine (Goodman, Lockshin, & Cohen, 2007; Pomarici, Lerro, Chrysochou, Vecchio, & Krystallis, 2017) that use a similar methodological approach as our study. In studies on olive oil, design has been studied from the perspective of appearance (Dekhili et al., 2011) and bottle design (Perito et al., 2019). Both studies show that such characteristics are not important drivers of consumer preference. Finally, as concerns with prior experience, such a characteristic is closely linked to earlier studies that assess loyalty (Gázquez-Abad & Sánchez-Pérez, 2009) and habit (Tempesta & Vecchiato, 2019), which find to drive consumer preferences and overall choice.

2.2. Cross-cultural differences in preferences for olive oil

Since the majority of studies on olive oil preferences have been conducted in producing countries, less is known about countries where olive oil is imported and not embedded in culinary practices (Jiménez-Guerrero et al., 2012). Moreover, few studies have attempted to provide a cross-cultural comparison of olive oil preferences (Baourakis & Baltas, 2003; Dekhili et al., 2011; Nielsen et al., 1998; Peršurić, 2020). Even when cross-cultural differences are addressed, the reasons behind these differences are usually not explored. The most common explanations are differences in consumers' knowledge and interest, and market-related factors (e.g., prices, brands) (Salazar-Ordóñez, Rodríguez-Entrena, Cabrera, & Henseler, 2018).

Differences in consumers' knowledge between producing and non-producing countries, create the implicit assumption that consumer preferences may equally differ. Dekhili et al. (2011) study preferences on a sample of French and Tunisian participants and find that, in the aggregate, French participants value product attributes such as "extra virgin" and AOC label more, whereas Tunisian participants value region of origin, organic label, and olive variety more. Peršurić (2020) studies consumer preferences in a sample from the UK and Germany and finds that for German participants health properties and hedonic product attributes of olive oil are more important, whereas for participants in the UK extrinsic product attributes (e.g., labels, certificates) are more important. Since these studies were based on small convenience samples, the findings should be treated with caution. Nevertheless, these findings suggest that differences go beyond the dichotomy of producing and non-producing countries.

2.3. Cross-cultural segmentation based on consumer preferences

In this paper, we assess the perceived importance consumers attach to olive oil product attributes using the Best-Worst Scaling (BWS) method (Louviere, Flynn, & Marley, 2015), and use the results to segment consumers based on a Latent Class Analysis (Vermunt &

Magidson, 2020). The superiority of such an approach has been discussed in earlier studies (Auger, Devinney, & Louviere, 2007; Lockshin & Cohen, 2011; Mueller Loose & Lockshin, 2013). Mueller Loose and Lockshin (2013) demonstrate the usefulness of the BWS method for cross-cultural segmentation as it reduces measurement invariance, which is a critical issue in cross-cultural research (Steenkamp & ter Hofstede, 2002). Lockshin and Cohen (2011) demonstrate that the cross-cultural segments derived from this process are more robust and useful than using the individual countries as segments. Auger et al. (2007) find the method producing useful clusters without the need to adjust scales for differences in use across the countries.

A similar approach is been followed by Dekhili et al. (2011), who segment French and Tunisian consumers based on olive oil preferences. Their results point to a solution of three segments with the first segment emphasizing “official cues” (i.e., AOC label, organic label, extra virgin type), the second emphasizing “origin cues” (i.e., region of origin, country of origin, variety), and the third emphasizing “sensory cues” (i.e., appearance, color, package). Among their findings is that French consumers represent the majority of the segment that emphasizes official cues, whereas Tunisian consumers represent the majority of the other two segments. In other words, French consumers tend to choose olive oil based on official signals, while Tunisian consumers mainly use origin and sensory cues. This is not a surprising result, as certification labels are more common in France.

3. Materials and methods

3.1. Participants and sampling

In total, 3,462 olive oil consumers from Denmark (N = 948), France (N = 982), Tunisia (N = 492), and the US (N = 982) were recruited through Qualtrics Online Sample. A quota sampling in terms of age and gender was followed in Denmark, France and US, while in Tunisia the quotas were relaxed since the response rate was low. The socio-demographic background of participants appears in Table 1. The countries varied in regards to tradition for production and consumption of olive oil (i.e., France and Tunisia), market size (i.e., the US), and imports (i.e., Denmark solely imports olive oil). The questionnaire was translated into the respective language for each country by professional translators. In Tunisia, both French and Arabic versions of the questionnaire were used.

3.2. The Best-Worst Scaling method

One of the challenging issues in cross-cultural research is validity in

Table 1
Socio-demographic characteristics of the sample.

	Total (N = 3,462)		Denmark (N = 948)		France (N = 1,040)		Tunisia (N = 492)		US (N = 982)	
	N	%	N	%	N	%	N	%	N	%
Gender										
Male	1,732	50.0	519	54.7	461	44.3	386	78.5	366	37.3
Female	1,730	50.0	429	45.3	579	55.7	106	21.5	616	62.7
Age	M = 45.2 (SD = 15.5)		M = 46.8 (SD = 15.8)		M = 47.5 (SD = 13.8)		M = 32.6 (SD = 10.5)		M = 47.6 (SD = 15.9)	
Education										
High school or below	1,574	45.5	480	50.6	508	48.8	90	18.3	496	50.5
Bachelor degree	1,318	38.1	309	32.6	379	36.4	262	53.3	368	37.5
Master degree or above	570	14.5	159	16.8	153	14.7	140	28.5	118	12.0
Family Status										
Single/living alone	1,068	30.8	314	33.1	266	25.6	209	42.5	279	28.4
Married/living with a partner	2,127	61.4	573	60.4	722	69.4	209	42.5	623	63.4
Other	267	7.7	61	6.4	52	5.0	74	15.0	80	8.1
Children (<18) living in the household										
Yes	1,229	35.5	233	24.6	408	39.2	208	42.3	380	38.7
No	2,233	64.5	715	75.4	632	60.8	284	57.7	602	61.3

measurement instruments (e.g., Ares, 2018; Steenkamp & Baumgartner, 1998). Differences in response styles across cultures result in lack of measurement invariance (Steenkamp & Baumgartner, 1998), which is a statistical property that should be met especially for international segmentation approaches where pooling of data is performed (Grunert, 2019; Steenkamp & ter Hofstede, 2002). From a methodological approach one remedy is to avoid the use of methodologies that rely on ratings (e.g. Likert scales), and instead use methodologies that are “scale free” such as ranking or the Best-Worst Scaling (BWS) method (Ares, 2018).

In our study we use the BWS method, and more specifically the Case 1 (“the object case”) (Louviere et al., 2015). BWS prompts participants to indicate the most (best) and least (worst) important product attribute among a sub-set of alternatives, following an experimental design out of the total set of product attributes. The advantage of BWS is that it has the ability to reduce scale usage variance and allow uncovering true relative similarities and differences of consumer preferences (Mueller Loose & Lockshin, 2013). Besides, BWS can accurately identify small consumer segments in cross-cultural studies (Ares, 2018; Mueller Loose & Lockshin, 2013). BWS has been used in assessing preferences for products especially for wine (e.g., Goodman et al., 2007; Lockshin & Cohen, 2011), and it has been frequently used in cross-cultural studies (Lee, Soutar, & Louviere, 2008; Lockshin & Cohen, 2011).

In our study we asked to indicate the product attribute that influenced participants choice the most and least the last time they purchased olive oil. Since our study aimed at a cross-cultural analysis, we decided to include those product attributes that are relevant across all countries where we collected data. We selected seven product attributes: 1) country of origin; 2) price; 3) brand name; 4) packaging; 5) label; 6) experience (I bought it before); and 7) type (i.e., regular, extra virgin). These product attributes are identified as relevant drivers of preferences in earlier literature (Dekhili et al., 2011; Jiménez-Guerrero et al., 2012) and are framed similarly to studies employing BWS in wine (Lockshin & Cohen, 2011). The seven product attributes were combined into seven choice sets of three items each, following a balanced incomplete block design. The design ensures that each product attribute appears the same number of times (i.e. three times) across all choice sets, and that within each choice set each pair of product attributes only appears once (Cohen, 2009). An example of a choice set is presented in Fig. 1, while the exact design is presented in the associated supplementary material (see Acknowledgements).

3.3. Questionnaire design

The questionnaire was organized in the following sections. In the

Remember the last time you purchased olive oil. Tick the ONE reason that MOST influenced your choice and the ONE that LEAST influenced your choice.

LEAST		MOST
<input type="radio"/>	Country of origin	<input type="radio"/>
<input type="radio"/>	Brand name	<input type="radio"/>
<input type="radio"/>	Attractive label	<input type="radio"/>

Fig. 1. Example of a choice set presented to participants.

first section, upon agreeing to informed consent, participants were asked to choose from a list those products they bought in the past year. Participants who did not buy olive oil were screened out. In the second section, participants answered questions concerning olive oil beliefs and usage. A single-item question assessed consumers' subjective knowledge on a 7-point Likert scale anchored from "1 = not at all knowledgeable" to "7 = highly knowledgeable" (adapted from Lakshmanan and Krishnan (2011)). Participants' involvement with olive oil was assessed with a 5-item scale (e.g., In general, I have a strong interest in olive oil; Olive oil matters a lot to me) adopted from Beatty and Talpade (1994) using a 7-point Likert scale anchored from "1 = totally disagree" to "7 = totally agree". A question assessed participants' attitudes measuring their beliefs about olive oil regarding taste ("1 = not tasty at all" to "7 = very tasty"; "1 = does not improve the taste of food" to "7 = improves the taste of food"), health ("1 = not healthy at all" to "7 = very healthy"), and price ("1 = not expensive at all" to "7 = very expensive"). The next question assessed participants' use of olive oil (as a salad dressing, cooking, and frying). In the third section, participants were introduced to the BWS task. The last section included questions about the socio-demographic background of participants. As this study was part of a larger project, the questionnaire included other sections that we do not report in this paper.

4. Results

4.1. Beliefs and usage of olive oil

Table 2 presents the participants' beliefs and usage of olive oil. Regarding subjective knowledge about olive oil, participants in all countries indicate that they think that they have a good level of knowledge (M = 4.9), with consumers in Tunisia reporting higher (M = 5.4) and consumers in Denmark reporting lower levels (M = 4.5) of subjective knowledge. In a similar vein, participants show a level of involvement above the scale mean (M = 5.0), with consumers in Tunisia reporting higher (M = 5.9) and consumers in Denmark lower (M = 3.8)

Table 2
Sample's olive oil beliefs and usage

	Total Mean (SD)	Denmark Mean (SD)	France Mean (SD)	Tunisia Mean (SD)	US Mean (SD)	F/Chi-square	p-value
Knowledge	4.9 (1.5)	4.5 (1.5) ^a	5.0 (1.4) ^b	5.4 (1.5) ^c	5.0 (1.4) ^b	53.47	<0.001
Involvement	5.0 (1.5)	3.8 (1.4) ^a	5.5 (1.2) ^b	5.9 (1.0) ^c	5.0 (1.3) ^d	449.37	<0.001
Attitudes							
Tasty	5.7 (1.4)	5.2 (1.4) ^a	6.0 (1.2) ^b	6.1 (1.4) ^b	5.6 (1.4) ^c	84.27	<0.001
Healthy	5.9 (1.3)	5.1 (1.3) ^a	6.2 (1.0) ^b	6.4 (1.2) ^d	6.0 (1.2) ^d	195.17	<0.001
Expensive	5.0 (1.4)	4.6 (1.3) ^a	5.1 (1.2) ^b	5.6 (1.4) ^c	5.0 (1.5) ^b	56.89	<0.001
Improves taste of food	5.7 (1.3)	5.1 (1.4) ^a	5.8 (1.2) ^b	6.3 (1.3) ^c	5.8 (1.3) ^b	97.83	<0.001
Use (%)							
Salad dressing	73.9	62.1	90.7	96.1	56.2	504.70	<0.001
Frying	41.2	70.3	16.7	11.0	54.2	841.18	<0.001
Cooking	77.8	74.7	77.6	71.5	84.1	39.15	<0.001

Notes: Subscripts indicate significant ($p < .05$) post hoc Tukey-b.

levels of involvement. Regarding attitudes, participants perceive olive oil as healthy (M = 5.9), tasty (M = 5.7), and a product that improves the taste of food (M = 5.7). Compared to the other statements, they agree less that it is expensive (M = 5.0). On average, Tunisian consumers reported higher and Danish consumers reported lower levels across all attitudinal statements. Concerning uses of olive oil, 77.8% use it for cooking, 73.9% as salad dressing, and 41.2% for frying. Some noticeable differences are that in France and Tunisia fewer consumers use it for frying (16.7% and 11.0%), whereas in Denmark 70.3% use it for frying. On the other hand, in France and Tunisia, the majority use olive oil as salad dressing (90.7% and 96.1%), whereas in the US only 56.2% use it as a salad dressing.

4.2. Perceived importance for olive oil product attributes

Table 3 presents the average individual BWS scores of olive oil product attributes for the total sample and across countries. In addition, the ranking of each olive oil product attribute is presented, together with the standardized ratio scale (see Mueller Loose & Lockshin, 2013) that allows to describe the importance of each attribute relative to the most important attribute. Since each product attribute was presented a maximum of three times, the individual BWS scores range from -3 to +3. For the total sample, the most important product attribute is the type of olive oil (1.59) followed by price (1.06), prior experience (0.73), and country of origin (0.16). On the opposite side, attractive label scored the lowest (-1.67), followed by packaging (-1.35), and brand name (-0.51). In a similar fashion, price is 65.0% as important relative to type, prior experience is 60.7%, country of origin 42.0%, brand name 28.9%, packaging 16.2%, and attractive label 13.7%. The analysis of variance shows significant differences in the average perceived importance scores across countries across all product attributes. However, the ranking of product attributes is almost identical with all countries rating type of olive oil as the most important and attractive label as the least important one. The only exception is Tunisia where the country of origin is the second most important product attribute, whereas price is less

Table 3
Average individual Best-Worst scores of olive oil product attributes across countries and analysis of variance.

Product Attribute	Total		Denmark			France			Tunisia			US			F	p-value
	Score	Ratio*	Score**	Ratio	Rank	Score	Ratio	Rank	Score	Ratio	Rank	Score	Ratio	Rank		
Type (i.e., regular, extra virgin)	1.59	100.0	1.72 ^a	100.0	1	1.66 ^{a,b}	100.0	1	1.41 ^c	100.0	1	1.50 ^{b,c}	100.0	1	7.70	<0.001
Price	1.06	65.0	1.40 ^a	70.2	2	0.84 ^b	55.3	2	0.69 ^b	63.3	4	1.14 ^c	73.5	2	26.74	<0.001
Experience (I bought it before)	0.73	60.7	1.09 ^a	67.5	3	0.41 ^b	50.5	4	0.74 ^c	71.5	3	0.70 ^c	64.3	3	30.40	<0.001
Country of origin	0.16	42.0	-0.25 ^a	29.2	4	0.61 ^b	48.1	3	1.11 ^c	79.4	2	-0.40 ^a	34.3	5	138.19	<0.001
Brand name	-0.51	28.9	-1.30 ^a	14.8	6	-0.13 ^b	34.4	5	-0.54 ^c	32.2	5	-0.15 ^b	39.1	4	144.76	<0.001
Packaging	-1.35	16.2	-0.87 ^a	17.7	5	-1.68 ^b	12.7	6	-1.68 ^b	14.9	6	-1.30 ^c	18.8	6	70.16	<0.001
Attractive label	-1.67	13.7	-1.78 ^a	11.3	7	-1.70 ^a	12.5	7	-1.72 ^a	12.8	7	-1.49 ^b	17.4	7	9.94	<0.001

Notes: * "Ratio" refers to the standardized ratio scale (see Mueller Loose & Lockshin, 2013); ** Subscripts indicate significant ($p < .05$) post hoc Tukey-b.

important compared to the rest of the countries.

4.3. Segmentation

Based on the individual BWS scores, participants were classified using a latent class cluster analysis (LCA) using Latent Gold 6.0 (Ver-munt & Magidson, 2020). Several statistical criteria have been proposed to choose on the best fit class model (Weller, Bowen, & Faubert, 2020), which however should be evaluated in conjunction with interpretability. Table 4 reports four criteria that were taken into account to assess the best fitting model: the log-likelihood (LL), the Bayesian Information Criterion based on the log-likelihood (BIC_{LL}), the p-value for each model under the assumption that the L² statistic follows a chi-square distribution, and the classification error. The decision of choosing the most parsimonious model is based on the BIC_{LL} being small compared to other models, the p-value being greater than 0.05 (i.e., providing an adequate fit), and the classification error relatively low compared to other models (Weller et al., 2020). The three-class model satisfied the criteria and was further considered as the most interpretable solution, and thus was retained as the most appropriate solution.

The three segments were labeled and interpreted based on the dominant BWS scores within each segment (Table 5). The first segment, labeled as "Quality Seekers", contains 47.9% of the respondents. This segment rates type of olive oil as the most important product attribute (2.68). Other product attributes that are important for this segment are experience (0.54) and country of origin (0.45). Attractive label (-1.88) and packaging (-1.51) are the least important, which are also the least important in the other two segments. The second segment, labeled "Price Conscious Consumers", contains 36.3% of the respondents. Compared to the other segments this segment scores highest on price (2.75) and lowest on the country of origin (-0.50) and brand name (-0.98). The third segment, labeled "Guarantee Seekers", contains 15.7% of the respondents. Compared to the other segments, this segment scores highest on experience (0.97), country of origin (0.79), and brand

Table 4
Latent class cluster models based on Best-Worst importance scores.

Model	LL	BIC _{LL}	p-value	Classification Error
One-cluster model (independence)	-41,613.24	83,568.77	-	0.000
Two-cluster model	-41,301.93	83,011.33	<0.001	0.000
Three-cluster model	-40,951.57	82,375.81	0.683	0.019
Four-cluster model	-40,863.57	82,265.02	<0.001	0.040
Five-cluster model	-40,648.48	81,900.02	<0.001	0.039

Notes: LL = Log-likelihood; BIC_{LL} = Bayesian Information Criterion, based on the log-likelihood.; p-value measures the significance of fit improvement between two consequent models.

Table 5
Mean scores, differences, and segment size for the three-cluster model across countries

Product Attribute	Class 1 "Quality Seekers"	Class 2 "Price Conscious Consumers"	Class 3 "Guarantee Seekers"	F/Chi-square	p-value
Type (i.e., regular, extra virgin)	2.68 ^a	.92 ^b	-.17 ^c	2,777.37	<0.001
Price	0.16 ^a	2.75 ^b	-.14 ^c	2,145.63	<0.001
Experience (I bought it before)	0.54 ^a	.86 ^b	.97 ^b	21.90	<0.001
Country of origin	0.45 ^a	-.50 ^b	.79 ^c	164.98	<0.001
Brand name	-0.45 ^a	-.98 ^b	.38 ^c	176.33	<0.001
Packaging	-1.51 ^a	-1.30 ^b	-.99 ^c	30.70	<0.001
Attractive label	-1.88 ^a	-1.74 ^b	-.84 ^c	158.14	<0.001
Segment size					
N (=3,462)	1,660	1,258	544		
Total (%)	47.9	36.3	15.7		
Denmark (%)	47.9	44.6	7.5		
France (%)	52.7	32.0	15.3	$\chi^2(6) = 132.22$ $p < .001$	
Tunisia (%)	49.0	25.2	25.8		
US (%)	42.5	38.5	19.0		

Notes: Subscripts indicate significant ($p < .05$) post hoc Tukey-b.

name (0.38). For this segment price (-0.14) and type (-0.17) are less important product attributes than in the other two segments. Finally, while packaging (-0.99) and attractive label (-0.84) are still the least important product attributes, compared to the other two segments their score is higher. Looking at the share of segments across countries, France has a higher proportion of "Quality Seekers", Denmark has a higher proportion of "Price Conscious Consumers", while Tunisia has a higher proportion of "Guarantee Seekers".

Table 6 presents differences in the socio-demographic background of the segments ground, as well as in beliefs and usage of olive oil. Regarding gender, "Guarantee Seekers" have more male consumers, while the other two segments have a slightly higher proportion of female consumers. Regarding age, the "Quality Seekers" segment is on average older whereas the "Guarantee Seekers" are younger. Regarding education, the "Price Conscious Consumers" segment has a higher proportion of consumers with lower educational backgrounds. Regarding family status, the "Quality Seekers" segment has a higher proportion of consumers who are married or living with a partner. The "Guarantee Seekers" segment has a higher percentage of consumers who have

Table 6
Differences across segments.

	Class 1 “Quality Seekers”	Class 2 “Price Conscious Consumers”	Class 3 “Guarantee Seekers”	F/Chi- square	p-value
Gender (%)				26.77	< 0.001
Male	48.7	47.4	60.1		
Female	51.3	52.6	39.9		
Age	48.0 ^a	43.6 ^b	40.3 ^c	64.05	<0.001
Education (%)				18.53	0.001
High school or below	42.7	49.8	43.8		
Bachelor degree	39.1	36.3	39.0		
Master degree or above	18.2	13.8	17.3		
Family Status (%)				15.62	0.004
Single/living alone	28.4	33.4	32.5		
Married/living with a partner	64.8	57.9	59.6		
Other	6.9	8.7	7.9		
Children (<18) living in the household (%)				21.84	<0.001
Yes	33.8	33.9	44.3		
No	66.2	66.1	55.7		
Knowledge Involvement Attitudes					
Tasty	5.2 ^a	4.5 ^b	5.1 ^a	97.17	<0.001
Healthy	5.3 ^a	4.5 ^b	5.2 ^a	134.09	<0.001
Expensive	5.9 ^a	5.3 ^b	5.7 ^c	66.05	<0.001
Improves taste of food	6.1 ^a	5.6 ^b	5.8 ^c	61.63	<0.001
Use (%)	5.0 ^a	5.0 ^a	4.9 ^a	1.62	<0.001
Salad dressing	5.8 ^a	5.4 ^b	5.7 ^a	33.22	<0.001
Frying	81.6	63.4	74.6	123.14	<0.001
Cooking	40.0	45.2	35.5	16.78	<0.001
	81.6	76.2	69.7	36.67	<0.001

children in their household. Regarding knowledge and involvement in olive oil, the “Quality Seekers” segment is the most knowledgeable and involved, whereas the “Price Conscious Consumers” the least. With regard to attitudinal beliefs, the “Quality Seekers” segment considers olive oil most as healthy, tasty, and that it improves the taste of food, while the “Price Conscious Consumers” segment believes this the least. The three segments do not differ in their perception as to whether the product is expensive. Finally, regarding the use of olive, the “Quality Seekers” segment uses more olive oil as salad dressing and for cooking, while the “Price Conscious Consumers” segment uses it more for frying.

5. Discussion

Our results demonstrate that olive oil type is the most important product attribute that drives consumer preferences. Type of olive oil is ranked as the most important product attribute across all four countries, and it is the most important product attribute that drives preferences in the largest segment (i.e., the “Quality Seekers”). Such finding supports the notion that type is an important product attribute for consumer choice (Dekhili et al., 2011; Jiménez-Guerrero et al., 2012; Mtimet et al., 2013). However, while our results are in line with Dekhili et al. (2011) who find that extra virgin olive oil is among the most important product attributes for French consumers, our findings are not in line with their results for the Tunisian consumers who rated type as less important. One possible reason for this difference is that in our study we refer to the type of olive oil in general, whereas Dekhili et al. (2011) refer to reference to extra virgin olive oil.

Consumer preferences for olive oil are further driven by price, which

is the second most important product attribute except in Tunisia. Furthermore, price is the second most important product attribute and the key driver for the second biggest segment (i.e., the “Price Conscious Consumers”). Our result is in line with earlier work that postulates that price is an important driver of consumer choice for olive oil (Baourakis & Baltas, 2003; Del Giudice et al., 2015; Martínez et al., 2002) and a quality cue (Di Vita et al., 2021). However, our results are not fully in line with Dekhili et al. (2011) who find that Tunisian and French consumers rank price as less important compared to product attributes such as country of origin. At the same time, it is worth mentioning that while there are differences in beliefs about how expensive olive oil is across countries, there are no differences across segments, not even for the “Price Conscious Consumers” segment.

Experience, country of origin, and brand are less important drivers of consumer preferences, but important drivers of choice for the third and smallest segment (“Guarantee Seekers”). These product attributes could be considered as quality assurance cues that minimize risk (Di Vita et al., 2021). Origin (country and/or region) is an important quality cue and a product attribute that is known to drive consumers’ preferences and overall demand for olive oil (Dekhili & d’Hauteville, 2009; Dekhili et al., 2011; Del Giudice et al., 2015; van der Lans et al., 2001), especially for consumers in producing countries (Del Giudice et al., 2015). This highlights further the importance of geographical origin certification, especially for the segment of “Guarantee Seekers”. Finally, origin certification can contribute to the marketing of olive oil from a brand-building perspective, since the category is not characterized by the presence of strong brands (Martínez et al., 2002).

Packaging and label design are found to be the least important drivers of consumer preferences. This finding is in line with earlier work as shown by Dekhili et al. (2011). However, such product attributes are key marketing tools and while people may reject their importance when being asked, they should not be neglected by managers. Similar findings emerge in studies conducted on wine that employ the BWS method (Mueller, Lockshin, & Louviere, 2010), and an explanation is that the cognitive approach in rating product attributes underestimates the perceived importance of marketing tools that are known to influence consumer responses more implicitly.

Another noticeable finding of our study is that while the perceived importance consumers attach to product attributes of olive oil differs across countries, their relative ranking is almost identical. The only exception is Tunisia, a producer country with consumers reporting to have greater knowledge about olive oil, where country of origin is a more important driver of consumer preferences. This result supports the hypothesis that consumers prefer products that are manufactured or grown in their own country (Verlegh & Steenkamp, 1999). Besides, such finding implies that even though consumers across countries may emphasize the perceived importance of the product attributes differently, they still evaluate them in the same hierarchy. Therefore, cross-cultural preferences for olive oil are not as different as one would expect. The derived segment solution points in the same direction since the size of the segments does not differ considerably, except for Tunisia. This result also highlights the opportunity for uniform marketing strategies across countries, that only require to be tailored to the specific segments (Grunert, 2019).

Our findings further indicate that the three segments differ in their beliefs, usage of olive oil, as well as their socio-demographic background. “Quality Seekers” is the segment that scores high in attitudinal beliefs regarding taste, health, and improving the taste of food. It is the segment that has the greatest subjective knowledge and involvement with olive oil and uses olive oil mostly as a salad dressing and for cooking. This segment comprises consumers who are on average older, more educated, and married or living with a partner. “Price Conscious Consumers” is the segment that scores low in attitudinal beliefs regarding taste, health, and improving the taste of food. It is the segment with the lowest knowledge and involvement with olive oil, and compared to other segments uses olive oil more for frying and less as a

salad dressing. Compared to the other segments, the “Price Conscious Consumers” are less educated and are more likely to be single/living alone. The “Guarantee Seekers” scores average in attitudinal beliefs, as well as involvement and knowledge about olive oil. This segment uses olive oil less for frying and mostly as a salad dressing. The “Guarantee Seekers” comprise of younger and male consumers, married and most likely to have kids in their household.

6. Conclusion

To our knowledge, our study is the first to offer a systematic measure of perceived importance for olive oil product attributes with a relatively large sample across four countries. More importantly, our study employs a method that overcomes measurement invariance and allows making valid cross-cultural comparisons. Besides, our study offers a cross-cultural segmentation solution and identifies three segments that not only differ on how these segments prioritize the product attributes that drive their preferences but also differ in their behavior and beliefs towards olive oil. These segments emerge in a consistent manner across countries with some noticeable differences, as described above, which allows for drawing universally applicable managerial implications.

Our study contributes to the existing body of studies on consumer preferences for olive oil (Dekhili et al., 2011; Jiménez-Guerrero et al., 2012; Mtimet et al., 2013). In summary, consumers across all countries prioritize type, price, prior experience, and country of origin, while they don't consider packaging, label design, and brands to be of equal perceived importance. Besides, the segmentation shows that type of olive oil is the most important driver for about half of the consumers (i.e., the “Quality Seekers”). For the remaining half, other product attributes are important drivers of choice such as prior experience, price, and country of origin (i.e., the “Price Conscious Consumers” and “Guarantee Seekers”). It is worth noting that the “Price Conscious Consumers” has the lowest subjective knowledge and involvement with olive oil, while it also scores low in attitudinal beliefs about olive oil as being healthy, tasty, and improving the taste of food. Besides, compared to other segments, this segment uses olive oil more often for frying. Finally, the “Guarantee Seekers” is more prevalent in countries with a tradition for production of olive oil (such as Tunisia), and less prevalent in countries where olive oil is only imported (such as Denmark).

While one may expect that the heterogeneity that exists across countries is the main explanation of the differences in consumer perceptions, the segments found in our study are rather uniform across countries, not only in terms of consumers' perceived importance, but also with regard to their perceptions about olive oil, use of olive oil, and socio-demographic background. This result confirms the emergence of global consumer segments (Alden, Steenkamp, & Batra, 1999) as a consequence of cultural homogenization and globalization (Steenkamp, 2019). Even more interestingly, we demonstrate that such cross-national segments can be found even for a food product produced only in specific countries, like olive oil. Such finding has ramifications for international marketing strategies, since uniform marketing strategies could be applied across countries for such products targeting similar segments.

Our study provides important insights on international segmentation of food consumers. Grunert (2019) noted that segmenting based on product attributes and benefits is one of the major approaches that have been proposed for international segmentation of food consumers, but also noted that the commonly used rating scales for measuring attribute importance limit the usefulness of this approach because of their susceptibility to cultural response bias. He did suggest the use of best-worst scaling to overcome these issues, because of the advantages this approach has in cross-cultural research (Ares, 2018). Such an approach has also been suggested by other researchers (Lockshin & Cohen, 2011; Mueller Loose & Lockshin, 2013). Our study shows that best-worst scaling is indeed useful for international segmentation based on product attributes and is able to identify international segments even in a product category where vast differences in product knowledge and

product use exist across countries.

Some useful managerial implications can further be derived from this study. First, the emergence of three segments in all countries provides the opportunity of forming uniform marketing strategies for olive oil products across countries, that only require tailoring to the specific segments. Second, the fact that type is the most important product attribute is proof of consumer knowledge about olive oil. Third, while a large proportion of consumers (36.3%) prioritizes price, this segment scores low in knowledge, involvement, and attitudinal beliefs. This allows producers to build on strategies that can positively impact such consumer responses (e.g., targeted educational campaigns, in-store tasting). Finally, the existence of a small segment that prioritizes experience, country of origin and brand, highlights the absence of strong brands in the category (Martínez et al., 2002), and at the same time the potential for strong brands to emerge through proper branding strategies. The fact that country of origin is important for this segment, although a relatively important product attribute for all segments, emphasizes the need for producing countries to support producer efforts in branding and marketing their products through proper country branding strategies.

Our study is not free of limitations that point to future research directions. While additional product attributes are known to drive consumer preferences for olive oil (e.g., variety, designation of origin labels, taste, organic certification), in our study we only focused on a relatively small number of product attributes. Our decision to not measure the importance of such product attributes was driven by our intention to focus on those attributes that consumers were more familiar with across all markets, since the lack of familiarity would result in possible random assessment of such attributes. In fact, this has been evident in non-producing countries, where “odd” findings are explained by lack of consumer knowledge (e.g., Mtimet et al., 2008). Therefore, we believe that a design with more product attributes would have jeopardize the study's validity. While there can be an implicit assumption on which level is the most preferred, such derived conclusions from our study should be interpreted with caution since they are subject of different methodological approaches. Finally, as pointed out above, since this approach underestimates the perceived importance of product attributes that affect consumers implicitly, other methodological approaches could be used to validate their relative importance.

CRediT authorship contribution statement

Polymeros Chrysochou: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Antonios Tiganis:** Formal analysis, Writing – review & editing. **Imene Trabelsi Trigui:** Conceptualization, Writing – review & editing. **Klaus G. Grunert:** Conceptualization, Writing – review & editing.

Declaration of Competing Interest

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

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