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A segmentation of fish consumers based on quantity and type of fish: Insights from the Swedish market

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ABSTRACT

The primary objective of this study is to elucidate the underlying factors contributing to the observed differences in fish consumption patterns. To accomplish this, a segmentation analysis was conducted on a representative sample of 2207 individuals from Sweden based on the dual dimensions of both the volume and variety of fish ingested. By scrutinizing these facets, the aim is to gain deeper insights into the distinct consumer archetypes characterized by their diverse fish consumption habits, thus uncovering the catalysts and deterrents that influence these patterns.

The outcome of the segmentation analysis (i.e., two-step analysis: hierarchical clustering followed by non-hierarchical clustering technique) reveals four distinct consumer segments, each possessing unique attributes concerning their preferences and behaviours regarding fish consumption. These segments are classified as the "Frequent," "Avid," "Occasional," and "Infrequent" fish consumers. The profiling of these segments is built on factors encompassing consumers' decision-making styles, involvement in food, environmental consciousness, as well as pertinent socio-economic variables including income, geographical location, age, educational attainment, and gender.

Evident from the findings is the clear demarcation of two segments characterized by robust fish consumption tendencies, specifically the "Frequent" and "Avid" segments. Subsequently, there exists a segment showcasing moderately pronounced fish consumption behaviours labelled as the "Occasional" consumer group, in contrast to a segment demonstrating a markedly diminished inclination for fish consumption, denoted as the "Infrequent" consumer.

All segments score high on habitual and brand-loyal purchasing intentions which emphasize the routine nature of fish consumption behaviour. In a broader context, the study underscores the inherent utility of segmenting consumers based on fish consumption volume and type, as this approach yields distinct consumer groups that can be systematically addressed by stakeholders ranging from policy makers to producers and other seafood advocates.

1. Introduction

Fish is a vital source of protein and an essential component of a healthy diet (Verbeke, Sioen, Pieniak, Van Camp, & De Henauw, 2005). However, despite its importance, the recommended intakes of seafood and fish established by public health authorities are often not met (Carlucci, Nocella, De Devitiis, Viscecchia, Bimbo, & Nardone, 2015). Additionally, statistical data reveals significant disparities in seafood and fish consumption among various segments of society (FAO, 2022).

Following (Petereit, Hoerterer, & Krause (2022) and Shepherd & Sparks (1994), the factors influencing consumption of food, including fish can be categorized in three groups: 1) the product itself (e.g., taste, texture, flavour), 2) the environment (e.g., availability, situation, culture), and 3) individual characteristics (e.g., personality, attitudes, values, perceptions). These factors' prevalence varies among consumers and food products. To increase the consumption of specific food products, including fish, food marketers, fish advocates, and policymakers must gain a better understanding of the drivers and barriers of consumption among different consumer segments.

Recent literature reviews have summarized studies of consumer

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behaviour related to sustainable diets in general (Biasini, Rosi, Giopp, Turgut, Scazzina, & Menozzi, 2019) and fish and seafood (Carlucci et al., 2015; Saidi, Cavallo, Del Giudice, Vecchio, & Cicia, 2023). Past experiences and dietary habits can influence attitudes towards fish. However, the literature reviews shows that there has been limited focus on habits related explicitly to fish consumption and shopping (Brécard, Hlaimi, Lucas, Perraudeau, & Salladarré, 2009; Johnston, Wessells, Donath, & Asche, 2001). This indicates the need for more research on "consumption habits as well as consumers' profiles with strong and weak fish-eating habits" (Carlucci et al., 2015, p. 221).

In line with this, this study aims to identify the reasons behind the significant variation in fish consumption (i.e., the product) among Swedish consumers by segmenting them based on the quantity and type of fish consumed (i.e., the environment) and profiling them based on their individual characteristics.

To understand the different fish consumer segments, the present study incorporates several profiling factors: 1) Responding to the call for a clearer view of the complete consumer-decision making process for fish (Saidi et al., 2023), decision-making styles are used to comprehend consumers' habit-based propensity to react in a certain way, influencing their fish consumption behaviour. 2) Jacobs, Sioen, Pieniak, De Henauw, Maulvault, Reuver, Fait, Cano-Sancho, & Verbeke (2015) and Kitano & Yamamoto (2020) have shown that consumption frequency of fish is higher in individuals with a higher involvement with the product. Consumer involvement in food is therefore included since it plays a crucial role in the consumption of various food products (see Zaichkowsky, 1985). 3) Research has emerged on environmentally conscious consumption, but the factors driving the consumption of sustainable products and facilitating sustainable choices and behaviour remain fragmented (Biasini et al., 2019; Carlucci et al., 2015; Nova-Reyes, Muñoz-Leiva, & Luque-Martínez, 2020). Environmental consciousness has been previously studied in this context (Carlucci et al., 2015; Skallerud, Armbrecht, & Tuu, 2021; Smith, Varble, & Secchi, 2017), and the concept plays a significant role concerning the calls for more sustainable food and fish consumption and production. 4) Finally, socioeconomic factors, such as age, gender, and education, are included, as previous studies have highlighted their importance for food and fish consumption (Clonan, Holdsworth, Swift, Leibovici, & Wilson, 2012; Dettmann & Dimitri, 2007; Govzman, Looby, Wang, Butler, Gibney, & Timon, 2021).

The study is therefore guided by the following two research questions:

1. Which consumer segments can be identified based on the frequency and type of fish consumed?
2. What are the profiles of fish consumer segments based on decision-making styles, involvement in food, environmental consciousness, and socio-demographic variables?

Segmentation is an established technique in marketing research (Beane & Ennis, 1987; Wedel & Kamakura, 2002) and is frequently used to divide markets into meaningful and homogeneous consumer segments for targeted actions by market actors, seafood advocates, and/or policymakers (Verain, Bartels, Dagevos, Sijtsema, Onwezen, & Antonides, 2012; Walsh, Hennig-Thurau, Wayne-Mitchell, & Wiedmann, 2001; Wedel & Kamakura, 2002). An advantage of person-centred segmentation approach is that it considers the many different combinations of theoretical constructs or variables (e.g., behaviour and attitudes) that make up an individual, and it tries to understand and describe how subgroups of individuals sharing similar combinations are associated with focal outcome constructs or variables (Howard & Hoffman, 2018).

A crucial factor for successful segmentation lies in the choice of variables used for segmenting and profiling (Dietrich, Rundle-Thiele, & Kubacki, 2017). Previous segmentation studies of fish and seafood consumers have typically used segmentation bases such as fish quality perceptions (Verbeke, Vermeir, & Brunsø, 2007), consumer motives for purchasing and consuming fish (e.g. price, nutritional value) (Claret, Guerrero, Aguirre, Rincón, Hernández, Martínez, Benito Peleteiro, Grau, & Rodríguez-Rodríguez, 2012; Wang & Somogyi, 2020), barriers and risk perceptions (Jacobs et al., 2015; Vanhonacker, Pieniak, & Verbeke, 2010), health-related attitudes (Pieniak, Verbeke, Olsen, Hansen, & Brunsø, 2010; Sacchettini et al., Castellini, Graffigna, Hung, Lambri, Marques, Perrella, Savarese, Verbeke, & Capri, 2021), psychographic constructs (e.g. consumers' involvement in the fish category, domain-specific innovativeness, or subjective knowledge) (Reinders, Banovic, Guerrero, & Krystallis, 2016), perceptions of information or visual package elements (Heide & Olsen, 2017; Olsen, Tuu, & Grunert, 2017), and attitudes towards production methods and labelling (Risius, Hamm, & Janssen, 2019; Vanhonacher et al., 2013). Especially food-related lifestyle has been widely used in the food domain as segmentation basis (e.g. Budhathoki, Zølner, Nielsen, Rasmussen, & Reinbach, 2022; Cullen & Kingston, 2009; de Boer, McCarthy, Cowan, 2004; Onozaka, Hansen, & Sørvig, 2014; Stancu, Brunsø, Krystallis, Guerrero, Santa Cruz, & Peral, 2022; Thøgersen, 2017; Verneau, La Barbera, Amato, Riverso, & Grunert, 2020; Witzling & Shaw, 2019; Wycherley, McCarthy, & Cowan, 2008). On the other hand, only a few studies have segmented consumers based on fish-eating habits and consumption frequency (e.g., Birch & Lawley, 2014; Sacchettini et al., 2021).

As there is limited research on factors influencing segments with "strong and weak fish-eating habits" (Carlucci et al., 2015, p. 221), this study segments consumers based on the frequency of consumption of the most common fish products in the Swedish market. These consumer segments are identified to address our first research question. In the second step, the segments are profiled based on their decision-making styles, product involvement, environmental awareness, and socio-demographic variables.

The contributions of this study are fourfold. First, it expands on previous literature by introducing manifest consumption behaviours as the basis for segmentation. By combining both the frequency of fish consumption (i.e., cod and salmon) and the specific form of consumption (i.e., pre-packaged, and fresh from the supermarkets delicatessen/fishmongers), the study provides a more comprehensive description of consumer segments than if only overall fish consumption frequency were considered. Second, this research advances a person-centred segmentation approach, which integrates stable purchasing behaviours with decision-making styles, product involvement, environmental awareness, and socio-demographic variables to explore homogeneous consumer segments. Third, the study extends previous literature by introducing and combining new constructs, such as decision-making styles, consumer involvement, and environmental consciousness, as well as socio-economic factors, in profiling the segments. Notably, the role of environmental consciousness as a profiling variable in segmentation studies has not been widely explored. Finally, this research employs a national sample of 2007 Swedish consumers, ensuring valid cluster solutions and avoiding the shortcomings associated with smaller, less representative samples and factor-clustering techniques used in previous studies (Dolnicar & Grün, 2008; Dolnicar, Grün, & Leisch, 2016).

The paper is structured as follows. The next section covers the conceptual background of the study that is followed by details regarding the methods employed. The results of our empirical study are then presented, and finally, the main findings are discussed, and implications are derived.

2. Theoretical background

2.1. Consumer decision-making styles

In a systematic literature review of consumer preferences for finfish, Saidi et al. (2023) call for future studies that include various psychological, biological, and situational factors to get a clearer view of the complete consumer decision-making process. The concept of consumer decision-making styles (i.e., CDMS) (Sproles & Kendall, 1986) combines several of these factors. Consumer decision-making styles influence

consumers' purchase and consumption behaviours. For instance, consider two customers in a supermarket, Rose and Walker. Rose chooses prepacked fresh salmon from the refrigerated counters, while Walker opts for fresh cod from the delicatessen. The differences in their choices may be attributed to their respective consumer decision-making styles.

Decision-making styles are habitual patterns of interpreting and responding to decision-making tasks, dependent on how individuals process information from their environment (Hunt, Krzystofiak, Meindl, & Yousry, 1989). Scott & Bruce (1995) also emphasize that decision-making styles are learned habits, with the number of identified alternatives and information gathered during a decision as key factors. These decision-making styles can be viewed as "surface" individual differences, which are stable, but can be adapted to different situations (Thunholm, 2004).

The concept of CDMS identifies eight basic decision-making styles that consumers use in approaching the market (see Table 1). According to Klein & Sharma (2018), the literature reveals that more than 40 studies use CDMSs to investigate consumer purchasing. The fundamental reason for the frequent use of CDMSs is their ability to capture consumer decision-making about an object, for example online shopping (Khare, 2012), apparel consumption (Tarnanidis, Nana, Sonny, & Maktoba, 2015), and food in general (Anić, Piri Rajh, & Rajh, 2014). Profiling segments of fish consumers based on their decision-making characteristics can therefore provide valuable insights.

2.2. Involvement in food

Consumer involvement refers to individuals' level of interest in a product, capturing its perceived relevance based on inherent needs, values, and interests (Zaichkowsky, 1985). It depends on personal, physical, and situational factors, such as store settings or purchasing products as gifts. Various measures of involvement have been proposed, including the Personal Involvement Inventory (PII) scale. Recent developments in leisure contexts highlight situational factors and identity aspects, such as centrality to lifestyle, attraction, social bonding, identity affirmation, and identity expression (Kyle, Absher, Norman, Hammitt, & Jodice, 2007).

For fish and seafood consumption, Carlucci et al. (2015) stress the need for more research on involvement as a significant predictor of consumer behaviour. They emphasize that consumer involvement, beyond pleasure and health-related aspects, plays a crucial role in understanding fish consumers. Previous studies by Verbeke and Vackier (2005) also support this idea, demonstrating a link between food involvement and fish consumption. To profile segments in this study, measures of general involvement in food, centrality to lifestyle, and identity are therefore included.

Table 1
Consumer decision-making styles (Sproles & Kendall, 1986).

CDMS:	Descriptions
(1) Perfectionism, high-quality consciousness	Consumers who seek the best quality products, shop carefully, and are not satisfied with "good enough" products.
(2) Price consciousness	Consumers who are mindful of lower prices, seeking the best value for their money and looking for sale prices.
(3) Impulsiveness	Consumers who make unplanned purchases, are impulsive shoppers, and are unconcerned about their spending.
(4) Confused by over-choice	Consumers who struggle with decision-making due to numerous product brands, options, and information overload.
(5) Brand consciousness	Consumers interested in buying more expensive and well-known brands, equating a higher price with better product quality.
(6) Novelty consciousness	Consumers interested in new products and keeping up-to-date with trends.
(7) Recreational, hedonistic shopping consciousness	Consumers who find shopping to be a pleasant and enjoyable activity.
(8) Habitual, brand-loyal purchasing orientation	Consumers who consistently buy their favourite brands.

2.3. Environmental consciousness

The food industry faces increasing political and societal pressure to provide sustainably produced food. Consequently, production methods have improved, accompanied by certification schemes like eco-labels. Within the fish industry, the FAO's Code of Conduct for Responsible Fisheries and WWF's Marine Stewardship Council are notable examples. Consumer awareness of environmental issues has also grown, impacting consumption behaviours.

Research by Wang, Pham, and Dang (2020) explored consumers' level of consciousness with environmental issues concerning organic food purchasing behaviours. The results indicated that environmental consciousness affects organic food purchasing intentions, mediated by food quality and moderated by price sensitivity (Wang et al., 2020). Other studies show that labelling fish products is desirable and influences behaviour to a certain degree (Brécard et al., 2009; Sigurdsson, Larsen, Pálsdóttir, Folwarczny, Menon, & Fagerstrøm, 2022). There is ambivalence among consumers towards eco-labels, with a portion showing interest while others remain indifferent (Jaffry, Pickering, Ghulam, Whitmarsh, & Wattage, 2004; Mauracher, Tempesta, & Vecchiato, 2013). Profiling segments based on their environmental consciousness can help identify groups more likely to purchase and consume sustainably produced fish and respond to eco-labelling.

2.4. Socio-economic characteristics

Socio-economic variables significantly impact fish consumption. Studies by Verbeke and Vackier (2005) and Olsen (2003) demonstrate age as a critical predictor of fish consumption. Women and high-income groups also show a higher tendency to consume seafood compared to others (Verbeke & Vackier, 2005). Honkanen, Olsen, and Verplanken (2005) found significant differences in ambivalence and concerns about wild fish among women, social classes, and income groups. Hence, socio-demographic variables play an essential role in understanding fish consumption and consumer behaviour (Clonan et. al., 2012; Gilg, Barr, & Ford, 2005). Inclusion of socio-economic factors will therefore provide better profiling of the consumer segments.

3. Material and methods

3.1. Sample characteristics

This study utilizes data from a national survey conducted in Sweden by the Laboratory of Opinion Research (LORE), a data collection organization affiliated with the University of Gothenburg. The sample of 3,600 respondents was drawn from The Citizen Panel, which comprises over 60,000 active participants. The sampling employed a probability-based approach with stratification according to age, gender, and education. Ultimately, 2,207 respondents (61.3 %) provided responses, after 53 observations were removed during the missing data analysis, yielding a response rate of 59.8 %.

The sample displays a balanced gender distribution, with 47.7 % female and 52.3 % male respondents. Certain age groups (<30 y and 60–69 y) in the sample deviate from national statistics resulting in a higher average age. Regarding the level of education, the present sample have higher educational levels (see Table 2), consistent with a common challenge in survey research (Reinikainen, Tolonen, Borodulin, Härkänen, Jousilahti, Karvanen, Koskinen, Kuulasmaa, Männistö, Rissanen, & Vartiainen, 2018). Comparative national statistics for monthly gross income was not possible to retrieve.

Table 2
Socio-demographic characteristics.

Characteristics	%	n	National statistics
Gender			
Men	52.3 %	1,032	50.4 %
Female	47.7 %	942	49.6 %
Age			
<30 y	9.9 %	196	19.0 %
30–39 y	14.2 %	281	16.8 %
40–49 y	16.9 %	334	15.9 %
50–59 y	17.9 %	354	15.9 %
60–69 y	23.0 %	454	13.6 %
≥70 y	18.0 %	355	18.7 %
Education			
Primary/lower secondary school	5.0 %	99	17.4 %
High school/vocational school	50.6 %	998	43.7 %
University degree	44.4 %	877	38.9 %
Monthly gross income			
SEK < 16 k	18.7 %	354	n.a.
SEK 16–26 k	21.1 %	404	n.a.
SEK 26–30 k	11.8 %	223	n.a.
SEK 30–37 k	20.0 %	379	n.a.
SEK 37–55 k	21.6 %	409	n.a.
SEK > 55 k	6.8 %	131	n.a.

3.2. Measurements

Fish consumption in Sweden primarily revolves around cod and salmon. Respondents were asked about their consumption frequency on a seven-point scale, ranging from "seldom/never" to "several times a week" for both cod and salmon, as well as for pre-packaged and fresh fish from supermarkets delicatessen/fishmongers. These variables are the basis for the segmentation analysis (see Analytical procedure below).

Consumer Decision-Making Styles (CDMS) were measured using the scale developed by Sproles and Kendall (1986), adapted to the food consumption context, similar to Anic et al. (2014). The study included 27 items measuring eight dimensions. All items (provided in Appendix 1) were scored on a scale from 1 (strongly disagree) to 7 (strongly agree).

Involvement levels in food were measured using four items based on previous scales and studies (Kyle et al., 2007; Verbeke & Vackier, 2005). Respondents rated their general involvement in food, centrality to lifestyle, and identity on a 7-point Likert-scale: (1) "In general, I have a great interest in food"; (2) "Food is very important to me"; (3) "Food means a lot to me"; and (4) "Food is very relevant to me" Environmental consciousness was measured with three items linked to self-identity (Sparks & Shepherd, 1992) and eco-labelling (cf. Mauracher et al., 2013): (1) "When shopping for food, I choose the most environmentally friendly alternative"; (2) "I avoid food items with unnecessary packaging"; and (3) "If there is an environmentally certified alternative, I choose it". The items were scored on a scale from 1 (strongly disagree) to 7 (strongly agree). All internal reliability scores exceed the lower threshold of Cronbach's α (i.e., 0.70; Hair Black, Babin, & Anderson, 2010), except the price consciousness scale (Cronbach's α = 0.69). The final part of the questionnaire focused on socio-demographic characteristics of respondents (see Table 5 for details).

Fish is a part of the broader food domain. Similar to other segmentation studies on seafood and fish consumption (e.g., Budhatkoki et al., 2022; Nystrand & Olsen, 2021; Reinders et al., 2016; Stancu et al., 2022), we opted to assess the profiling variables within the overarching food domain rather than exclusively focusing on fish. This decision stems from the notion that attitudes and behaviours are unlikely to substantially differ between these levels.

3.3. Analytical procedure

To segment fish consumers, a two-step cluster analysis was performed using four clustering variables: cod consumption, salmonoid consumption (type of fish), pre-packaged fish, and fresh fish (product form). The hierarchical cluster analysis employed the average linkage method and squared Euclidian distance measure to identify a range of possible cluster solutions (Hair, et al., 2010), followed by a non-hierarchical method. Using the stopping rule of percentage changes in heterogeneity (see Hair et al., 2010), the most promising cluster solutions in the hierarchical analysis were 6 (14.4 % increase) and 3 (8.4 %) clusters, with further examination conducted on cluster solutions ranging from three to six clusters. Considering practical interpretability and distinct characteristics, a four-cluster solution was chosen. For samples over 200, a non-hierarchical technique (k-means cluster analysis in SPSS) is recommended for large data sets as in the current study (n = 2154) (Hair et al., 2010). Thus, this was the second step of the cluster procedure.

The four-cluster solution was then used to profile fish consumers based on consumer decision-making styles (CDMS), involvement in food, ecological consciousness, and sociodemographic variables. ANOVAs were conducted to identify statistically significant differences between clusters on both the clustering and profiling variables. The results and profiling of each segment are presented in the following section, followed by a discussion of the segmentation results in a wider theoretical and managerial context.

4. Results

The cluster analysis revealed four distinct consumer segments, each reflecting varying priorities in fish consumption (see Table 3). These segments are as follows: Frequent consumers (30 % of the sample), avid consumers (18 %), occasional consumers (24 %), and infrequent consumers (28 %). Except for avid consumers, the segments are of similar size.

Regarding the type of fish consumed (cod or salmonoid), the differences between segments are more significant than the differences within each segment. However, for the type of product (pre-packaged and fresh), there are differences both within and between segments.

Table 4 provides insights into the importance of various decision-making styles, involvement in food, and ecological consciousness for each segment (mean values) and highlights statistically significant differences between the clusters. On a scale from 1 to 7, most mean values for the decision-making styles are relatively low, indicating that certain styles are not highly prevalent in the context of fish consumption (specifically, brand consciousness, novelty-seeking, price sensitivity, confusion by over-choice, and impulsiveness). Interestingly, confusion by over-choice and habitual decision-making styles do not differ between segments, suggesting that confusion has a limited impact on consumer choices, while habits are strong across all segments.

Additionally, both involvement in food and ecological consciousness are at or above the midpoint for all four segments, but there are statistically significant differences between the segments in these aspects.

To examine differences in sociodemographic variables (age, gender, education, residence, and income) between segments, chi-square analysis and post-hoc tests were conducted (Table 5). Significant differences were found in terms of age, residence, education, and income. These findings will be discussed further below.

The results from Tables 3–5 will be used to describe and profile the segments in the subsequent sections.

4.1. Segment A: Frequent fish consumers (30 %)

This is the largest consumer segment. Frequent fish consumers almost exclusively purchase pre-packaged fish from supermarkets, and they consume larger quantities compared to both occasional and infrequent fish consumers. This might be related to the fact that they are more price conscious (than avid and occasional consumers). This segment shows higher levels of brand consciousness, novelty-seeking, and recreational orientation. They also exhibit slightly more

Table 3
Cluster results with mean scores on cluster variables.

Cluster variables	Frequent (a) (30 %, n = 561)	Avid consumer (b) (18 %, n = 345)	Occasional (c) (24 %, n = 453)	Infrequent (d) (28 %, n = 538)	Sig.
Cod consumption	4.96	5.50	4.04	3.14	b > a > c > d
Salmonoid consumption	5.07	5.51	4.39	3.25	b > a > c > d
Pre-packaged	4.97	4.98	3.25	3.08	a, b > c, d
Fresh	1.96	5.05	4.14	1.37	b, c > a > d

Note. Different letters (a, b, c, d) indicate significantly ($p < .05$) different average scores than the segment equal to that letter. ANOVA and Bonferroni post hoc test were used.

Table 4
CDMS, Involvement and Ecological consciousness.

	Frequent (a)	Avid (b)	Occasional (c)	Infrequent (d)	Sig.
CDMS:					
Perfectionist (Chronbach's α = 0.90)	5.37	5.97	5.85	5.22	b, c > a, d
Brand (Chronbach's α = 0.78)	3.71	3.93	3.66	3.47	b > a, c > d
Novelty (Chronbach's α = 0.73)	2.04	2.21	2.02	1.79	b > a, c > d
Recreation (Chronbach's α = 0.71)	4.57	4.95	4.73	4.28	b > a, c > d
Price (Chronbach's α = 0.69)	3.32	2.80	2.90	3.50	a, d > b, c
Confused (Chronbach's α = 0.79)	2.94	2.85	2.84	2.97	n.s.
Impulsiveness (Chronbach's α = 0.75)	3.12	2.82	3.28	3.41	d > a > c > b
Habitual (Chronbach's α = 0.80)	5.46	5.31	5.31	5.50	n.s.
Involvement (Chronbach's α = 0.95)	4.77	5.29	5.04	4.33	b, c > a > d
Ecological consciousness (Chronbach's α = 0.84)	4.28	4.64	4.42	4.00	b > a > c > d

Note. Different letters (a, b, c, d) indicate significantly ($p < .05$) different average scores than the segment equal to that letter. ANOVA and Bonferroni post hoc test were used.

impulsiveness than avid consumers. Moreover, they display higher involvement and ecological consciousness compared to infrequent consumers. The frequent consumer is the "regular Joe", meaning that there are no differences in terms of sociodemographic characteristics for this segment.

4.2. Segment B: Avid fish consumers (18 %)

This segment represents the smallest group of the most ardent and dedicated fish consumers. Avid consumers consume more fish than all other segments, including both pre-packaged and fresh fish. It is particularly noticeable for the latter category, where they consume more than all other segments. They show a strong inclination towards perfectionism, brand consciousness, novelty-seeking, and recreational activities. Like occasional consumers, this segment scores higher than the other two segments in terms of involvement and ecological consciousness. Consumers in this segment are older (59 % over 60 years old and 12 % under 40) and live more often in metropolitan areas (58 %). Few in this segment live in large cities (19 %). There are no differences in terms of income, gender, or education.

4.3. Segment C: Occasional fish consumer (24 %)

The occasional consumer segment consumes fish less frequently than avid and frequent consumers but more often than infrequent consumers. They prefer shopping for fresh fish at fish mongers and supermarket counters. The occasional consumer group comprises a larger proportion of high-income individuals (55 % with over 30 k SEK in monthly income). This preference aligns with their inclination toward consuming fresh fish, which is typically more expensive. They display similarities with avid consumers in terms of perfectionism but are more impulsive. Additionally, they exhibit higher levels of novelty-seeking and recreational orientation than infrequent consumers. They also share similar food involvement with avid consumers, but their ecological consciousness is higher than that of infrequent consumers.

4.4. Segment D: The infrequent fish consumers (28 %)

The infrequent fish consumer segment constitutes the second-largest group and displays relatively lower fish consumption compared to other segments. When consuming fish, they prefer pre-packaged products. This segment consists of relatively younger individuals (41 % under 40 years old and only 22 % over 60) with lower incomes (58 % under 30 k SEK per month), and they are more likely to live in small cities or rural areas. Additionally, a smaller proportion of this segment holds a university degree. The infrequent consumers exhibit lower scores on most decision-making styles, except for price sensitivity (3.50) and impulsiveness (3.41). They are more price-conscious than avid and occasional consumers and more impulsive than frequent and avid consumers. Furthermore, this segment displays lower food involvement and ecological consciousness compared to all other segments.

5. Discussion and conclusion

The current study contributes to the seafood consumer literature by showing how fish consumption frequency and consumption (i.e., of cod and salmon) and of different fish product forms (i.e., pre-packaged and fresh) effectively form consumer segments. The study also shows how consumers' decision-making styles (CDMS), involvement in food, environmental consciousness, and sociodemographic variables effectively discriminate between consumer segments, adding to the understanding of what characterizes the seafood consumer.

The results clearly reveal that segments do exist regarding fish consumption. In response to Caruzzi et al's (2015) call, the results produce and profile consumer segments with strong fish-eating habits (the frequent and avid consumers), medium strong fish-eating habits (the occasional consumer) and relatively weak fish-eating habits (the infrequent consumer). Previous segmentation studies based on fish consumption frequency have utilized simple frequency measures of fish consumption in general (e.g., Birch & Lawley, 2014; Sacchettini et al., 2021). This study employs a more finely woven and intricate measure to segment consumers, encompassing the most consumed fish species in the Swedish market (namely, cod and salmon), alongside consumption

Table 5
Socio-demographics.

	Sample	Frequent (a)	Avid (b)	Occasional (c)	Infrequent (d)	*Chi-square tests*
Gender						$\chi^2 = 6.94$ (0.074)
Female:	48 %	51 %	50 %	45 %	45 %	
Male:	52 %	49 %	50 %	55 %	55 %	
Age						$\chi^2 = 151.98$ (0.000)
Under 40 years old	24 %	25 %	*12 %*	23 %	**41 %**	
40 – 59 years old	35 %	37 %	29 %	37 %	37 %	
Over 60 years old	41 %	38 %	**59 %**	40 %	*22 %*	
Education						$\chi^2 = 11.25$ (0.081)
Primary/lower secondary school:	5 %	4 %	5 %	3 %	5 %	
High school/ vocational school:	51 %	50 %	46 %	48 %	55 %	
University degree:	44 %	45 %	49 %	49 %	*40 %*	
Residency						$\chi^2 = 51.06$ (0.000)
Small city or countryside	27 %	27 %	23 %	23 %	**32 %**	
Large city area	27 %	29 %	*19 %*	27 %	**33 %**	
Metropolitan area	46 %	44 %	**58 %**	51 %	*36 %*	
Personal income per month						$\chi^2 = 17.59$ (0.001)
Low (SEK < 30 k):	52 %	50 %	50 %	*45 %*	**58 %**	
High (SEK > 30 k):	48 %	50 %	50 %	**55 %**	*42 %*	

Note. The percentages in bold (**XX%**) are significantly ($p < .05$) higher than the average for all segments. The percentages in italics (*XX%*) are significantly ($p < .05$) lower than the average for all segments. Chi-square tests with post-hoc tests were performed (adjusted standardized residuals).

frequency across various product forms (specifically pre-packaged and fresh). This approach yields a more intricate and comprehensive depiction of the segments, thus facilitating a more accessible engagement for seafood product marketers, policymakers, and other proponents of seafood consumption. Hence, this study contributes to the literature on seafood consumer behaviour.

This study contributes to addressing the call made by Saidi et al. (2023) for a clearer depiction of consumers' decision-making processes when purchasing and consuming fish. Decision styles encompass acquired habits (Thunholm, 2004), and the study distinctly illustrates that the various segments ground their fish consumption in distinct acquired habits. This phenomenon has not been evidenced in prior research on the behaviour of fish consumers.

The study also demonstrates that involvement with food significantly influences the categorization of an individual as a particular type of fish consumer. This observation aligns with the contentions of both Carluzzi et al. (2015) and Saidi et al. (2023), who advocate for an enhanced comprehension of the significance of involvement, encompassing both food in general and specifically the domain of fish consumption. The empirical findings in this study correspondingly corroborate prior scholarly inquiries (Verbeke & Vackier, 2005).

Previous scholarly investigations into sustainable consumption (for a comprehensive overview, see Biasini et al., 2021) have prominently relied upon quantitative methodologies, frequently employing statistical techniques such as correlation and regression analyses. These approaches, while valuable, possess inherent limitations in their capacity to primarily discern causal relationships pertaining to specific outcomes (such as those related to health, environment, food quality), as well as broader socio-economic dimensions of sustainability. Notably, these analyses consider interrelationships with other pertinent factors, including but not limited to quality and price. Consequently, the findings from these inquiries exhibit considerable heterogeneity and underscore the multifaceted consumer attitudes towards factors like eco-labelling, as evidenced by studies conducted by Jaffry et al. (2004) and Mauracher et al. (2013). In a departure from the prevalent variable-centric approach, the present study introduces an alternative perspective. It unveils significant associations between individuals' ecological consciousness and their frequency of fish consumption. By adopting this person-oriented approach, the research increases our understanding of environmentally conscious consumption patterns. Additionally, it sheds light on the intricate dynamics of who is more predisposed to engage in such environmentally conscious consumption practices.

Socio-economic factors have been demonstrated in numerous prior studies to play a role in comprehending the behaviour of fish consumers (e.g., Verbecke & Vackier, 2005; Olsen, 2003). This present study similarly aligns with previous research and contributes to the cumulative body of knowledge concerning the significance of socio-economic factors.

Our findings offer novel insights into the underlying motivations driving consumers who are inclined towards fish consumption. Moreover, we delve into the intricate interplay of decision-making processes and traits at an individual level, serving to differentiate various consumer segments. The selection of distinct domain-specific traits for inclusion in this study is both firmly rooted in the realm of social psychology and food marketing literature (Thunholm, 2004; Saidi et al., 2023) and methodologically robust in terms of construct assessment.

Several strengths bolster the validity of this study. First, compared to many other segmentation studies this study uses a national sample (e.g., Budhathoki et al, 2023; Risius et al., 2019; Vanhonacker et al., 2010). Additionally, our adoption of an "item-clustering" approach, as opposed to the conventional "factor-clustering" technique (Dolnicar & Grün, 2008), further enhances the methodological rigor of this research. The substantial size of our sample instils confidence in the reliability and generalizability of our findings. This robust foundation reinforces the practical implications of our study for fish producers and marketers. For instance, the resultant segment sizes offer a more reliable representation of the authentic proportions of consumers within the distinct segments.

5.1. Policy and managerial implications

As stated by Carlucci et al. (2015), the levels of fish consumption do not reach recommended targets in many countries. For policy advisors, for example public health authorities, the knowledge of these consumer segments is helpful to develop accurate, tailored communication campaigns or policies for increased fish consumption. For businesses, it gives opportunities to target specific groups of the market and understand which consumer decision making styles (CDMS) that drives their consumption or if for example eco-labelling (linked to ecological consciousness) is of importance.

Targeting infrequent fish consumers can increase fish consumption substantially, since they consume lower levels of all types and forms of fish. This segment is younger, has lower incomes, a lower education level, and resides less often in the metropolitan areas. The importance of age and income is similar to results found in previous studies of fish consumption (see Verbecke & Vackier, 2005; Olsen, 2003). Already with these basic facts about socio-demographics, policy measures and campaigns could be tailored by policy makers (and businesses). The infrequent consumer is also more price sensitive and impulsive, which lends

itself to, for example, classic in-store communication campaigns offering attractive deals on pre-packaged fish (which is the preferred product form for infrequent consumers). As CDMS are learned habits and somewhat stable according to Scott & Bruce (1995) and Thunholm (2004), policy makers and businesses can expect, for example, infrequent fish consumers to have this initial behavioral predisposition (more price sensitive and more impulsive). Another CDMS that is important for practitioners targeting infrequent consumers (and the other segments as well) is the habitual, brand-loyal purchasing orientation. This CDMS scores high for all segments, meaning that consumers might not spend much time considering new types of fish, brands, or product forms in the store. Their processing of information in the store would, in line with Hunt et al. (1989), be drawn to recognizable brands and previous habits. This is also in line with previous research on fish consumption stating that consumer decisions are often routine-based due to habits, lack of information, or indifference (Rönnerstrand, Armbrecht, Lundberg, Sundell, 2020; Taghikhah, Voinov, Shukla, & Filatova, 2021). We know that breaking habits is crucial to achieve more sustainable consumption in general (White, Habib, & Hardisty, 2019), e.g., a higher level of fish consumption that would improve public health. Again, this would lead us to recommend highly visible in-store communication campaigns and offers, which could help create new habits of fish consumption.

However, perfectionism and high-quality consciousness also scores high for all segments, but particularly for avid and occasional fish consumers who more often purchase fish at fish mongers' and at manual counters in supermarket where knowledgeable staff is available to guide the consumer. The high levels of perfectionism might speak in favour of using certifications and labelling ensuring high-quality products (Sigurdsson et al., 2022). In terms of eco-labelling, this might be most important for avid consumers, but also for frequent and occasional consumers, which scores relatively high on environmental consciousness and might thus belong to the group of consumers that according to e.g., Jaffrey et al. (2004) and Mauracher et al. (2013) are interested in, and prefer, eco-labelled fish. In sum, the segments with strong or medium strong fish-eating habits (all but infrequent consumers) would demand more information about the products, quality ques, and engagement which favours e.g., labelling or guidance from knowledgeable staff or other information sources. This argument is also strengthened by the scores on involvement in food. Avid and occasional consumer have the highest scores, highlighting that those that consume fresh fish at manual counters or with fish mongers are more involved, while frequent consumers still have a significantly higher involvement score than infrequent consumers even if they rarely purchase fresh fish. These segments (in particular avid and occasional consumers) are more involved and would need e.g., more detailed information and the possibility of more engaging consumer experiences (see Zaichkowsky, 1985). To sum up, the relationship between involvement and fish consumption seems to have a stronger relationship with product form (fresh and pre-packaged fish) and only partly to the quantity consumed.

5.2. Limitations and future research

Even if the sample used in this study is based on a large national survey, it is geographically limited to Sweden and contains an over-representation of highly educated respondents. The results in a Swedish context could be transferrable to other similar markets (e.g., in other Nordic countries or Western Europe) with caution. However, to segment consumers based on the quantity and type of fish consumed is a methodology that could also be applied in other contexts.

There are additional factors that could potentially be employed to profile segments, which were not encompassed within this study. Some recommendations include incorporating measures of consumer attitudes and norms. Research has consistently demonstrated the significant impact of attitudes on fish consumption behaviour in prior studies (López-Mas, Claret, Reinders, Banovic, Krystallis, & Guerrero, 2021). A similar trend has been observed in relation to social norms (Petereit et al., 2022), for instance. Food choices can entail both favourable and adverse consequences. Public policy interventions aimed at influencing consumer choices in the realm of food employ diverse communication methods to apprise consumers about the potential consequences of consuming specific types of foods (Dolgopolova, Li, Pirhonen, & Roosen, 2021). For instance, exposure to information concerning the health and environmental effects of salmon farming and fishing is anticipated to exert an influence on attitudes and intentions, as well as their interrelation with individuals' pre-existing knowledge (i.e., antecedent behavioural beliefs) (Lindell & Perry, 2012; Rizzi, Annunziata, Contini, & Frey, 2020; Witzling, Shaw, & Amato, 2015). Thus, exposure to either positive or negative information is considered a pivotal contextual factor capable of modifying the primary predictors of intentions and behaviours, explained in terms of behavioural, normative, and control beliefs (Lee, Bae & Kim, 2020; Menozzi, Sogari, Simeone, Czajkowski, Zawadzki, Bazoche, Lucas, Mora, Aanesen, 2023).

Lastly, it is also important to point out that the data in this study was collected a couple of months before the COVID-19 pandemic broke out. Data on dietary behaviour during the pandemic indicated a decrease in fresh fish and seafood consumption (Zupo, Castellana, Sardone, Sila, Giagulli, Triggiani, Cincione, Giannelli, & De Pergola, 2020). Thus, it would be of interest to follow up and see if any permanent behavioural changes have occurred.

Ethical statement

The study was explained to consumers in the online questionnaire. They were informed that they would participate in the survey using their personal smartphone or computer, that all data would be de-identified and only reported in total. All participants acknowledged an informed consent statement in order to participate in the study.

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CDMS dimensions	Items
Perfectionism	In purchasing food products getting very good quality is very important to me
Perfectionism	In general, i usually try to buy the best food products overall quality
Perfectionism	I make special effort to choose the very best quality food products
Brand	The well-known national food product brands are best for me
Brand	The more expensive food product brands are usually my choices
Brand	The higher the price of a food product, the better its quality
Brand	I prefer buying the best-selling food product brands
Novelty	I purchase the trendy food product items
Novelty	I pay attention that my nutrition is in line with trends
Novelty	It is very important to me to buy food products that are in line with trends
Novelty	When buying food products, it is fun to buy something new and exciting
Recreation	Going shopping food products is one of the enjoyable activities of my life
Recreation	Shopping at the grocery stores wastes my time (r)
Price	I buy food products as much as possible at sale prices
Price	The lower price food products are usually my choice
Price	I look carefully to find the food products of the best value for the money
Impulsiveness	I should plan my shopping of food products more carefully than I do
Impulsiveness	I am impulsive when purchasing food products
Impulsiveness	Often, I make careless food product purchases I later wish I had not
Confused	There are so many food product brands to choose from that often I feel confused
Confused	Sometimes it's hard to choose which grocery stores to shop
Confused	The more I learn about food products, the harder it seems to choose the best
Confused	All the information I get on different food products confuses me
Habituation	I have favorite food product brands I buy over and over
Habituation	Once I find a food product or brand I like, I stick with it
Habituation	I go to the same grocery stores each time I shop
Habituation	I change food product brands I buy regularly (r)

Note. Items that are reversed are indicated with "(r)".

CRediT authorship contribution statement

John Armbrecht: Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Erik Lundberg:** Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Kåre Skallerud:** Conceptualization, Investigation, Methodology, Writing – review & editing.

Declaration of Competing Interest

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

Data availability

Data will be made available on request.

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