Exploring seafood choices at the point of purchase among a sample of Swedish consumers

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Abstract

Purpose – Seafood consumption in Sweden is below the national recommendations and limited to very few species. This study aims to explore the factors shaping seafood choices at the point of purchase among a sample of current consumers in Sweden, and examines their attitudes regarding seafood consumption more broadly.

Design/methodology/approach – Convenience sampling was used to recruit consumers planning to purchase seafood at a supermarket in Sweden. Participants' shopping trip was recorded using wearable eye tracking glasses and, upon completion, semi-structured interviews were conducted using a cued retrospective think aloud method. This exploratory study integrates qualitative data ($N = 39$) with eye tracking data ($N = 34$), to explore how seafood choices unfold when consumers purchase at the point of purchase.

Findings – Purchases were mostly restricted to familiar seafood species. Four interlinked main themes were identified from thematic analysis of the interview data: Ambivalence, Nice and Necessary, Proficiency with

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Data availability statement: The data that support the findings from this study are available upon request.

Ethics statement: The study was assessed for compliance with national ethical standards through an internal process at RISE Research Institutes of Sweden and was approved at the Department of Material and Surface Design. All participants provided informed consent, and all data was collected anonymously. Permission from the store manager was obtained before data collection.

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Seafood and External Influences. Sustainability information (e.g. certifications) faced strong competition from other visual elements at the point of purchase, receiving less attention than product imagery and pricing information.

Originality/value – This study is the first to explore the factors shaping seafood choices of current consumers at the point of purchase. The unique approach, combining explicit and implicit measures, enriches understanding of the factors influencing seafood choices and how these may interrelate. The results are valuable for the industry and contribute to the literature by identifying possible routes to improve seafood sustainability communication.

Keywords Seafood consumers, Point of purchase, Eye tracking, Consumer behaviour, Seafood sustainability

Paper type Research paper

1. Introduction

Solutions to the challenge of providing healthy and environmentally sustainable foods to a growing population are urgently required. Consumers can play a role in mitigating the environmental impact associated with the food industry through dietary change, most critically by reducing consumption of terrestrial animal-derived foods (Poore and Nemecek, 2018). However, research has mainly focused on plant- (Farmery *et al.*, 2017) and insect-based products as sustainable alternatives (Onwezen *et al.*, 2021). The role of aquatic foods in this transition has been overlooked, but its importance is being increasingly acknowledged (Blue Food Assessment, 2021; Koehn *et al.*, 2022). This highly diverse food category has the potential to support sustainable diets while providing high nutritional value, in particular when replacing meat consumption, as many seafood species outperform terrestrial animal-derived foods in sustainability terms (Gephart *et al.*, 2021; Hallström *et al.*, 2019). This transition strategy may also appeal to consumers who are resistant to eschewing animal products entirely.

As in other European countries (Altintzoglou *et al.*, 2011), current consumption in Sweden does not meet the guidelines set by public health authorities and is also limited to very few species (Borthwick *et al.*, 2019). In addition to the health benefits of seafood consumption, which typically outweigh the potential negative effects (EFSA, 2014), promoting diversification can provide benefits from a nutritional perspective (Bernhardt and O'Connor, 2021) and enhance the resilience of food systems (Troell *et al.*, 2014) while reducing pressure on overfished species (Witkin *et al.*, 2015). Given the large variability across seafood groups, efforts should be made to direct consumption towards those with high nutrient density but low greenhouse gas emissions, such as small pelagic species and bivalves (e.g. mussels, oysters) (Bianchi *et al.*, 2022).

Previous studies have identified a myriad of factors that influence consumers' choice of seafood, although a better understanding of how these may contribute to the purchase behaviour is needed. Intrinsic sensory aspects and health beliefs are known to be crucial factors, acting as both drivers and barriers to seafood consumption (Carlucci *et al.*, 2015; Saidi *et al.*, 2023). In addition, extrinsic characteristics such as price, origin, labels, production method, sustainability and animal welfare have been extensively investigated, as well as other relevant factors such as sociodemographic characteristics, situational variables (e.g. availability) and psychological factors related to attitudes and beliefs (Cantillo *et al.*, 2021; Saidi *et al.*, 2023). Some degree of preference and willingness to pay more for healthier and eco-friendly seafood options has also been identified (McClenachan *et al.*, 2016; Menozzi *et al.*, 2020).

Certifications can help guide consumers towards more sustainable seafood choices at the point of purchase, reducing the environmental impact of aquaculture and capture fisheries (Gephart *et al.*, 2021). Nonetheless, such labels are often discussed as both a problem and a solution in public debates and the media (Van Holt *et al.*, 2018). In Sweden, recognition of the main seafood labels (i.e. Marine Stewardship Council (MSC) and Aquaculture Stewardship

Council (ASC)) remains rather low, which undermines their usefulness since this is reliant on consumers recognizing and understanding them (Jonell *et al.*, 2016). Limited understanding of labels and a lack of in-store guidance could act as barriers to purchasing eco-labelled products (Winson *et al.*, 2021).

Most previous studies have investigated seafood preferences and behaviour using mainly self-reported surveys, which may not account for how decisions unfold at the point of purchase. Explicit and self-reported measures of pro-environmental behaviours could lead to desirability bias, and given that there might be inconsistencies between what consumers say and do (Oliphant *et al.*, 2020), it has been suggested that "more research should be conducted to bridge the intention-behaviour gap" (Carlucci *et al.*, 2015). As visual attention is a precursor of label use and product purchase, one way to address this gap is to complement explicit data with implicit measurements of actual behaviour using for instance eye tracking. Previous studies have incorporated eye tracking to gain a better understanding of consumers' perception of seafood, for instance to evaluate the perceived healthiness of fish products (Mitterer-Daltoé *et al.*, 2014), and to validate co-created packaging designs for fish products (López-Mas *et al.*, 2022). However, food-related eye tracking studies have typically been conducted in the lab, raising concerns regarding ecological validity (Bialkova *et al.*, 2020). Eye tracking can also be utilized in a retail context to examine the impact of information on product selection (e.g. Bartels *et al.*, 2018). In combination with self-reported data, eye tracking is a valuable tool for assessing how visual information affects behaviour, with researchers calling for additional studies in real shopping situations (Ma and Zhuang, 2021).

This study aims to explore the factors shaping seafood choices among a sample of current Swedish consumers when purchasing at a retail environment, and examine attitudes towards seafood consumption more broadly. The combination of qualitative and eye tracking data facilitates identifying the elements that attract consumers' visual attention during purchase and increases understanding of their thought process in detail. To our knowledge, this is the first study to explore seafood choices in a retail environment using a combination of implicit and explicit measurements. The following research questions are addressed (RQ):

RQ1. What are the factors that shape consumers' seafood choices in a retail environment?

RQ2. What is the role of seafood sustainability information at the point of purchase?

RQ3. What are consumers' attitudes towards seafood consumption and the dietary guidelines?

2. Methodology

2.1 Research approach

2.1.1 Participants and recruitment. Thirty-nine consumers (Table 1) were recruited at a supermarket in Gothenburg, Sweden. Participants were informed that the goal was to understand how they purchased products in the store, specifically seafood (of any format: fresh, frozen or other), but no further details were provided. The recruitment of participants continued until data saturation was determined to have been reached (Saunders *et al.*, 2018), after discussion among three authors (EC, ESC and PB).

The study was conducted in November 2021, throughout nine consecutive days. A temporary stand was placed to intercept shoppers upon entrance to the store, using a large sign to attract those that had an intention to purchase seafood (fish and/or shellfish) at that specific time and location (convenience sampling). Prospective participants requiring corrective glasses to do their shopping and those with visual impairments were screened out

	Category	N	%
Gender	Female	17	43.6
	Male	22	56.4
Age group	18–30	10	25.6
	31–50	14	35.9
	51–70	13	33.3
	Over 71	2	5.1
Children in the household (0–16 years old)	No children in the household	29	74.4
	Children in the household	10	25.6
Frequency of consumption of seafood (reported)	Less than once a month	1	2.6
	Once every 2–3 weeks	3	7.7
	Once a week	13	33.3
	2–3 times a week	19	48.7
	More than 3 times a week	3	7.7

Source(s): Authors work

Table 1. Summary of demographic data from the participants in the study ($N = 39$)

to avoid disturbances during the eye tracking task. Only consumers able to communicate fluently in English (self-report) were invited to participate to ensure that interview questions were understood correctly.

2.1.2 Procedure and equipment. Tobii Pro Glasses 3 (sampling rate of 50 Hz) were used to collect the visual and behavioural data – from entrance until exit of the store – including sound to capture potential verbal interactions between consumers and staff. After providing informed consent, the eye tracking glasses were set up with the help of the interviewer (to verify good visibility and participant comfort), who also completed a one-point calibration to ensure accuracy. Before entering the store, and to habituate participants in wearing the equipment, they were asked demographic questions (Table 1) and their motivation for purchasing seafood. Participants were then instructed to complete their shopping trip as they had intended, including purchases from other categories.

2.1.3 Interviews. Upon participants' completion of their shopping trip, semi-structured interviews (10–15 min) were conducted with the help of an interview guide (also available in Swedish) and recorded for offline transcription. This ensured common understanding and consistency in data collection, while remaining open to relevant spontaneous topics.

Participants were first asked about their considerations when taking the purchase decision and spontaneous comments were followed up using a retrospective think aloud method (RTA, Tanner *et al.*, 2019). During the RTA, the eye tracking video was replayed to participants using Glasses 3 Controller software (with the footage from the sections where seafood products were selected, from entrance until exit from the relevant store section). The RTA allowed participants to enrich their answers regarding the motives for their choices. The remainder of the interview addressed:

(1) Reasons for purchasing the product(s); whether the item had been purchased previously; their considerations when making the purchase decision; any other seafood products that were considered but not purchased and why,

(2) Perceived importance of the environmental impact of seafood production and sustainability of purchased products; recall of sustainability labels; recognition and trust when exposed to three labels (MSC, ASC, as well as KRAV - a Swedish environmental food label),

(3) Future intentions regarding seafood consumption; strategies that could help them achieve their consumption goals,

(4) Awareness of the seafood dietary guidelines and attitudes towards it.

These questions cover the following concepts which, in turn, align with the research questions posed: factors that shape seafood choices (RQ1), perceptions of sustainability and labels (RQ2), attitudes towards seafood consumption and the current guidelines (RQ3). Participants were compensated with a gift card.

2.2 Data processing and analysis

2.2.1 Eye tracking and behavioural data. Five of 39 participants were excluded from the eye tracking analysis due to technical issues leading to data loss, resulting in a final data set of 34 participants. For the visual and behavioural analyses, only the sections of the shopping trip where seafood products were purchased were selected (across multiple formats: fresh counter and other pre-packaged seafood categories: refrigerated, frozen and canned) and included the time from entrance to exit (e.g. from the first fixation on the relevant seafood section until the last fixation). The selected sections were reviewed for each participant, frame-by-frame and mapped into predefined visual areas of interest (AOIs) within each category. Seafood categories were determined by where participants purchased from, whereas AOIs were selected *a priori* based on which elements could be relevant during purchase (e.g. price, product image, certifications). Claims conveyed through packaging (e.g. nutritional information), were mapped within the "product information" area of interest. No adjustments to the layout of the seafood sections were made during data collection, and all elements were already present at the store. Data was mapped using Tobii Pro Lab software Analyzer edition (version 1.181, Copyright © 2021 Tobii AB) and "Tobii I-VT Attention Filter" was used to determine fixations, with the velocity threshold parameter set to 100°/s. Only instances in which elements could be clearly identified from the video were used for mapping, discarding ambiguous cases or those not fitting into the predefined AOIs.

For each seafood category (fresh and other), repeated measures ANOVA was used to compare the total fixation duration across the AOIs using SPSS version 28 at an alpha level of 5%. In both cases, sphericity from Mauchly's test was violated, thus the Greenhouse-Geisser correction was applied. Where significant difference in AOIs were found, Bonferroni corrected post-hoc comparisons were performed.

2.2.2 Interviews. The recorded audio material from the interviews was first transcribed by one researcher (EC). Thematic analysis (Braun and Clarke, 2006) was employed to evaluate the data and to extract major codes and overarching themes. After familiarization with the data through both listening to the audio recordings and reading the transcripts, initial codes were independently generated by two researchers (EC and ESC). To connect the analysis process with the research questions, categorization of codes into drivers and barriers was used as a general guideline during initial coding. Following this, a common codebook with codes and definitions was generated across two rounds of joint evaluation. Initial candidate themes were then investigated independently by the two coders, and further revisions were carried out in two separate sessions. The themes and data were subsequently discussed by three authors (EC, ESC and PB), after which the final thematic structure was generated. The authors would like to disclose their dietary preferences (one pescatarian and three flexitarians) as transparency in thematic analysis is critical (Braun and Clarke, 2006).

3. Results

3.1 Eye tracking and behavioural data

Participants spent a median of 9 min in total shopping in the store, and the time spent varied across categories: fresh ($N = 21$; median = 3.31 min, IQR = 2.35–4.09 min), frozen ($N = 11$; median = 1.05 min, IQR = 0.71–1.40 min), refrigerated ($N = 6$; median = 0.60 min, IQR = 0.30–0.94 min) and canned ($N = 1$; 0.92 min). Salmon was the most frequently purchased product (23 times) followed by shrimps (10 times).

Data were grouped separately for the fresh counter and remaining aggregated categories (refrigerated, frozen and canned). Table 2 summarizes the share of participants who viewed, and the share of total time spent viewing, each AOI for the fresh and other categories.

For fresh seafood (see Appendix Figure S1a), a significant effect of AOI on fixation duration was detected [$F(1.618, 32.369) = 38.283$, $p < 0.001$]. The total fixation duration on products was significantly greater than for any other areas: brochures and recipes ($p < 0.001$), price and name ($p = 0.006$). A heatmap visualization of the aggregated attention distribution at a section of the fresh counter illustrated these differences (Plate 1). No other significant differences between AOIs were detected.

A significant AOI effect [$F(2.271, 34.059) = 21.637$, $p < 0.001$] was also found for the remaining aggregated categories (see Appendix Figure S1b). A significantly higher fixation duration on product imagery than certificates ($p < 0.001$), product information ($p < 0.001$), price ($p = 0.009$) and product name ($p = 0.028$). No further significant differences were found between AOIs.

3.2 Interviews

Four main interrelated themes, and associated subthemes, were identified through thematic analysis: *Ambivalence*, *Nice and Necessary*, *Proficiency with Seafood* and *External Influences* (Table 3). The thematic map (Figure 1) visualizes the themes and how they were interrelated. In the sections that follow, these are exemplified using anonymized quotes (Table 4).

Table 2.
Visual elements and metrics for fresh counter vs other seafood categories (aggregated over refrigerated, frozen and canned)

Area of interest (AOI)	Share of participants who viewed (%) *	Share of total time spent (%) *, fixation duration
Fresh counter		
Product	100.0	63.1
Price and name[§]	100.0	29.4
Bömlo brochure	76.2	2.7
MSC brochure	90.5	2.4
Recipes	42.9	2.3
Other seafood categories (refrigerated, frozen and canned)		
Product imagery	100.0	48.3
Price	93.7	27.3
Product name	100.0	20.7
Product information	37.5	2.0
Certification	31.2	1.7

Note(s): *These numbers are rounded and do not sum to 100

[§] Note that at the fresh counter, the "price and name" tag did not facilitate distinguishing between these two elements due to its small size, and also included production method information as well as, in some cases, the MSC acronym

Source(s): Authors work

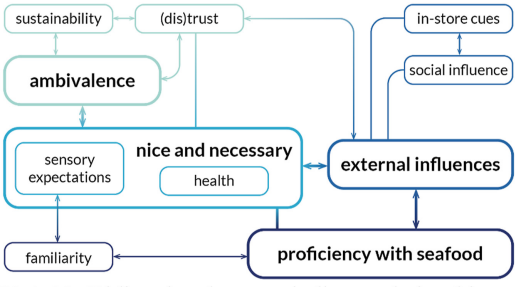
Note(s): Data was defined from the entrance to the counter until exit. Relative fixation duration (relative to the sum of all fixation durations), using attention filter Tobii Pro IV-T Filter with the velocity threshold parameter set to 100°/second. Automatic color settings, opacity set to 80% and radius 75 px
Source(s): Authors work

Plate 1.
Heatmap of the right section of the fresh counter (N = 21), showing visual attention ranging from low (green colour) to high (red colour)

Theme	Sub-theme(s)	Codes
Ambivalence	Sustainability	Internal conflict, compromise, knowledge, environment, climate, certification/label, eco, local, production method, farmed vs wild, species, overfishing, bycatch, feed, transportation, animal welfare, alternative to seafood
	(Dis)trust	Label, documentary, fishing industry, scepticism, companies, store, staff, sponsored
Nice and Necessary	Sensory expectations	Appearance, fresh, enjoyment, fresh vs frozen
	Health	health, variety, antibiotics, chemicals, colourants
Proficiency with Seafood	Familiarity	Convenience, habit, food preparation, planning, recipe, tradition, staple, special occasion
External Influences	Social influence	Staff, friend, family, other shoppers
	In-store cues	Brand, price, quality, context, origin

Source(s): Authors work

Table 3.
Themes and coding



Note(s): Bidirectional arrows indicate relationships between (sub)themes
Source(s): Authors work

Figure 1.
Thematic map, showing the underlying main four themes and sub-themes identified using thematic analysis

Theme	Sub-theme(s)	Quote	Age group and gender
Ambivalence		*"I would rather feel like I want to eat more fish, but it feels like it's better to eat less fish because of the news you hear about it"*	18–30 years old, male
		"If there was another better option for my diet, I would definitely not buy fish because I am aware of the fish industry and I don't like it that much. So it's kind of a dilemma"	18–30 years old, female
	Sustainability	*"Sustainability is important but, after seeing this documentary Seaspiracy, I mean you get disappointed (. . .) you know that these labels are quite corrupted. I'm very sceptical to the labels"*	18–30 years old, female
		"I don't know how this salmon is bred, if it's in big casquets . . . because it's not wild salmon, that would be the best."	51–70 years old, female
	(Dis)trust	*"We looked at quite a lot of documentaries about seafood. I really wanted to have MSC certified fish, that's one of the things I've been looking for (. . .) We usually buy the seafood here, I really like that they have . . . for example the salmon without any antibiotics"*	18–30 years old, female
		"I know that my choice doesn't really matter since the MSC label is basically nothing, I learnt that MSC company is funded by the big fishing industries, so they are paying the fisheries to label their own products, and I find that a bit . . . it's a very subjective judgement what is sustainable or not. I thought MSC was the great thing (. . .) but now I found out that MSC isn't as good as I thought it was, so I look at the weight and the price more"	18–30 years old, male
Nice and Necessary		*"It tastes good and it's still really good, they say it has benefits with fats and such. (. . .) It is hard to find alternatives that tastes as good and it is good for the body, I don't know of any alternatives"*	18–30 years old, female
		"We still buy it because we don't really have a choice for it, if something was vegetarian but tasted like fish . . . but sometimes I think that fish tastes really good, we have tried something like a spread made of pea, but it doesn't taste like fish for me"	31–50 years old, male
	Sensory expectations	*"For the shrimps: do they look fresh? I'm very picky about the colour of the antenna to see if they are not grey. Long antennas, and if the shrimp itself is pink, then I know that they have not been frozen"*	51–70 years old, female
		"If it looks good. Some are bloody and some have a lot of fat, this one didn't have that (. . .) When I was waiting, I looked to see what they had and they had weird stuff [crab claws]" (. . .) I was looking at the oysters and mussels too but didn't consider buying them, I was thinking I wonder how fresh they are, they need to be really fresh. It's at [supermarket chain], it's not at a restaurant (. . .) I don't know how safe it is"	18–30 years old, female
	Health	*"A lot of good vitamins, it contains vitamins that are good to eat (. . .) salmon is because of the fat. I like shrimps because you have selenium"*	51–70 years old, male
		"I just don't want anything that could be caught in the wild or contain toxins, the whole Baltic sea is kind of like toxic, and it's important to take care of that, the wild is unpredictable what it actually contains . . . dioxins, mostly heavy metals. There is an issue with the fishing industry and they can brand it as North Atlantic but it could be from the Baltic. That's pretty much poisonous and I don't want cancer"	31–50 years old, male

Table 4.
Anonymized example quotes corresponding to each theme and sub-theme

(*continued*)

Theme	Sub-theme(s)	Quote	Age group and gender
Proficiency with Seafood		*"It is a little bit lack of knowledge about how to prepare fish in a quick way in the evening (. . .). It is easier just to take some meat and pasta, it's more demanding to cook fish"*	51–70 years old, female
		"I was looking at the mussels, I know the kids like it but it takes time. Is it worth it? It takes more time to cook than saithe, you have to clean them and think differently. No. Fast and easy, saithe"	51–70 years old, female
	Familiarity	*"Only salmon. I think it's the easiest to cook, you don't need a lot of things. It's tasty just to grill it. I feel that it includes the healthiest vitamins and good fat, things you need"*	18–30 years old, Female
		"If I improve my cooking skills I would try kinds of seafood, other than salmon . . . like white fish or other fish"	31–50 years old, female
External Influences		*"My boyfriend said "only salmon", so we didn't buy white fish, but I thought it looked really nice"*	18–30 years old, female
		"I was looking at fresh fish but then I realized I don't want to buy fresh fish today, because it would be just by myself. My wife doesn't eat it so I can't cook it for dinner (. . .). As long as my wife is at home I never buy fish. It's only when she is gone"	18–30 years old, male
	Social influence	*"I asked him (husband) if he wants, and he said no because he hates fish, I buy it anyway for myself." (husband intervenes): "I like it, but not from the Baltics. This is from the Baltics." "No, it is Nordic salmon. I know that beforehand, they also have . . . you see this? Information about the salmon, on the counter. Where it's from, why it is more expensive, and those sort of things. (. . .) I asked why this is more expensive, and they explained it to me and I read the brochure a couple of years ago"*	31–50 years old, female
		"I asked about the difference between that salmon and that salmon, the assistant said that one is much better and then I also got some information about it [brochure]. I was reading the information from the brochure."	18–30 years old, female
	In-store cues	*"I try to buy certified. I'm not sure what MSC means, but my understanding is that is better than without MSC so then we buy that"*	31–50 years old, male
		"I asked [the staff] about the origin, and it wasn't the best. All the salmon is farmed in Norway, not wild caught (. . .). I would go for wild caught, it is not fed with food that I don't know what it is, farmed fish is getting food to grow fast and get fatter"	31–50 years old, female

Source(s): Authors work

Table 4.

3.2.1 Theme 1: Ambivalence. Participants manifested Ambivalence (conflicting attitudes causing mental discomfort) towards seafood. This typically resulted from participants' positive attitudes towards seafood clashing with concerns about its environmental impact. Such Ambivalence could, in some cases, be resolved by limiting consumption frequency. Ambivalence became evident when participants were informed about the dietary guidelines, as some expressed uncertainty on whether these recommendations should be followed.

Two sub-themes were identified within the theme of *Ambivalence*: (1) *sustainability* and (2) *(dis)trust*.

(1) Sustainability

Overall, participants expressed awareness and interest in the environmental impact of seafood production, which evoked feelings of unease and discomfort. Subjective knowledge

was obtained from exposure to this topic from the news, documentaries and/or social media. Overfishing and concerns about the production method were perceived as important, and difficulties when making a choice from the consumer perspective were raised.

An important aspect highlighted by respondents was the perception of the seafood industry as unsustainable. Multiple participants provided detailed arguments on this and spontaneously mentioned being affected by documentaries such as *Seaspiracy*, a 2021 documentary film about the environmental impact of fishing.

Several respondents stated having reduced or intending to reduce their current meat and fish consumption in the future. Some respondents even self-identified as vegetarians despite having just purchased seafood products. This conflict was resolved by highlighting the nutritional benefits, while emphasizing the lack of suitable alternatives.

Concerns regarding farmed salmon (e.g. use of antibiotics, feed, colourants and animal welfare) were raised by several respondents. Wild salmon was often perceived as more sustainable, healthier and more natural compared to farmed. However, very few respondents reported having tried wild salmon due to its low availability.

(2) (Dis)trust

Trust (or the lack thereof) was detected towards labels, retailers and the industry more broadly. Participants expressed wanting to trust these actors, but some scepticism remained. Retailers were considered responsible for providing better alternatives and/or excluding red listed seafood. Although several respondents expressed concerns surrounding certifications, stating that their meaning was unclear, others trusted them and used labels as part of their decision-making process. Several respondents, however, mentioned being negatively affected by the media and consequently changing their behaviour.

Both recognition and trust varied across certifications. KRAV was interpreted as a traditionally Swedish label, recognized and trusted as an independent assessment by nearly all respondents. However, KRAV was not associated with seafood nor sustainability, rather with organic products. Most respondents recognized MSC, although some mentioned less objectivity due to associations with the fishing industry. ASC was perceived as similar to MSC, though it was less recognizable.

(Dis)trust was related to respondents' subjective knowledge about the environmental impact of seafood, namely overfishing. Distrust seemed to have an impact on attitudes towards the dietary guidelines, which were sometimes interpreted as biased.

3.2.2 Theme 2: Nice and Necessary. Participants held positive attitudes linked to the sensory experience and health benefits of seafood, which frequently emerged as joint drivers of consumption. Seafood was perceived as a source of protein with unique nutrients (Necessary), while sensory expectations towards familiar species such as salmon or shrimps were positive (Nice). As seafood was regarded as particularly difficult to replace (with substitutes either unknown, unavailable or sensorially unsatisfactory), this accentuated the sense of Ambivalence for some respondents.

Nice and Necessary was comprised of the subthemes: (1) *sensory expectations* and (2) *health*.

(1) Sensory expectations

Consumers' choices were often driven by sensory expectations resulting from familiarity and previous experience. Sensory modalities such as appearance, texture and taste were linked to quality and freshness, and were used as a point of reference during the selection of seafood products. Some participants manifested clear preferences towards fresh seafood, which was perceived as higher quality and used visual cues to assess freshness at the counter. Participants scanned the available seafood products while waiting to be attended, and generated expectations based on previous experience. Unfamiliar products were typically

deemed as less appealing. Sensory properties were often interrelated with health and safety beliefs, with context affecting their trust and the product's expected quality (e.g. supermarket vs restaurant).

(2) Health

Most participants cared about the impact of seafood choices on their health, with the main nutritional benefits being protein, vitamins, minerals and omega-3 fatty acids. On the other hand, health aspects related to seafood production or origin acted as a barrier. Several participants mentioned concerns about the presence of toxic contaminants in certain locations (e.g. Baltic Sea and Swedish lakes), which raised distrust towards the industry. This was evident for wild seafood, which seemed to be perceived as higher risk. In addition, respondents showed health concerns linked to the presence of heavy metals and chemicals. These concerns contrasted with the associated benefits and contributed to Ambivalence but were managed by limiting intake. Ambivalence was sometimes resolved by choosing options that were perceived as healthier: products labelled as "eco", produced using specific methods, or avoiding products from certain locations.

Salmon was a controversial species from a health perspective, influenced by information from media, news outlets and participants' social circles. Some believed that it was better to avoid salmon altogether for health reasons, and several respondents voiced concerns about farmed salmon from Norway. Rooted in these concerns, some established a preference towards what was typically referred to as the "better salmon", namely Bömlo (see Appendix Figure S2), a Norwegian farmed salmon brand. This was displayed at the fresh counter near the standard salmon and was supported by a brochure with claims (e.g. related to health, welfare and production method; see Appendix Figure S3). These claims seemed to resonate with respondents, who were often willing to pay a slightly higher price for it, and some appeared to trust it more than seafood labels such as MSC. One respondent even mentioned never buying Norwegian salmon, despite having just purchased Bömlo.

3.2.3 Theme 3: Proficiency with Seafood. Participants' knowledge of handling and cooking seafood emerged both as a barrier and a driver to frequent consumption and diverse purchasing. At times, seafood was considered suitable for special occasions, as it required a certain degree of planning. Consumers with low levels of proficiency perceived it as difficult to cook (e.g. compared to meat or pasta), while ready-to-eat seafood products were deemed more convenient and versatile, simplifying preparation time.

Planning seemed to be highly relevant for fresh seafood, linked to its high perishability. Participants often had a specific recipe in mind when purchasing from the fresh counter; while refrigerated, frozen or canned products were considered staple foods for those that were uncertain and did not plan for a specific time to consume it. Some ready-to-eat products at the fresh counter were associated with special occasions (e.g. fresh shrimps or smoked salmon), whereas other products (e.g. fish burgers) were considered convenient and suitable as an everyday meal. Respondents experienced at-home barriers related to perceived convenience and proficiency. For instance, although most respondents were relatively familiar with mussels, its consumption seemed to be rather occasional.

Several respondents sought inspiration at the fresh counter and advice from staff. Recipes were mentioned to be valuable, potentially helping to overcome low proficiency and related anxieties when buying less familiar species. In contrast, some respondents with higher levels of Proficiency with Seafood carefully described the recipe they had in mind.

Familiarity was identified as a subtheme within *Proficiency with Seafood*:

(1) Familiarity

The degree of familiarity that respondents have with certain species seemed to affect their proficiency and estimated preparation/cooking time. Common species (e.g. salmon) were

perceived as a staple food, more convenient and appropriate for use in multiple situations. Although other species were also examined at the point of purchase, and sometimes even considered, most respondents limited their seafood choices to familiar species and recipes. Familiar species were also connected to positive sensory expectations and health attributes. Nonetheless, some respondents disclosed their interest in challenging themselves and being eager to experiment with unfamiliar species.

3.2.4 Theme 4: External Influences. A range of External Influences guided consumers' intentions and decisions both before entering the store and at the point of purchase, for instance the presence of other people and information provided by external sources (e.g. social circles or media). In-store cues were often used as proxy indicators of quality that guided purchase decisions.

Two interrelated subthemes were found within *External Influences*: (1) *social influence* and (2) *in-store cues*.

(1) Social influence

Consumers' seafood choices were often influenced by the presence of other individuals and their preferences. Within households, social norms seemed to be established regarding which type(s) of seafood were acceptable. Some participants who were accompanied by others (e.g. family) considered their input and expectations critical, and mentioned this as a barrier. For instance, sensory disliking of seafood from a family member limited its perceived situational appropriateness, despite considering it a necessary part of the diet.

Participants' subjective knowledge, coupled with their level of trust, affected their decisions. Occasionally, in-store material supported consumers' previously held beliefs and subjective knowledge. In some cases, the staff were instrumental in providing relevant information at the point of purchase and guiding consumer choices. Since two types of salmon were available at the fresh counter, participants requested recommendations from the staff.

(2) In-store cues

Although all participants planned to purchase seafood, their final product selection was often influenced by in-store cues. The physical appearance of the product as well as price were important factors, a similar pattern also observed in the eye tracking data (Plate 1). Some consumers mentioned being inspired by price fluctuations and species availability at the fresh counter.

Fresh and frozen seafood seemed to fulfil different purposes and involve different planning strategies (i.e. special occasion for fresh vs staple food for frozen). Perceived quality was mostly assessed based on sensory properties (e.g. appearance) and price. Generally, seafood from the fresh counter had a higher perceived quality compared to frozen, and lastly canned products.

Sustainability aspects were mentioned unprompted by some consumers, in relation to specific species, products and in-store visual cues such as certificates. Trust towards the labels seemed to mediate the purchase intention of certified seafood. Occasionally, the MSC label had a supportive and guiding role for consumers.

Consumers expected the staff at the fresh counter to provide additional information such as origin and production method, which were also used as indicators of quality. Although wild fish was generally perceived as a healthier and more natural option, most respondents purchased farmed seafood. The influence of the staff and the media in consumer attitudes highlights a relationship between *External Influences* and the *(Dis)trust* subtheme.

4. Discussion

This exploratory study contributes to current understanding by focussing on the factors that influence consumers' seafood choices and how these may interrelate. The ecologically valid

setting (supermarket) acknowledges the importance of context and provides additional insights that are valuable for industry, in particular when communicating sustainability information at the point of purchase.

In agreement with previous research, this study identified that intrinsic properties, such as sensory qualities and healthiness (i.e. *Nice and Necessary*) are important factors when choosing seafood products (Cantillo *et al.*, 2021; Carlucci *et al.*, 2015; Saidi *et al.*, 2023). Our results highlight that, despite the need for diversification, familiarity and proficiency play a critical in consumer choices. Unfamiliarity and lack of knowledge on how to prepare certain species can outweigh the desire for more sustainable and underutilized fish (Witkin *et al.*, 2015). In this study, only a limited range of species was purchased, and these were deemed as more convenient than unfamiliar ones, especially by participants with self-reported low cooking skills. Perceived difficulty of preparation has been pointed out as a barrier to seafood consumption in previous studies (Carlucci *et al.*, 2015; Saidi *et al.*, 2023). Similarly, sensory uncertainty and practicalities, in connection with unfamiliarity, were identified as obstacles to meat substitute acceptance in Sweden (Collier *et al.*, 2021). This reinforces the need to consider familiarity and perceived behavioural control when encouraging dietary changes, as these issues seem relevant across several food categories.

Extrinsic influences such as price, origin, production method, sustainability and animal welfare can also shape seafood choices (Saidi *et al.*, 2023). Overfishing and the use of drugs in fish farming are common concerns for consumers (Zander and Feucht, 2018, Rönnerstrand *et al.*, 2020). Risius *et al.* (2017) found that specific information on origin, price and certain claims (e.g. "no antibiotics"), had more impact on the buying decision than sustainability labels. In this study, claims used by the Bömlo salmon brand (related to health, welfare and production method) seemed to evoke more trust than labels among some consumers and translated into purchases at a higher price. Although some consumers may be willing to pay price premiums for sustainably farmed salmon products, improved communication strategies are needed to facilitate consumer choices (Hynes *et al.*, 2019; Zander and Feucht, 2018). Effective communication is particularly crucial for the seafood industry, as there is a risk that increasing levels of environmental awareness could lead to decreased consumption (Skallerud *et al.*, 2021).

4.1 Challenges and opportunities when communicating seafood sustainability information

Despite the potential of seafood to support the transition towards more sustainable and healthier diets, current consumers experience Ambivalence regarding their choices. Seafood is often framed as a trade-off between health benefits and environmental impact (Farmery *et al.*, 2017), and growing media presence is contributing to controversy and confusion (Van Holt *et al.*, 2018). Documentaries such as *Seaspiracy* could negatively impact consumers' attitudes towards seafood, potentially driven by heuristics and uncertainty around the subject. Ambivalence has previously emerged in relation to preferences for fish attributes (Carlucci *et al.*, 2015) but further research should be undertaken in this area.

Our results indicate a mismatch between consumers' choices and attitudes towards sustainability post-purchase. Despite the availability of information at the counter (e.g. sustainability labels), such material faces strong competition in terms of visual attention, and strategic placement may be needed to increase visual salience and, by extension, impact on buying behaviour (Bartels *et al.*, 2018).

In line with studies that identified personal information as the most used and trusted sources by European consumers (Pieniak *et al.*, 2007), our findings suggest that fishmongers and seafood counter personnel can provide relevant information and help guide consumer choices. From an industry perspective, educating staff as well as offering supporting material (e.g. brochures, signage) in a way that catches their attention at the time of purchase could

help reassure current consumers and promote more sustainable seafood choices (Hynes *et al.*, 2019; Winson *et al.*, 2021).

4.2 Limitations and future research directions

This study integrated qualitative data with eye tracking in the natural retail context, given the lack of research on consumers' seafood choices at the time of purchase. This approach was highly useful to maximize ecological validity and enriches findings from previous literature. However, due to its exploratory nature, the sample size was relatively small and these findings should not be considered generalizable to the Swedish population. Moreover, the data was collected within a high-income area near the port of Gothenburg where fresh seafood supplies are widely available. Future studies should utilize larger sample sizes and incorporate other non-coastal regions and/or rural areas in Sweden. The data collection was conducted in English, potentially introducing minor difficulties in communication, although this is not a major concern given the high proficiency in Sweden (Education First, 2022). Moreover, data collection occurred during the COVID-19 pandemic, when household seafood consumption increased, however a general decreasing tendency has been reported since 2022 (Seafood in Sweden, 2022). Future research should examine possible shifts in consumption patterns and explore associations with other food categories such as meat and plant-based substitutes.

5. Conclusions

Overall, consumers' seafood choices were mostly limited to familiar species (e.g. salmon and shrimps). Factors associated with consumption frequency and variety included sensory expectations, health beliefs and cooking proficiency. External factors (e.g. media, other people) played an important role in consumers' seafood choices both before entering the store as well as in-store.

Consumers spontaneously expressed interest and subjective knowledge about seafood sustainability, as well as different degrees of cognitive dissonance associated with (dis)trust. Inconsistencies were found between the importance given to sustainability post-purchase and actual purchase behaviour. Sustainability information (e.g. labels) faced intense competition from other visual elements in-store and awareness/knowledge about labels did not automatically translate to visual search. Although exploratory in nature, this study provides a more detailed understanding of the factors shaping consumers' seafood choices in the retail context. Moreover, the Ambivalence experienced by current consumers regarding their choices reinforces the need to improve communication strategies at the point of purchase.

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Appendix

The supplementary material for this article can be found online.

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