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Beyond the "Big 5": diversifying seafood preferences in South West England

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Abstract

Purpose – Seafood consumption can support sustainable dietary transitions by reducing reliance on other animal proteins and boosting local food production. Despite UK health advice to "eat two portions of fish per week, including one oily fish", UK seafood consumption remains low and focuses on mostly imported "Big 5" species (salmon, cod, haddock, tuna and prawns), overlooking many locally caught small oily species (e.g. mackerel, herring and pilchard). To improve food security and public health while reducing the environmental impact of seafood, it is necessary to identify effective ways to encourage local, sustainable seafood consumption, diversifying the species eaten.

Design/methodology/approach – Through an online discrete choice experiment in South West England, preferences for fish species, origin, format, sustainability messaging and price were assessed. A split-sample design explored the role of the UK healthy diet guidance, presenting information "nudges" from the NHS or respondent's supermarket.

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Findings – The results confirm strong, statistically significant preferences for salmon and cod, which were not influenced by health guidance. Seafood format preferences varied by species, especially for breaded products, suggesting opportunities to promote small oily fish consumption in more desirable formats. Sustainability messages were favoured over none, though their impact on choices was marginal.

Originality/value – This study expands the existing literature by systematically exploring preferences and trade-offs across a diverse range of species, going beyond the "Big 5" to assess opportunities and barriers to shift consumption towards small oily fish. In doing so, we consolidate previously fragmented evidence on UK seafood preferences and offer policy-relevant insights for food and health strategies, and the processing and marketing of sustainable seafood.

Keywords Discrete choice experiment, Behavioural nudges, Health guidance, Seafood preferences

Paper type Research article

1. Introduction

Seafood consumption provides numerous health benefits, including lower mortality, reduced risk of heart disease and improved neurodevelopment in children (Hicks *et al.*, 2019; Orlich *et al.*, 2013; Mozaffarian and Rimm, 2006; UN Nutrition, 2021). It can also reduce environmental impacts associated with other animal proteins (e.g. livestock) (Scarborough *et al.*, 2023; Troell *et al.*, 2019). For example, small pelagic fisheries like mackerel, herring and pilchards have some of the lowest environmental footprints per protein unit, being caught in large schools and reducing fishers' fuel use (Hilborn *et al.*, 2018). Yet in 2019, only 65% of fishery stocks were within biologically sustainable levels (FAO, 2022). Balancing public health needs and stock depletion risks requires effective wild fisheries management (FAO, 2022), and a fundamental shift in consumption patterns towards what can be sustainably supplied over time, necessitating greater consumer flexibility.

Several characteristics shape seafood consumption choices globally, such as origin, harvest method, format, packaging, place of purchase, certifications, labels and species (Cantillo *et al.*, 2020; Carlucci *et al.*, 2015; Saidi *et al.*, 2023). Product origin has commonly been found to be one of the most important seafood attributes, especially when considered in single-species studies, with local products generally preferred (Ariji, 2010; Banovic *et al.*, 2019; Claret *et al.*, 2012). Beyond seafood characteristics, Saidi *et al.* (2023) categorise the factors influencing fish consumption into six groups according to the Mojet Model (intrinsic, extrinsic, situational, psychological, biological and physiological, and socio-cultural factors). The authors highlight the importance of communicating the benefits of consuming local seafood species for ecosystems and environmental sustainability, and providing information about origin, catch and production methods to improve consumers' understanding (Saidi *et al.*, 2023).

In the UK, historical, cultural and socio-demographic influences have driven unique consumption trends, in terms of species and quantity (FAO, 2023; Harrison *et al.*, 2023; MMO, 2022; Public Health England, 2020; Thurstan, 2022). National health guidance recommends two 140g fish portions per week, one of which should be oily [1] (Public Health England, 2004), but UK consumption is much lower, particularly for oily fish (FAO, 2023; Public Health England, 2020) [2]. UK consumers also eat a narrow variety of seafood, focusing on mostly imported, larger species known as the "Big 5" (MMO, 2022). The Big 5 refers to cod, haddock, salmon, tuna and prawns, which account for 80% of consumption (Marine Stewardship Council, 2025). In 2019, domestic catch made up just 40% of seafood consumption (Harrison *et al.*, 2023). Meanwhile, small oily species landed by the national fleet (e.g. mackerel and herring) are mostly exported, resulting in large nutrient losses for the UK (Jennings *et al.*, 2016; Löfstedt *et al.*, 2025; MMO, 2022). This underutilisation of nutritious, sustainably caught, local seafood is attributed by Garibay-Yayen and Willer (2025) to consumers' "conservative culinary culture", placing pressure on specific fish stocks. Overreliance on imports also exacerbates environmental impacts from transport and increases the risk of price volatility and trade shocks (Harrison *et al.*, 2023; Jennings *et al.*, 2016; Löfstedt *et al.*, 2025). Diversifying UK fish consumption towards local, nutrient-rich species could reduce import reliance while supporting local fishing communities and healthy diets (Löfstedt *et al.*, 2025).

A limited range of studies have explored UK consumers' seafood preferences and their determinants, resulting in fragmented and inconclusive findings (Cantillo *et al.*, 2020; Thurstan, 2022). A 2018 EU-wide survey found that 51% of UK respondents had no seafood origin preferences, while 22% preferred UK-sourced, and only 16% from their local region (Kantar Public Brussels, 2018). Conversely, Martino *et al.* (2023) find that fishing cultural heritage strongly influences choices for residents in two coastal towns in West Scotland, with strong preferences for local seafood.

Some cross-country studies have also examined UK preferences regarding aquaculture sustainability, yet these typically consider a single species or range of products (fresh/chilled, canned or smoked) without exploring how species impacts choice (Banovic *et al.*, 2019; Van Osch *et al.*, 2019). This omission is significant, as a recent survey identified species to be one of the most important factors considered by UK seafood consumers, following quality and availability (Garibay-Yayen and Willer, 2025). Encouragingly, Menozzi *et al.* (2020) explore preferences for both aquaculture and wild-caught production for seven different species (cod, herring, pangasius, salmon, sea bass, sea bream and trout) across five European countries (France, Germany, Italy, Spain and the UK). However, rather than directly assessing species as an independent attribute, Menozzi *et al.* (2020) include the seven species as choice labels, meaning that the estimated species effects reflect consumers' evaluations of species-specific product features instead of pure preferences for species alone. While this provides useful insights into relative preferences for species-labelled products, it does not isolate the independent effect of species on consumer choice. On this basis, the authors find that salmon, cod, sea bass and sea bream products are generally preferred in all countries, with salmon and cod scored relatively higher in the UK, while herring and pangasius were least preferred (Menozzi *et al.*, 2020).

Although multi-country studies allow for spatial comparisons, they are not tailored to the specific UK market and policy contexts. In the UK, many of the species included in Menozzi *et al.* (2020) are predominantly harvested via aquaculture or are less relevant to the UK seafood market, e.g. pangasius (also known as basa). Additionally, in the labelled choice experiment, all included species were shown to cost more than cod and salmon in the UK (except herring), while in France, Germany, Italy and Spain, cod and salmon tended to be the most expensive options included (Menozzi *et al.*, 2020). Therefore, these less familiar alternatives do not necessarily offer appropriate substitutes to the popular Big 5 for UK consumers. A5 of the supplementary material summarises existing discrete choice experiment (DCE) studies which explore UK seafood choices. Only one UK-specific multispecies DCE was identified, but it was conducted over 20 years ago and focused only on common Big 5 products, finding positive responses to quality and eco-labelling (Jaffry *et al.*, 2004). Further UK research is needed to explore up-to-date preferences beyond the Big 5 and to inform current seafood policy priorities, e.g. nudges for species diversification to support health guidance and sustainable catches.

"Nudging" refers to changes in the decision-making context that predictably influence decisions, without constraining options or altering economic incentives (Thaler and Sunstein, 2008). Salience nudges highlight specific, novel and emotionally associated aspects of a choice to steer behaviour (Blackford, 2021). Nudges have frequently been applied to food contexts to successfully influence sustainable choices in both online and field settings, e.g. improving descriptions and positioning of vegetarian menu items, or adding health and environmental labelling (Bacon and Krpan, 2018; Langen *et al.*, 2022; Kurz, 2018; De-loyde *et al.*, 2022; De Bauw *et al.*, 2022; Langen *et al.*, 2022).

Our paper examines the determinants of UK seafood choices and whether nutrition guidance nudges can promote oily fish consumption and seafood diversification. Preferences are explored in a multispecies DCE administered via an online questionnaire of 1,000 seafood consumers in South West England. Along its extensive coastline, the South West is home to numerous fishing villages and ports, with seafood having important cultural, social, economic and historic significance in the region.

Our paper provides several novelties. Our DCE systematically examines preferences for, and trade-offs between species, product format, origin of catch, sustainability messaging and price, going beyond literature review studies (e.g. Carlucci *et al.*, 2015; Cantillo *et al.*, 2020; Saidi *et al.*, 2023). Unlike existing choice studies (e.g. Jaffry *et al.*, 2004; Menozzi *et al.*, 2020), we include a diverse range of species beyond the Big 5, which are directly relevant to the UK seafood market, consolidating previously fragmented research on UK seafood preferences (Thurstan, 2022) and offering more targeted and salient policy information. This approach supports realistic choices and builds understanding of relative preferences between species (including small oily fish), identifying opportunities and barriers to diversifying UK seafood consumption.

A key evidence gap for UK environmental and food policies is understanding how to support engagement with local seafood systems (Thurstan, 2022). “Rebranding” catches has been used to encourage local consumption, e.g. Cornish sardines (Martindale, 2014), but many seafood products still do not display their origin. By exploring preferences for different product origins, specifically from the South West, UK, Europe and beyond, we uncover the role of clear communication in consumer decision making.

Finally, although “nudges” have been widely used to influence food choices, their application to seafood remains limited, especially in the UK (Carlucci *et al.*, 2015; Cantillo *et al.*, 2020; Thurstan, 2022). Greater seafood knowledge has previously been associated with eating a wider variety of species, including small pelagic fish (Almeida *et al.*, 2015). While fish is often considered healthy, many consumers lack awareness of specific nutritional benefits associated with different species or formats (Banovic *et al.*, 2019; Carlucci *et al.*, 2015; Garibay-Yayen and Willer, 2025; Menozzi *et al.*, 2020). UK seafood consumers have identified that greater knowledge about health benefits could offer an important intervention to encourage more diverse consumption (Garibay-Yayen and Willer, 2025). However, the credibility of the source of information (e.g. government, public health authorities, supermarkets, social media, etc.) contributes to consumers’ trust and shapes food decisions (Meijer *et al.*, 2023). In particular, greater trust in information from food chain actors has been shown to strengthen the relationship between motivation and intention to buy sustainable products; this did not hold for healthy products, for which consumers may prefer information sources outside of the food chain (Macready *et al.*, 2025). Trust in information sources varies across consumers, with individuals relying on different criteria to judge the reliability of different sources of nutrition and health information (Joya and Orth, 2025; Meijer *et al.*, 2023). Expanding on existing UK seafood preference studies, we therefore test the effectiveness of health guidance information on diversifying seafood preferences from two sources, the National Health Service (NHS) and the consumer’s supermarket.

The remainder of this paper outlines the online DCE questionnaire design and modelling approach in Section 2. Section 3 presents key results, which are discussed in Section 4, with Section 5 concluding the paper and offering recommendations to support the diversification of UK seafood consumption.

2. Materials and methods

2.1 Questionnaire design and data collection

An initial questionnaire and DCE were developed between April and August 2023. In its first stage, the questionnaire was tested and refined during a workshop at a marine science conference [3] and through 18 semi-structured interviews with individuals working in seafood supply and the retail sector at a leading UK supermarket. Two focus groups were organised, with university students [4] and members of the public across England [5]. The questionnaire was then piloted online with 100 sample respondents. While the workshop, interviews and focus groups played a large role in refining the DCE scenario, attributes and their levels, only minor changes were made to the questionnaire following the pilot, such as wording of supplementary questions.

Data was collected between September and November 2023 via an online questionnaire hosted on the survey platform Qualtrics XM, which supplied a panel of 1,000 seafood-eating respondents living in South West England (including 100 pilot responses). Quotas ensured demographic representation by age and gender. Checks were in place to ensure that respondents' stated diet and residence were consistent with requirements. Quality control measures included removal and replacement of "straight-line" and gibberish responses, and anyone completing the survey in less than half the median pilot response time (7 min). This included 10 pilot responses, which were replaced by the panel provider during the full launch, giving a final sample of $N = 910$. Further details of the questionnaire and sample can be found in A1 and A2 of the supplementary material.

2.2 Discrete choice experiment (DCE) and nudge treatment

DCEs are a stated-preference method used to uncover individual preferences for specific attributes of a product or service through collecting and analysing choice data (Hensher *et al.*, 2005; Lancsar *et al.*, 2017; Louviere *et al.*, 2000). By making choices between different alternatives, described by several attributes with varying levels, individuals indicate their preferences through the attribute trade-offs they make (Lancsar *et al.*, 2017).

In this research, the DCE captured respondents' preferences for different attributes of fish products that they may find in a shop or supermarket. DCEs are frequently used in food choice research and were chosen in this study because they are particularly effective for understanding the importance of and trade-offs between multiple different product attributes (Lizin *et al.*, 2022). This approach is especially useful to test preferences for new products or features not currently available on the market to help decision makers anticipate consumers' choices. Therefore, the DCE represents the most suitable method for understanding preferences for underrepresented fish species and prospective labelling and nudging messages.

A long list of potential attributes was first drawn from existing literature (Cantillo *et al.*, 2020; Carlucci *et al.*, 2015). These were presented to workshop and interview participants to expand or refine based on what was most relevant, interesting and useful to them. Five key attributes were then extracted and explored in the focus groups, with participants indicating that they were content with the number, scope and clarity.

Table 1 summarises the final five product attributes included in the survey. The first was the type of fish, with eight species included to capture a range in taste, texture, nutritional qualities and consumer familiarity. Specifically, herring and mackerel represented smaller, oily fish, and salmon, cod and haddock were included as popular Big 5 species. Hake, sea bass and sole were included as less familiar but generally well-received substitutes to the Big 5. Despite predominantly being farmed rather than wild-caught, salmon was included as a baseline due to its popularity in the UK. Three different fillet formats were included: fresh, breaded and an easy-to-cook option with sauce in oven-ready packaging, as pre-prepared options might overcome potential barriers of unfamiliar preparation (Birch and Lawley, 2014; Menozzi *et al.*, 2020). Differences in processing may also influence how consumers evaluate different species, as format can alter the taste, texture, perceived quality and preparation effort associated with each species. Conversely, preferences for format may depend on the species considered, reflecting both familiarity and expectations around preparation. As a result, relative preferences for species may vary across formats. The four origin of catch options were: Local (South West England), Domestic (Britain), Imported (Europe) and Imported (Outside of Europe). An attribute capturing sustainability messaging on product packaging described "Sustainably caught from healthy fish stocks", "Sourced from a well-managed fishery" and no messaging levels, reflective of existing supermarket labelling strategies and distinguished in further detail to respondents (see Table 1). Finally, each product was assigned a price typical for a UK supermarket, ranging between £1.50 and £9.50 for 250g.

Table 1. Description of DCE attributes and levels

Attribute	Levels	
Fish: Type of fish contained in the product	Salmon	Haddock
	Mackerel	Hake
	Herring	Sea bass
	Cod	Sole
Format: How the fish has been prepared	Fresh fillets	
	Breaded fillets	
	Easy-to-cook fillets with sauce in oven ready packaging	
Origin: Where it was caught	Local (South West England)	
	Domestic (British)	
	Imported (Europe)	
	Imported (Outside of Europe)	
Sustainability: Messaging surrounding how it was sourced	"*Sustainably caught from healthy fish stocks*": meaning that the quantity of the fish taken from the ocean leaves enough for the future and catch methods do the least possible damage to other marine wildlife and the wider marine environment	
	"Sourced from a well-managed fishery": meaning that the fishery is subject to an effective management system that respects local, national and international laws and standards, and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable	
	[None]: meaning that there is no information presented on the product regarding its sustainability	
Price: Cost per packet	£1.50	£5.50
	£2.50	£6.50
	£3.50	£7.50
	£4.50	£9.50

The final experimental design was constructed using Ngene [6] (ChoiceMetrics, 2021), to generate 48 different choice tasks, structured into eight blocks of six choice tasks [7]. During the focus groups, participants were presented with example choice cards with between four and six alternative fish choices. The focus groups determined that five alternatives (four fish products and the option to choose "none") were the most effective in balancing simplicity, participant comprehension and quantity of information generated. A small number of restrictions were applied, including no repeat species within a single choice card, and salmon could not appear with local origin (i.e. it is not caught/farmed in the South West). In addition, price levels were restricted across species to reflect existing pricing structures and consumer expectations, and to minimise the likelihood of dominant alternatives. Specifically, prices presented for mackerel and herring did not exceed £7.50, and did not fall below £3.50 for all other species. Prior to undertaking the choice tasks, respondents were introduced to the choice scenario and provided information about the attributes. They were reminded of their budget constraints (Brown and Hagen, 2010) and asked to treat each choice card as a new occasion. For each choice card, respondents were asked to select their preferred option. Figure 1 shows an example choice task.

	Salmon	**Sole**	**Cod**	**Mackerel**	
Format	Fresh fillets	Breaded fillets	Easy-to-cook fillets in oven tray with sauce	Breaded fillets	**None of these**
Origin	Imported (Outside of Europe)	Imported (Europe)	Local (South West England)	Domestic (British)	
Sustainability	Sustainably caught from healthy stocks	Sustainably caught from healthy stocks	Sourced from a well-managed fishery		
Price	£6.50	£4.50	£4.50	£1.50	

Figure 1. Example choice task

The sample was randomly split into three sub-groups: control ($n = 322$), NHS ($n = 307$) and supermarket ($n = 281$). The control group responded to the six choice tasks without additional information. The other two groups (i.e. treatment groups) received one of the following messages before answering the choice tasks:

[The NHS website/Your supermarket] states that "A healthy, balanced diet should include at least 2 portions of fish a week, including 1 of oily fish", because fish and shellfish are good sources of many vitamins and minerals, and oily fish are particularly high in long-chain omega-3 fatty acids, which can help maintain a healthy heart. In general, most of us should eat more fish in our diet, including more oily fish.

Oily fish include:

- *Herring (bloater, kipper, and hilsa are all types of herring)*
- *Pilchards*
- *Salmon*
- *Sardines*
- *Sprat*
- *Trout*
- *Mackerel*

Some white fish species can also be a source of omega-3 fatty acids, but at lower levels than oily fish. For example:

- *Sea bass*
- *Sea bream*
- *Turbot*
- *Halibut*

The presented guidance highlights key oily species and their benefits for maintaining a healthy heart, encouraging individuals to opt for species like herring, rather than always selecting their typical white fish (i.e. cod or haddock). Presenting the same information as from the NHS and respondent's supermarket allowed us to explore whether the source of information had an impact on its role in decision making.

2.3 Modelling approach

The standard approach to analysing choice data across a finite number of alternatives is the conditional logit model introduced by McFadden (1974), which assumes that individuals choose their best available option to maximise their utility. The utility gained by an individual, n, from an alternative, i (Equation (1)), is made of a deterministic component, V, and a random unobservable stochastic component, ε.

$$U_{i,n} = V_{i,n} + \varepsilon_{i,n} = \beta'_n X_{i,n} + \varepsilon_{i,n} \tag{1}$$

V is characterised by a vector of attributes, X, and associated coefficients, β. This approach thus enables the derivation of a vector of marginal utilities β'_n associated with the product attributes within a choice scenario, in this case: species, format, origin, sustainability messaging and price. The probability that an individual will choose alternative i, out of all alternatives $j = 1, \ldots, J$ within the choice situation is then given by Equation (2).

$$P_{i,n} = \frac{e^{V_{i,n}}}{\sum_{j=1}^{J} e^{V_{j,n}}} = \frac{e^{\beta'_n X_{i,n}}}{\sum_{j=1}^{J} e^{\beta'_n X_{j,n}}} \tag{2}$$

However, the conditional logit model assumes that $\varepsilon_{i,n}$ is independent and identically distributed (IID) (Hensher and Greene, 2003), which fails to allow for correlation between the error components of different alternatives and choice situations (Hensher *et al.*, 2005; Hensher and Greene, 2003). For example, within panel data, individuals respond to multiple choice tasks, and so some correlation in the unobserved heterogeneity across choices is expected (Hensher and Greene, 2003; Lancsar *et al.*, 2017).

Mixed logit models move away from this assumption, allowing coefficients to vary across individuals (McFadden and Train, 2000). When individual coefficients are assumed to follow a probability distribution rather than taking a fixed value we can specify a random parameter/error component model (Hensher and Greene, 2003). Each coefficient is now characterised by a mean and standard deviation, capturing the extent of variation in preferences estimated from the data. In Equation (3), $\eta_{i,n}$ represents the random component of the coefficient for individual i, drawn from the assumed distribution, capturing the deviation of the individuals' preference from the population mean. $\varepsilon_{i,n}$ remains an unobserved component that is independent and identically distributed (IID) across alternatives [8].

$$U_{i,n} = \beta'_n X_{i,n} + \left[\eta_{i,n} + \varepsilon_{i,n}\right] \tag{3}$$

The mixed logit probability that an individual will choose alternative i (Equation (4)), is given by the integral of the standard logit probability weighted by the density of parameters $f(\beta)$, i.e. a weighted average of the logit formula (Equation (2)) for different values of β (Train, 2001).

$$P_{i,n} = \int \left(\frac{e^{\beta'_n X_{i,n}}}{\sum_{j=1}^{J} e^{\beta'_n X_{j,n}}} \right) f(\beta)\, d\beta \tag{4}$$

The other approach taken to capturing preference heterogeneity is latent class modelling. Unlike the random parameter model, the latent class approach models parameter variation discretely as separate classes, with each class having different β values (Hess, 2024). Here, the density function $f(\beta)$ is discrete, with β taking M possible values (or number of classes), and s_m giving the share of the population in class m, i.e., the probability that $\beta = b_m$ (Train, 2001). The new probability that an individual will choose alternative i is thus shown in Equation (5).

$$P_{i,n} = \sum_{m=1}^{M} s_m \left(\frac{e^{b'_m X_{i,n}}}{\sum_{j=1}^{J} e^{b'_m X_{j,n}}} \right) \tag{5}$$

In the basic model s_m is constant across individuals, but can also be linked to individuals' characteristics using the class allocation model. This is shown by Equation (6), which gives the probability that individual n falls into class c, with Z being a vector of observed characteristics, and γ a parameter vector.

$$\pi_{n,c} = \frac{e^{(Z_i \gamma_c)}}{\sum_{m=1}^{M} e^{(Z_m \gamma_m)}} \tag{6}$$

While both the continuous mixed logit and latent class models propose alternative strategies to capture heterogeneity of preferences, the latter avoids assumptions surrounding parameter distributions across individuals and can provide policy relevant information on heterogeneity (Greene and Hensher, 2003).

3. Results

Overall, the survey sample was representative of the UK population in terms of gender and age. While no income quotas were in place, the sample's median range (£30,001-£40,000 per year) roughly aligns with current median gross household income in Great Britain (Department for Work and Pensions, 2024). χ^2 tests confirmed that the control, NHS, and supermarket subsamples were statistically equivalent in age, income and gender (see A2 of supplementary material).

Respondents were asked whether they had previously tried or were willing to try a range of fish species (Table 2). As expected, the Big 5 fish (cod, haddock, salmon and tuna [9]) are most frequently tried, while several other species exhibit large proportions of respondents that had not tried them (e.g. sprat, turbot, whiting, halibut, monkfish, seabream, herring and whitebait). Notably, among the species respondents would not eat again, are smaller, oily and highly nutritious species (anchovies, mackerel, sardines, sprat, herring and whitebait). Similarly, large numbers of respondents who have not tried these species indicate that they would not be willing to, consistent with existing evidence of conservative consumption attitudes (Garibay-Yayen and Willer, 2025). Still, a modest proportion of consumers exhibit a willingness to consume and try small oily species, suggesting that going beyond the Big 5 would be possible under the right circumstances. The results for less commonly tried white fish species (e.g., hake, monkfish and various flatfish) offer further potential, indicating that the public may be more receptive to incorporating a wider variety of local white fish into their diets.

Random parameter mixed logit results are shown in Table 3 (Models 1 and 2) and 4 (Model 3). Categorical variables have been modelled using dummy coding, with their coefficients presented relative to the associated baseline level: set to salmon (species), fresh fillets (format), local (origin) and no messaging (sustainability messaging).

Model 1 presents the baseline model. Statistically significant and negative coefficients for species indicate that, ceteris paribus, salmon is preferred to all other species, apart from cod, which is equally preferred (not statistically significant). Herring, mackerel, sole and hake are found to be least preferred, likely due partly to lower familiarity, consistent with current consumption trends (Table 2). However, significant standard deviations highlight heterogeneity in preferences across all species, highlighting that some consumers are more open to small oily or less familiar seafood than others.

Fresh fillets were found to be most preferred compared to breaded and easy-to-cook options in Model 1, perhaps due to quality, nutrition, versatility, and freshness perceptions compared with more processed choices (Carlucci *et al.*, 2015). However, in Model 2, an interaction term captures differences in format preferences across species. This reflects the expectation that the marginal utility of a species may depend on product format, as processing can alter the salience of species-specific sensory characteristics, quality perceptions and preparation risks. Less processed formats, such as fresh fillets, tend to emphasise taste, texture and freshness qualities,

Table 2. Respondents' familiarity with fish[a]

	Which species of fish have respondents tried? ($N = 910$)				For the species respondents have not tried, would they be willing to try them?		
	I have tried it and would have it again	I have tried it and would not have it again	I have not tried it	I don't know	Would like to try it	Would be willing to try it	Would not try it
Anchovy	35.3% (321)	28.8% (262)	29.3% (267)	6.6% (60)	18.7% (50)	31.1% (83)	50.2% (134)
Cod	95.9% (873)	1.9% (17)	1.4% (13)	0.8% (7)	46.2% (6)	46.2% (6)	7.7% (1)
Flatfish (e.g. Sole, Plaice, Flounder)	57.0% (519)	11.0% (100)	26.0% (237)	5.9% (54)	28.7% (68)	44.3% (105)	27.0% (64)
Haddock	85.2% (775)	6.9% (63)	6.0% (55)	1.9% (17)	40.0% (22)	43.6% (24)	16.4% (9)
Hake	53.5% (487)	10.4% (95)	29.0% (264)	7.0% (64)	33.0% (87)	53.4% (141)	13.6% (36)
Halibut	36.9% (336)	10.2% (93)	44.9% (409)	7.9% (72)	37.2% (152)	47.4% (194)	15.4% (63)
Herring	33.1% (301)	16.5% (150)	42.9% (390)	7.6% (69)	28.2% (110)	40.8% (159)	31.0% (121)
Mackerel	64.0% (582)	19.7% (179)	14.2% (129)	2.2% (20)	16.3% (21)	38.8% (50)	45.0% (58)
Monkfish	37.9% (345)	10.1% (92)	43.8% (399)	8.1% (74)	30.6% (122)	45.4% (181)	24.1% (96)
Pollock	55.6% (506)	12.6% (115)	25.5% (232)	6.3% (57)	33.6% (78)	49.1% (114)	17.2% (40)
Salmon	84.5% (769)	10.5% (96)	3.6% (33)	1.3% (12)	18.2% (6)	45.5% (15)	36.4% (12)
Sardine	55.1% (501)	24.0% (218)	18.1% (165)	2.9% (26)	15.8% (26)	29.1% (48)	55.2% (91)
Sea Bass	63.2% (575)	8.4% (76)	23.8% (217)	4.6% (42)	33.2% (72)	45.6% (99)	21.2% (46)
Sea Bream	36.5% (332)	10.2% (93)	44.2% (402)	9.1% (83)	35.6% (143)	45.0% (181)	19.4% (78)
Sprat	15.9% (145)	15.7% (143)	57.4% (522)	11.0% (100)	28.2% (147)	41.4% (216)	30.5% (159)
Tuna	84.6% (770)	10.0% (91)	4.0% (36)	1.4% (13)	8.3% (3)	41.7% (15)	50.0% (18)
Turbot	25.4% (231)	8.8% (80)	56.6% (515)	9.2% (84)	36.3% (187)	48.9% (252)	14.8% (76)
Whitebait	40.2% (366)	18.6% (169)	32.9% (299)	8.4% (76)	24.7% (74)	44.5% (133)	30.8% (92)
Whiting	33.1% (301)	11.6% (106)	47.0% (428)	8.2% (75)	30.4% (130)	51.4% (220)	18.2% (78)

Note(s): [a]"Would like to try" signifies an interest and desire to try the species, whereas "would be willing to try" suggests openness but with some reluctance or hesitation

Table 3. Mixed logit models 1 and 2

Variable		Model 1: Mixed logit Mean coefficients (std. errors)	Model 1: Standard deviations (std. errors)	Model 2: Mixed logit with species-format interactions Mean coefficients (std. errors)	Model 2: Standard deviations (std. errors)
No choice alternative specific constant (ASC)		−5.796*** (0.257)	2.445*** (0.200)	−6.078*** (0.265)	2.427*** (0.170)
Species	*Mackerel*	−2.759*** (0.153)	1.727*** (0.131)	−3.118*** (0.202)	1.678*** (0.133)
	Herring	−3.407*** (0.188)	1.180*** (0.201)	−3.870*** (0.254)	1.454*** (0.205)
	Cod	−0.089 (0.091)	1.247*** (0.118)	−0.003 (0.149)	1.248*** (0.128)
	Haddock	−0.894*** (0.106)	0.934*** (0.164)	−1.259*** (0.156)	0.857*** (0.209)
	Hake	−2.131*** (0.161)	0.997*** (0.205)	−2.653*** (0.234)	1.049*** (0.214)
	Sea bass	−1.107*** (0.120)	1.240*** (0.154)	−1.384*** (0.172)	1.343*** (0.192)
	Sole	−2.137*** (0.138)	1.136*** (0.147)	−2.235*** (0.186)	1.073*** (0.172)
Format	*Breaded*	−0.318*** (0.066)	0.839*** (0.081)	−0.956*** (0.195)	0.796*** (0.106)
	Easy-to-cook	−0.249*** (0.055)	0.255 (0.187)	−0.237* (0.139)	0.214 (0.167)
Origin	*Domestic*	−0.261*** (0.061)	0.026 (0.074)	−0.290*** (0.069)	0.048 (0.111)
	Imported (Europe)	−0.858*** (0.073)	0.463*** (0.095)	−0.906*** (0.081)	0.389*** (0.131)
	Imported (Outside Europe)	−1.008*** (0.086)	0.831*** (0.094)	−1.026*** (0.091)	0.805*** (0.112)
Sustainability Messaging	*Healthy fish stocks*	0.388*** (0.055)	0.229 (0.144)	0.472*** (0.066)	0.252 (0.231)
	Well-managed fishery	0.346*** (0.057)	0.230 (0.165)	0.445*** (0.067)	0.261 (0.163)
Price		−1.244*** (0.067)	0.704*** (0.038)	−1.174*** (0.069)	0.676*** (0.048)
Species × Format	*Mackerel × Breaded*			0.693** (0.297)	1.143** (0.446)
	Mackerel × Easy-to-cook			0.157 (0.341)	0.526 (1.595)
	Herring × Breaded			1.135*** (0.328)	0.446 (0.751)
	Herring × Easy-to-cook			−0.675** (0.330)	0.705** (0.357)
	Cod × Breaded			0.472* (0.268)	0.339 (0.437)
	Cod × Easy-to-cook			−0.462** (0.221)	0.577 (0.416)
	Haddock × Breaded			0.995*** (0.256)	0.264 (0.286)
	Haddock × Easy-to-cook			0.219 (0.234)	0.401 (0.586)
	Hake × Breaded			0.667* (0.403)	1.275*** (0.444)
	Hake × Easy-to-cook			0.428* (0.238)	0.020 (0.285)
	Sea bass × Breaded			−0.070 (0.390)	1.898*** (0.528)
	Sea bass × Easy-to-cook			0.278 (0.235)	0.511 (0.534)
	Sole × Breaded			0.639** (0.256)	0.297 (0.272)
	Sole × Easy-to-cook			−0.448 (0.295)	1.223** (0.526)

(*continued*)

Table 3. Continued

Variable	Model 1: Mixed logit Mean coefficients (std. errors)	Model 1: Standard deviations (std. errors)	Model 2: Mixed logit with species-format interactions Mean coefficients (std. errors)	Model 2: Standard deviations (std. errors)
Log-Likelihood	−7034.08		−6998.08	
AIC	14132.17		14116.16	
BIC	14343.53		14512.47	
R^2	0.1995		0.2036	
Adj. R^2	0.1959		0.1968	
Observations	5,460		5,460	

Note(s): *** statistical significance at 1% level, ** statistical significance at 5% level; * statistical significance at 10% level

meaning that more familiar or premium species (e.g. salmon) could receive a larger utility premium in this format. In contrast, processed formats (e.g. breaded or easy-to-cook) standardise flavours, reduce preparation effort and skill requirements, and may lower risk associated with trying alternative species, resulting in reduced food neophobia (Costa *et al.*, 2025). Consumers may also hold expectations about the "appropriate" format for specific species based on familiarity and market availability, meaning that their utility may increase when species-format combinations align with expectations. By accounting for this, we find statistically significant positive coefficients for many of the interactions, indicating a preference for breaded over fresh fillets for white flaky species used in fish and chips, and for herring and mackerel. This highlights that while fish format and presentation impact supermarket choices, this varies across species.

Both Models 1 and 2 indicate significant preferences for local products, which decrease as distance increases. While statistically significant standard deviations indicate heterogeneity in preferences for imported fish, respondents consistently prefer products from the South West to the rest of Britain. Respondents also demonstrate consistent positive preferences for sustainability messaging on packaging compared to no message. In contrast, species, price and some format preferences vary significantly across respondents. These findings highlight the potential for widespread labelling interventions compared to more targeted pricing and product interventions (e.g. through supermarket loyalty cards), to promote sustainable consumption beyond the Big 5.

In Model 3 (Table 4), the effectiveness of information treatments in influencing species preferences is tested by interacting treatment groups with species. Although the NHS and supermarket nudges contained the same health message, the supermarket source may have been more salient or credible for some respondents, leading to greater individual-level variation in choice behaviour. This is reflected in a small number of significant standard deviations for the supermarket interactions, which likely capture differences in respondent engagement rather than systematic differences in response to species based on the treatment. Importantly, the mean coefficients for all interactions were non-significant, indicating no systematic impact of either treatment on species preferences.

To better characterise preference heterogeneity, several latent class models were tested with between two and five classes (see A3 of supplementary material for details). The three-class model was selected as the best fit with the lowest BIC score (Greene and Hensher, 2003) and is presented in Table 5 (Model 4). Four covariates were included in the class membership model: gender, income (being over £30,000), age and consuming fish at home more than once a week. These covariates represent theory-driven choices, as well as existing empirical evidence. Income reflects both access and willingness to pay for premium or diverse seafood options, in

Table 4. Mixed logit model 3 with nudge interactions

Variable		Model 3: Mixed logit with species-nudge interactions Mean coefficients (std. errors)	Standard deviations (std. errors)
No choice alternative specific constant (ASC)		−5.903*** (0.271)	2.457*** (0.189)
Species (control)	*Mackerel*	−2.939*** (0.222)	1.695*** (0.138)
	Herring	−3.429*** (0.260)	1.270*** (0.237)
	Cod	−0.142 (0.143)	1.170*** (0.133)
	Haddock	−0.856*** (0.168)	0.882*** (0.212)
	Hake	−2.022*** (0.253)	0.964*** (0.283)
	Sea bass	−1.077*** (0.180)	1.096*** (0.172)
	Sole	−2.101*** (0.202)	1.027*** (0.190)
Species × NHS nudge	*Mackerel × NHS*	0.277 (0.257)	0.041 (0.270)
	Herring × NHS	−0.087 (0.281)	0.293 (0.207)
	Cod × NHS	0.015 (0.190)	0.172 (0.336)
	Haddock × NHS	−0.128 (0.216)	0.353 (0.434)
	Hake × NHS	−0.230 (0.306)	0.133 (0.800)
	Sea bass × NHS	−0.137 (0.233)	0.153 (0.251)
	Sole × NHS	0.020 (0.305)	0.835 (0.582)
Species × Supermarket nudge	*Mackerel × Supermarket*	0.096 (0.280)	0.731** (0.307)
	Herring × Supermarket	−0.220 (0.340)	0.645 (0.660)
	Cod × Supermarket	0.106 (0.203)	0.750*** (0.278)
	Haddock × Supermarket	−0.048 (0.225)	0.559* (0.288)
	Hake × Supermarket	−0.144 (0.337)	0.350 (0.927)
	Sea bass × Supermarket	−0.168 (0.280)	1.461*** (0.353)
	Sole × Supermarket	−0.244 (0.282)	0.476 (0.400)
Format	*Breaded*	−0.317*** (0.068)	0.825*** (0.087)
	Easy-to-cook	−0.241*** (0.056)	0.106 (0.899)
Origin	*Domestic*	−0.272*** (0.062)	0.022 (0.083)
	Imported (Europe)	−0.880*** (0.075)	0.462*** (0.101)
	Imported (Outside Europe)	−1.021*** (0.088)	0.857*** (0.097)
Sustainability Messaging	*Healthy fish stocks*	0.381*** (0.056)	0.373*** (0.102)
	Well-managed fishery	0.345*** (0.058)	0.138 (0.270)
Price		−1.220*** (0.067)	0.688*** (0.036)
Log-Likelihood		−7,023.26	
AIC		14,166.51	
BIC		14,562.83	
R^2		0.2008	
Adj. R^2		0.1939	
Observations		5,460	

Note(s): *** statistical significance at 1% level, ** statistical significance at 5% level; * statistical significance at 10% level

line with consumer behaviour theory. As data were collected in fixed income brackets (see A2 of supplementary material), the £30,000 threshold offers two well-populated sample groups (42% ≤ £30,000 vs 53% > £30,000) and provides a near-median split based on UK household income before tax at the time of data collection (ONS, 2023). Purchase frequency captures respondents' familiarity with seafood and habitual consumption, which could strongly influence product knowledge and preferences (Honkanen *et al.*, 2005). Gender was included to capture potential differences in seafood preference and format choices, with some evidence suggesting that men are more likely to consume fried fish (Govzman *et al.*, 2021). Finally, the inclusion of age captures generational differences in awareness, familiarity, sensory priorities

Table 5. Latent class model coefficients (standard errors)

Variable		Model 4: Latent class model Class 1	Class 2	Class 3
No choice alternative specific constant (ASC)		−2.677***	−3.235***	−5.037***
		(0.760)	(0.491)	(0.560)
Species	*Mackerel*	−2.835***	−2.988***	−1.218***
		(0.446)	(0.446)	(0.242)
	Herring	−3.760***	−3.955***	−1.846***
		(1.024)	(0.892)	(0.235)
	Cod	−0.334	0.380	−0.287
		(0.383)	(0.302)	(0.182)
	Haddock	−1.634***	−0.151	−0.942***
		(0.502)	(0.405)	(0.159)
	Hake	−1.829***	−2.552***	−1.308***
		(0.692)	(0.424)	(0.251)
	Sea bass	−0.461	−1.039***	−0.646***
		(0.412)	(0.242)	(0.186)
	Sole	−2.646***	−2.026***	−1.000***
		(0.661)	(0.353)	(0.201)
Format	*Breaded*	−1.200**	0.049	−1.271***
		(0.590)	(0.275)	(0.442)
	Easy-to-cook	−1.137**	0.246	−0.407**
		(0.443)	(0.243)	(0.204)
Species × Format	*Mackerel × Breaded*	1.072	−0.418	1.208***
		(0.762)	(0.669)	(0.467)
	Mackerel × Easy-to-cook	0.300	−0.571	0.399
		(0.759)	(0.797)	(0.256)
	Herring × Breaded	1.061	0.206	1.433***
		(1.392)	(0.862)	(0.491)
	Herring × Easy-to-cook	1.006	−0.063	−0.392
		(0.943)	(0.938)	(0.326)
	Cod × Breaded	1.042	−0.068	1.066**
		(0.752)	(0.403)	(0.446)
	Cod × Easy-to-cook	0.612	−0.293	−0.073
		(0.553)	(0.288)	(0.276)
	Haddock × Breaded	1.331	−0.310	1.342***
		(0.858)	(0.400)	(0.501)
	Haddock × Easy-to-cook	1.778***	−0.855*	0.400
		(0.689)	(0.437)	(0.276)
	Hake × Breaded	0.145	0.322	1.373***
		(1.163)	(0.568)	(0.499)
	Hake × Easy-to-cook	−0.919	0.208	0.596*
		(4.903)	(0.611)	(0.305)
	Sea bass × Breaded	−2.110*	0.144	0.817*
		(1.249)	(0.372)	(0.477)
	Sea bass × Easy-to-cook	0.200	−0.274	0.699**
		(0.628)	(0.331)	(0.285)
	Sole × Breaded	1.959**	0.345	0.588
		(0.856)	(0.422)	(0.448)
	Sole × Easy-to-cook	1.210	−0.508	0.046
		(0.843)	(0.476)	(0.297)
Origin	*Domestic*	−0.225	0.025	−0.293***
		(0.459)	(0.160)	(0.076)
	Imported (Europe)	−0.659*	−0.220	−0.874***
		(0.379)	(0.191)	(0.097)
	Imported (Outside Europe)	−0.794	−0.187	−0.895***
		(0.488)	(0.198)	(0.145)
Sustainability Messaging	*Healthy fish stocks*	0.341	0.199	0.393***
		(0.211)	(0.150)	(0.074)
	Well-managed fishery	0.550**	0.079	0.292***
		(0.218)	(0.148)	(0.072)
Price		−0.453***	−0.130***	−0.304***
		(0.067)	(0.039)	(0.041)

(*continued*)

Table 5. Continued

Variable		Model 4: Latent class model Class 1	Class 2	Class 3
Covariates:				
Male		−0.141	0.005	
		(0.284)	(0.209)	
Income above £30,000		−0.248	0.234	
		(0.296)	(0.214)	
Age	*25–34*	0.469	0.268	
		(0.626)	(0.329)	
	35–44	0.213	−0.244	
		(0.580)	(0.349)	
	45–54	0.473	−0.160	
		(0.606)	(0.388)	
	55–64	1.163**	0.157	
		(0.578)	(0.452)	
	Over 65	1.534***	−0.198	
		(0.577)	(0.550)	
Consume fish more than once a week		−0.984***	−0.138	
		(0.310)	(0.232)	
Class Probability		0.1493	0.3619	0.4888
Log-Likelihood		−7086.85		
AIC		14389.7		
BIC		15103.07		
R^2		0.1935		
Adj. R^2		0.1812		
Observations		5,460		

Note(s): *** statistical significance at 1% level, ** statistical significance at 5% level; * statistical significance at 10% level

and openness to new foods (Steptoe *et al.*, 1995; Govzman *et al.*, 2021; Whitelock and Ensaff, 2018), as well as evolving dietary patterns over time (Harrison *et al.*, 2023).

Of these covariates, only age (55+) and frequent at-home seafood consumption were statistically significant predictors of class allocation. Individuals in class 1 were more likely to be older and less likely to consume fish regularly at home than those in classes 2 and 3, suggesting that variation in preferences may be more strongly driven by taste differences and consumption habits than by standard demographic characteristics.

Because the model includes species interactions with format, the species coefficients represent marginal changes in utility for the baseline format (fresh fillets), while the interaction terms capture the further changes that are attributed to the different formats for each species. Consequently, species preferences must be interpreted jointly with the interaction terms rather than from the species coefficients alone. To aid interpretation, format-specific marginal indirect utility changes combining species and interaction coefficients are presented in A4 of the supplementary material.

Classes 1 and 2 exhibit relatively stable species rankings across formats, with most interactions between species and format found to be not statistically significant. This suggests that for these respondents, the relative value of species changes little when products are offered in breaded or easy-to-cook formats. Class 2 is also characterised by lower price sensitivity, and its members are less responsive to sustainability messaging and product origin. This indicates a group of consumers whose seafood choices may be more habitual and driven by established purchasing contexts rather than evaluation of the seafood characteristics offered during each purchasing occasion. Such consumers are less inclined to explore new species.

In contrast, class 3 shows a greater number of significant interactions between species and format, indicating that preferences for individual species vary more substantially depending on product processing. Respondents in this class demonstrate significant responsiveness to origin and sustainability messaging, offering potential avenues for species diversification. They also exhibit stronger preferences for selecting a product rather than opting out (as reflected by the ASC coefficient), suggesting greater openness to substituting between different seafood products and formats. As the largest consumer segment, with an estimated membership probability of 49%, these consumers represent a key target group for initiatives aimed at promoting species diversification.

4. Discussion

Most previous seafood preference studies focus on one species (Cantillo *et al.*, 2020). Multi-species studies predominantly focus on Big 5 species (Jaffry *et al.*, 2004) or the introduction of a substitute for a popular fish such as salmon or cod (Chen *et al.*, 2015). Multispecies studies offer several benefits, enabling the implementation of realistic choice scenarios, capturing unobserved species characteristics and allowing cross-species comparisons to understand relative preferences (Carlucci *et al.*, 2015; Nguyen *et al.*, 2015; Yip *et al.*, 2017). The species included in our study (Big 5 and beyond) were chosen to capture a range of characteristics while remaining relevant to the UK seafood industry and existing markets. Our results reiterate the importance of consumers' taste for species and account for their interaction with format preferences. Willingness-to-try results (Table 2) show large proportions of respondents having previously tried small oily species but being unwilling to have them again, emphasising the challenges of promoting their consumption. However, choice model results indicate greater acceptance for small oily fish in breaded formats. This reduction in neophobia (reluctance to try new foods) could be associated with a favourable texture improving sensory expectations (Costa *et al.*, 2025). This avenue for diversification is particularly promising for consumers who display stronger format preferences (Table 5). Such consumers would be more likely to purchase non-Big 5 species like mackerel and herring if offered in breaded formats. Model covariates suggest that these individuals are generally under 55 and eat fish more frequently compared to other consumers. However, a greater understanding of the characteristics that drive belonging to this group could further facilitate targeted marketing of oily species. Future research could explore a wider range of demographic and behavioural factors to better understand heterogeneity in seafood preferences, supported by social behavioural analysis.

Our results also demonstrate preferences for local and domestic fish, consistent with global findings attributing this to ethnocentrism, trust and perceptions of superior quality, freshness and safety standards (Carlucci *et al.*, 2015; Jaffry *et al.*, 2004; Stefani *et al.*, 2012; Mauracher *et al.*, 2013; Cantillo *et al.*, 2020). This result appears to contradict the existing UK market reality, presenting a potential paradox in which British seafood consumption is dominated by imports (Harrison *et al.*, 2023), despite preferences for local products. While on average respondents prefer local seafood, strong preferences for specific species (in this case, salmon and cod, two of the Big 5 species) currently hold a greater weight in driving seafood choices. This is shown by the coefficients capturing species preferences having larger magnitudes than coefficients related to origin, thus confirming the existing market trends.

However, using a discrete choice experiment also allows us to explore preferences for products and attributes not currently available in the market to help anticipate consumer choices, uncovering preferences for local products which are not always available in supermarkets (where 95% of respondents purchase their seafood from). Furthermore, supermarket packaging often omits origin labelling, with focus groups indicating that individuals are often unaware of product origins despite intentions to buy local. Labelling can also be misleading or become conflated when covering multiple aspects of production at the same time, e.g. origin and organic (Messer *et al.*, 2017; Richetin *et al.*, 2022). By better highlighting local and British origins on packaging, consumers might be guided towards these products (Saidi *et al.*, 2023). This would inherently support species diversification away from the predominantly imported Big 5 species (MMO, 2022), towards more locally small, oily, abundant species.

Promoting local origin is already being leveraged in the South West through local fishing organisations. One example is the Plymouth Fishing and Seafood Association's "Seafood Plymouth" initiative, which promotes consumption of locally abundant lesser-known species (e.g. gurnard, pouting, rays, mackerel and lemon sole), to support local fishers, communities and businesses while reducing carbon emissions from imports (Plymouth Fishing and Seafood Association, 2024). Scaling such initiatives through partnerships with supermarkets could amplify their impact, making sustainable choices more accessible to a wider consumer base.

Eco-labelling and sustainability certifications are important signals for seafood consumers, including in the UK (Jaffry *et al.*, 2004; Carlucci *et al.*, 2015). Our models substantiate this, highlighting small statistically significant preferences for both sustainability messages, compared to no messaging. However, many respondents struggled to define seafood sustainability in an open survey question, and focus groups revealed limited awareness of criteria for sustainability certification, such as the Marine Stewardship Council's (MSC) blue tick. Within our choice experiment, messaging referring to "healthy stocks" and "well-managed fisheries" have similar effects, supporting the idea that consumers value sustainability information, but may not have strong preferences for one specific message or certification over another. A more nuanced understanding of seafood sustainability may lead to consumers placing greater decision weight on sustainability when purchasing fish (Lawley *et al.*, 2019). This could be supported through education strategies and improved labelling to clearly and simultaneously highlight multiple sustainability aspects (e.g. through traffic lights).

Existing studies call for education on the tangible health benefits of seafood to promote sustainable consumption (Garibay-Yayen and Willer, 2025; Menozzi *et al.*, 2020; Saidi *et al.*, 2023). However, in our study, nudges promoting health guidance and nutritional benefits of oily fish had little impact in shifting species preferences, regardless of the information source. This contrasts with Banovic *et al.* (2019) and Menozzi *et al.* (2020), who found that health and nutritional claims on packaging positively influence product preferences across countries. This difference in outcome likely stems from differences in methodological approaches. For instance, both Menozzi *et al.* (2020) and Banovic *et al.* (2019) test the impact of the presence of nutrition and health claims as attributes in their choice tasks, highlighting that respondents prefer seafood products with the claims rather than without. In contrast, we test whether the provision of the health and nutritional information impacts preferred species, rather than respondents' preferences for the presence of the information itself. However, Menozzi *et al.* (2020)'s species-specific findings reveal varying levels of willingness to pay for such claims depending on the species, possibly capturing consumer expectations surrounding which fish offer high omega-3 as claimed. Likewise, the framing of the health information could also play an important role. While our information nudge reflects actual NHS guidance, other studies test shorter and simpler claims. In particular, Banovic *et al.* (2019) compare the effect of the simple and specific labels on packaging: "Rich in omega 3", "High in protein", "Improves heart function", "Improves brain function" and no claim. These are potentially more meaningful and easily digestible claims than existing UK health guidelines, suggesting that simplifying guidance may have greater success. Importantly, questionnaire responses also show that nutritional qualities are only somewhat important when purchasing seafood, and respondents were generally unaware of the micronutrients provided by different species. Such findings emphasise the complexity in shifting seafood preferences and the need for further research on effective nudging strategies to support policy goals.

Our findings corroborate existing evidence that the *source* of messaging matters (Joya and Orth, 2025; Macready *et al.*, 2025). Specifically, we observe evidence of treatment effect heterogeneity for the supermarket source, but none for the NHS source, indicating that participants responded more variably depending on whether the message originated from the supermarket or public health service. While Macready *et al.* (2025) suggest that health information may be better received from outside the food supply chain, our results indicate that supermarket-delivered information may be more salient in the purchasing context. A possible explanation is the timing and setting of the intervention: consumers are unlikely to encounter public health messaging at the point of food choice, whereas supermarket communications are already embedded within the decision environment. As a result, supermarkets may be better situated to influence seafood preferences away from Big 5 species.

Previous research has considered the role of harvest method and preferences for aquaculture (e.g. Banovic *et al.*, 2019; Bronnmann and Hoffmann, 2018; Darko *et al.*, 2016; Roheim *et al.*, 2012); however, such considerations have been well explored and were beyond the scope of this study. Instead, this research explores wild-caught seafood consumption and focuses on promoting consumer flexibility to adapt to changes in sustainable catches, aiming to better align future demand with sustainable supply.

As the sample was limited to South West England, it is unclear how comparable the findings are to other UK regions. As a coastal region, people may eat more seafood, with preferences reflecting availability of fresh seafood, local culture and support for the fishing industry. South West consumers may be more influenced by the highlighting of local origins than other non-coastal regions, due to the fishing sector's strong role in its historic, cultural and social identity (Coulthard *et al.*, 2025). Indeed, it is estimated based on a range of economic indicators that the seafood sector is roughly four times more important to Cornwall and the Isles of Scilly than Great Britain (Plunkett-Cole and Curtis, 2023). Other UK regions also have different population demographics (e.g. age, income and ethnicity), which will likely impact their seafood preferences and transferability of the results. Future research should examine regional and socio-demographic differences in seafood preferences and explore how more targeted interventions can be leveraged to promote local seafood consumption across the UK.

5. Conclusions

In this study, we investigated the conditions needed for consumers to consider a trade-off between the UK's favourite seafood (Big 5) and highly nutritious and locally abundant small oily fish species. Overall, our study consolidates previously fragmented research on UK seafood preferences (Thurstan, 2022) and provides relevant insights to promote more diversified seafood consumption and healthier diets. Our findings have wider implications for UK food policy and for the retailing of wild-caught seafood.

Increasing consumption of locally caught seafood beyond the heavily imported Big 5 would promote healthy, sustainable and resilient food systems, in line with existing UK policy goals. In particular, the recently published National Food Strategy seeks to transform the UK food system to be more resilient, ensuring healthy and sustainable food is affordable and accessible to all (Defra, 2025). While trade is vital for UK food security, import strategies need to account for the environmental impact of food produced outside of the UK. Shifting seafood consumption towards local species would reduce emissions from trade and facilitate greater monitoring and control over the environmental impact of our food system, in line with the National Food Strategy. Proposed tariffs, which depend on the environmental impact of imports (The National Food Strategy, 2021), offer a potential mechanism for transitioning seafood purchases by driving price differentials that could incentivise consumption of locally abundant small oily fish instead of the Big 5. This shift should be accompanied by a carefully managed, balanced harvest across all species caught in the South West (including the Big 5, oily fish and other local stocks), aligning fishing mortality and species' productivity to support sustainable yields, as outlined in Law and Plank's balanced harvesting framework (Law and Plank, 2023).

The National Food Strategy also highlights the potential for both commercial and public health marketing of healthy and sustainable food choices, but existing marketing spending is predominantly focused on unhealthy options, with only 2% spent on fish (Defra, 2025; The National Food Strategy, 2021). More effective, targeted public health marketing, combined with legislation for retailers to adopt comprehensive origin and multifaceted seafood labelling, could enable consumers to fulfil their preferences beyond the Big 5. These combined approaches could be further enhanced by educating consumers on the multifaceted nature of seafood sustainability as part of emerging strategies to promote ocean literacy (e.g. “Y Môr a Ni”, a framework for Ocean Literacy in Wales). At the same time, policymakers should consider simplifying existing health guidance to build understanding and engage a wider audience of consumers. However, further research into spatial and socio-demographic trends is still needed to enable more targeted policy and interventions across the UK.

Retailers also have an important role to play in sustainable seafood transitions, with our survey indicating that 95% respondents purchase seafood from supermarkets. Our results highlight that seafood consumers in the South West would prefer locally abundant, small, oily fish species if breaded. While not the healthiest option, breaded formats may offer a way to increase consumption of omega-3 and other micronutrients. Offering a wider range of accessible product formats for lesser-known species could promote diversified seafood consumption, particularly amongst individuals with weaker species preferences. This, combined with local origin labels and sustainability messaging, could be particularly effective at guiding consumers beyond the Big 5. Our results provide some insights into how retailers could promote these products, but further research identifying how different demographic factors and existing habits drive preferences is recommended to support effective product promotion and translation of results from the South West to other parts of the UK.

Authors’ contributions

Ellen McHarg: Conceptualization, Methodology, Investigation, Formal Analysis, Writing – original draft, Writing – review and editing; *Gaetano Grilli:* Conceptualization, Methodology, Supervision, Writing – review and editing; *Tiziana Luisetti:* Conceptualization, Supervision, Writing – review and editing; *Rosalind H. Bark:* Supervision, Writing – review and editing; *Silvia Ferrini:* Conceptualization, Methodology, Supervision, Writing – review and editing.

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Notes

1. Oily fish (such as salmon, mackerel, herring, sardines, sprats and whitebait) are high in omega-3, vitamin *D*, and sometimes contain edible bones, offering a source of calcium, providing essential micronutrients.
2. Average weekly consumption of oily fish amongst adults aged 19–64 was estimated to be 56g, with children consuming less than 20 g (Public Health England, 2020).
3. Sustainable Management of Marine Resources (SMMR) Annual Conference 2023. Bristol, UK.
4. A 90-min in-person focus group with six students (undergraduate and postgraduate) at University College London (UCL).
5. A 90-min online focus group with eight members of the public from a range of locations across England. Five participants were aged between 18 and 45, with three respondents over the age of 45. Both focus groups had an even proportion of men and women participants.
6. Ngene is a software tool used to generate experimental designs for stated choice surveys (choice-metrics.com).
7. Preliminary results from the 100 pilot responses informed prior values applied in a D-efficient Bayesian design ahead of full sample launch (Ferrini and Scarpa, 2007).
8. The mixed logit model presented in the results section accounts for differences in preferences between individuals using MLHS inter-individual normal random draws for all variables except price, which uses negative log random draws.

9. Prawns were excluded as they are not considered to be fish.

Supplementary material

The supplementary material for this article can be found online.

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