



Health-related attitudes as a basis for segmenting European fish consumers

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ABSTRACT

This paper identifies and profiles consumer segments based on health-related attitudes. Cross-sectional data were collected in 2008 through a pan-European consumer survey ($n = 2400$) with samples representative for age and region in France, Poland and Spain. Four distinct consumer segments based on health-related attitudes are identified: low interest in healthy eating consumers (29.4%), positive health enthusiasts (28.2%), health strivers (35.0%) and health uninvolved (7.4%). The segments differ significantly with respect to fish consumption, attitudes and knowledge about the health benefits of fish, interest in potential informational cues when purchasing fish, and individual socio-demographic characteristics. The segment low interest in healthy eating is characterised by younger age, more males, higher BMI, low fish consumption and low interest in information, and herewith emerges as a relevant though difficult to reach segment from a food and health policy perspective. Positive health enthusiasts and health strivers have a strong involvement with food, and a strong interest in healthy eating. Both segments have a very favourable disposition towards fish consumption, which would fit with their focus to either stay healthy (positive health enthusiasts) or improve their current health status (health strivers). Health uninvolved consumers do not care strongly about health in general; though attach high importance to eating healthily.

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1. Introduction

Food markets and policies in high income countries are characterised by increased attention to health and nutrition (Golan and Unnevehr, 2008). Extensive scientific evidence exists about the associations between diet and health, and more particularly about food choice, diet and nutrition as determinants of chronic and lifestyle diseases (Feldeisen and Tucker, 2007; Kaline et al., 2007). Dietary adjustments may not only influence people's present health status, but may also determine whether or not an individual will develop diseases such as cancer, cardiovascular disease or diabetes later in life. Consequently, healthy eating has been heavily promoted by public health authorities, food policy makers and food marketers during the last decades. The result has been an increase in sales of foods that market their health attributes and an increase in more healthy food consumption (Gilbert, 2000; Ragaert et al., 2004).

Nevertheless, some studies (Welch et al., 2002; Geeroms et al., 2008) indicate that despite considerable public health communica-

tion efforts, still a large proportion of the population does not comply with dietary recommendations, particularly those related to fruits and vegetables and seafood consumption. This might be due to inappropriate communication strategies and non-optimal choice of message content, source of information or target audience. It has been shown that communication and information campaigns that target a specific audience are more likely to have their intended impact on food choice and diet (Verbeke, 2008) than broadly oriented campaigns.

Audience segmentation and selection of communication channels are two of several social marketing principles that have been proposed as guidelines to improve the effectiveness of food policy and public health interventions (Slater and Flora, 1991). In consumer behaviour research, grouping consumers into segments with similar characteristics has provided a better understanding of consumption patterns (Brunso, 2003; Pieniak et al., 2007). In health psychology, specifically health promotion research, segmentation analysis has successfully been applied to identify and select target groups most likely to benefit from specific health promotion campaigns, providing information about beliefs and behaviour held in those groups and consequently facilitating the development of the most appropriate communications (e.g. Abel, 1991; Clatworthy et al., 2005). Insight into the characteristics of the target audience permits providing more specific and targeted

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information to be delivered through the appropriate information media and sources, resulting in higher effectiveness, higher impact, better coverage and higher penetration (Sacharin, 2001; Rimer and Kreuter, 2006). However, scientific evidence shows that also tailored health communications have achieved only modest success in changing a number of health-related behaviours (Verbeke, 2005).

Segmentation research, regardless of the method used, is designed to identify groups of objects that share common characteristics, such as consumers with similar attitudes, preferences, motivations, eating habits or lifestyles. Objects grouped together in a potential target segment are intended to be similar to each other, and dissimilar to objects outside the segment. Cluster analysis is the most frequently used statistical method for classification or segmentation of people in both health psychology (Clatworthy et al., 2005) and marketing research (Beane and Ennis, 1987). This method can be described as post hoc since the types and number of segments are determined on the bases of results from data analysis, and descriptive with no distinction between dependent and independent variables (Wedel and Kamakura, 2000). Thus, it differs from a priori and predictive research methods like regression or discriminant analysis. Even though several advanced methods for clustering have been described in the research literature (Wedel and Kamakura, 2000; Green and Krieger, 1995), this study uses the most common post hoc descriptive method for marketing segmentation, namely hierarchical clustering (Beane and Ennis, 1987).

The aim of this study is to identify consumer segments based on their involvement in food and health, and their self-reported health. The focus will be on fish consumption as one of the relevant behaviours where previous campaigns seem to have fallen short. Fish is beneficial for human health, as it is an important source of a number of nutrients, particularly protein, retinol, vitamin D, vitamin E, iodine, selenium and the essential long-chain polyunsaturated fatty acids. Despite conclusive evidence about the health benefits of omega-3 fatty acids found in especially fatty fish, consumer awareness and beliefs that fish are a good source of these nutrients or that these nutrients confer health benefits were found to be rather poor (Verbeke et al., 2005). It should be noted that fish may also be contaminated with pathogenic bacteria, viruses, toxins, chemical and other environmental hazards (Sumner and Ross, 2002). Recently, several studies concentrated on the question whether it is possible to follow dietary recommendations of eating two portions of fish a week, of which one should be fatty fish, without exceeding tolerable intakes of chemical environmental contaminants (Mozaffarian and Rimm, 2006; Sioen et al., 2008a,b; Smith and Sahyoun, 2005; Hughner et al., 2008). Their results showed that health benefits of eating fish outweigh the potential risk for the vast majority of the population. Nevertheless, vulnerable population groups such as pregnant women, infants, children and elderly are recommended to avoid particular species and/or fish from particular origin (Sioen et al., 2008b).

Health has been identified as an important motivator of people's food choices (Roininen et al., 2001). A healthy diet has been associated with better nutrition, healthier lifestyles, and in some cases, better health outcomes (Diehr and Beresford, 2003). There are several ways to define health. Past definitions have included emotional well-being, feeling happy, being with friends, social responsibility, having energy, looking good, achievement and level of physical health, to identify consumer segments according to perceptions of the meaning of health (Geeroms et al., 2008). Health theories conceptualise consumers' understanding of health (Furnham, 1988) and might influence their health beliefs/motivation and behaviors (Hughner and Kleine, 2008; Stainton Rogers, 1991), such as those related to diet. In our study we will explore consumers' involvement in health and their interest in healthy eat-

ing. Health involvement refers to the personal relevance or importance attached to health issues, based on inherent needs, values and interests (Zaichkowsky, 1985). In consumer behaviour literature, involvement has been shown to have robust effects on explaining consumers' purchase and eating decisions (Marshall and Bell, 2004), including fish consumption (Olsen, 2001; Pieniak et al., 2008).

Subjective health is an individual's assessment or self-rating of her/his health in general (Baron-Epel and Kaplan, 2001). It is considered to be a valid and reliable indicator of personal health, particularly in studies where other forms of health information are not included (Ferraro et al., 1997). Subjective health has been found to associate with future health and people's satisfaction with life (Benyamini et al., 2004). The main purpose of this study is to identify consumer segments based on health-related variables. Although health-related attitudes have been already used as variables to form segments (for a review see Clatworthy et al., 2005), to our knowledge, no study has segmented consumers based on health involvement, interest in healthy eating, and subjective health in the same setting and then estimated how these segments correlate with fish consumption. An identification of homogenous consumer groups on the basis of their health-related attitudes may help improve the effectiveness of tailored health communication and provide implications for food and health policies. The second purpose is to investigate whether the resulting segments differ with respect to fish consumption, attitudes and knowledge about the health benefits of fish, interest in potential informational cues when purchasing fish, and individual demographic characteristics.

2. Materials and methods

2.1. Data collection

Quantitative data were collected through a cross-sectional web-based consumer survey with samples representative for age and region in France, Spain and Poland. Total sample size was 2400 respondents, i.e. 800 respondents in each of the three considered European countries. The sample was composed of 1560 women (76.3%) and 840 men (23.7%). This gender distribution reflects the criterion that all respondents were the main responsible person for food purchase in the household. A quota sampling procedure with age and region as quota control variables was applied. The age range of the population was defined as 20–70 years. The mean age of the sample was 41.8 (SD = 13.1). Participants were randomly selected from the representative IPSOS Online Access Panel (Malhotra and Peterson, 2006) according to the national population distributions for age and region. This panel consists of individuals who have been recruited previously through off-line recruitment methods (e.g. random walk or street contact procedures) and who agreed to take part in future surveys. All contact and questionnaire administration procedures were electronic. Data collection was performed during the period from April 27 until May 8, 2008. All relevant international guidelines and standards relating to the collection and processing of personal data from human beings have been abided. Participants were adult volunteers from whom written informed consent has been obtained. Table 1 shows the sample characteristics.

The questionnaires were developed to measure a wide variety of constructs in relation to fish and health including behaviour, attitudes and beliefs, knowledge, and use of informational cues. The measurement instruments were developed in English and then translated into French, Polish and Spanish by professional translation services within each country. The back-translation method was used to verify the multilingual versions of the questionnaire

Table 1
Sample characteristics (%).

	France (n = 800)	Poland (n = 800)	Spain (n = 800)	Total (n = 2400)
<i>Gender</i>				
Male	35.0	35.0	35.0	35.0
Female	65.0	65.0	65.0	65.0
<i>Age</i>				
20–29 years	21.0	27.0	21.0	23.0
30–39 years	23.0	22.4	25.0	23.5
40–49 years	22.0	22.4	22.0	22.1
50–59 years	18.0	20.8	17.0	18.6
60–70 years	16.0	7.5	15.0	12.8
<i>Education</i>				
Primary or secondary (<18 years of age)	43.1	48.1	53.4	48.2
Higher (>18 years of age)	56.9	51.9	46.6	51.8

and were pre-tested in the national languages through pilot studies.

2.2. Segmentation variables

Four items regarding subjective health were included: “Compared with people at my age, my health is excellent”; “Compared with people at my age, my current physical health is excellent”; “I am as healthy as anyone I know at my age”; and “Compared with people at my age, my current mental health is excellent”. The items were mainly based on the general health perception scale from the short-form health survey SF-36 (JE, 1993).

Interest in healthy eating was measured by three items adapted from the Food Choice Questionnaire (Steptoe et al., 1995). Only the most appropriate and relevant items related to fish were included based on findings from exploratory focus group discussions (Pieniak et al., 2007; Brunso et al., 2009): “It is important to me that the food I eat on a typical day... (1) is good for my physical and mental health; (2) keeps me healthy; and (3) is nutritious”.

Health involvement was measured through four items based on the involvement scale developed by Zaichkowsky (1985), which also corroborates the food involvement scale suggested by Bell and Marshall (Bell and Marshall, 2003). The four items are: “Health is very important to me”, “I care a lot about health”, “Health means a lot to me” and “I appreciate healthy food very much”.

All aforementioned items, which compose three constructs, were measured on 7-point Likert scales anchored by “totally disagree” (1), “neither agree nor disagree” (4), and “totally agree” (7). All three constructs have previously been cross-culturally validated across consumer samples taken from Belgium (French and Dutch language versions), The Netherlands, Spain, Denmark and Poland (Pieniak et al., 2008).

2.3. Segment profiling variables

The segmenting variables were selected to identify specific market opportunities and formulate strategies to promote fish consumption. The profiling variables relate to five themes: fish consumption, attitudes and knowledge about the health benefits of fish, interest in potential informational cues when purchasing fish, and individual socio-demographics characteristics, including self-reported weight and height. Fish consumption was measured as the sum of reported fish consumed at and away from home. A 9-point frequency scale ranging from “never” to “daily or almost every day” was used. This response scale was recoded into frequencies per week (e.g. “never” became 0; “once a week” became 1; and “daily or almost daily” became 6.5 and so on) and aggregated in order to obtain one measure, namely total fish consump-

tion frequency per week. Respondents were also probed for their intention to consume fish, using the validated scale by Pieniak et al. (2007), where they could indicate their next week’s probability of eating fish as a main course on a 7-point scale ranging from “very low probability” (1) to “very high probability” (7). Additionally, the construct of general attitude towards fish consumption was measured using six items that were scored on 7-point semantic differential scales. Respondents were presented with the statement: “Please indicate which word best describes how you feel when you eat fish”. The adjectives at opposite sides of the scale were bad/good, unsatisfied/satisfied, unpleasant/pleasant, dull/exciting, terrible/delightful, and negative/positive. These items have previously been used to assess general attitudes in both marketing (Stayman and Batra, 1991) and food consumption studies (Olsen et al., 2007; Sparks and Guthrie, 1998; Frewer et al., 1994). Next, two knowledge constructs have been included: subjective knowledge and objective knowledge (Brucks, 1985; Park et al., 1994). Subjective knowledge about fish pertains to people’s perceptions of what or how much they know about a product class (fish) and is based on consumer’s interpretation of what s/he knows. It has been measured on a validated scale consistent with measures used in previous studies (e.g. Pieniak et al., 2007). Five items scored on a 7-point Likert scale were included: “Compared to an average person, I know a lot about fish”; “My friends consider me as an expert on fish”; “I have a lot of knowledge of how to prepare fish for dinner”; “I have a lot of knowledge how to evaluate the quality of fish”; “I am as healthy as anyone I know at my age”. Consumer’s level of objective (nutritional) knowledge about fish was measured with six statements, assumed to be common knowledge among at least half of the population, that are either true or false; e.g. “Fish is a source of dietary fibre” (false); “Fish is a source of omega-3 fatty acids” (true); “It is recommended to eat fatty fish once a week” (true); “Consumption of fatty fish is important in the prevention of some chronic diseases, such as cardiovascular diseases” (true); “High maternal fish consumption during pregnancy and infant’s fish intake in the first year improves child developmental skills” (true); and “Consumption of fatty fish and fatty acids lowers risk of coronary heart diseases” (true). A binary scale “true”/“false” was used (Park et al., 1994). We opted for not including a “don’t know” response category, which forced respondents to think and make up their mind about the proposed statements.

Consumers were asked about their interest in emerging information cues. Four possible information cues were selected: “health benefits”, “safety guarantee”, “quality mark”, and “nutritional composition”. The respondents had to indicate to what extent they are interested in each of the included potential information cues. A 7-point Likert scale ranging from “not interested” (1) to “very interested” (7) was used.

2.4. Data analysis

Several studies in the health communication literature have outlined criteria that are appropriate for segmenting audiences (e.g. Clatworthy et al., 2005; Slater, 1996). We have followed the guidelines for reporting cluster analysis recommended by Clatworthy (2005). In order to determine the unidimensionality of the constructs included in the study, a maximum likelihood confirmatory factor analysis on the pooled sample was performed using the robust maximum likelihood procedure in LISREL 8.72. Data were further analysed using the statistical software SPSS version 15.0. A two-step clustering procedure (Wedel and Kamakura, 2000) was applied to obtain segments based on respondents’ health-related attitudes. Ward’s hierarchical clustering method was used to identify distinctive, homogenous segments on the basis of health involvement, interest in healthy eating, and subjective health. After having identified the optimal number of segments, the results

Table 2

Factor loadings and reliability estimates for construct measures related to health attitudes ($n = 2400$).

Constructs and items	Factor loadings
Health involvement	(0.95)
Health is very important to me	0.97
Health means a lot to me	0.94
I care a lot about health	0.91
I appreciate healthy food very much	0.81
Interest in healthy eating	(0.93)
It is important to me that the food I eat on a typical day is good for my physical and mental health	0.95
It is important to me that the food I eat on a typical day keeps me healthy	0.93
It is important to me that the food I eat on a typical day is nutritious	0.82
Subjective health	(0.87)
Compared with people at my age, my health is excellent	0.97
Compared with people at my age, my current physical health is excellent	0.92
Compared with people at my age, my current mental health is excellent	0.66
I am as healthy as anyone I know at my age	0.63

Note: Internal construct/composite reliabilities are reported in parentheses. All factor loadings are significant at $p < 0.001$. Fit-statistics for the pooled data: $\chi^2(41) = 312.75$, $p < 0.001$; RMSEA = 0.053; GFI = 0.97; CFI = 0.99.

were fine-tuned by using the non-hierarchical K -means clustering method (Hair et al., 2006). The profiles of the resulting segments were determined using chi-square cross-tabulation and Univariate General Linear Model (ANOVA) with post hoc Tukey comparison of mean scores. The segments were compared across fish consumption, attitudes and knowledge about the health benefits of fish, interest in potential informational cues when purchasing fish, and individual socio-demographic characteristics.

3. Results and discussion

3.1. Confirmatory factor analysis of the health-related attitude measures

Confirmatory factor analysis of the three construct measures – (health involvement, interest in healthy eating, and subjective health) confirmed that all items in the measurement model reflect the expected theoretical constructs and a four factor solution was best suited for the data. Standardised factor loadings and reliability estimates are presented in Table 2. The individual item loadings on the constructs were all highly significant with values ranging from 0.63 to 0.97 and t -values from 27.86 to 64.42. No cross loadings of 0.4 or more appeared. Hence, all the items were considered in the interpretation of the factors (Hair et al., 2006). Cronbach's alpha internal reliability coefficients ranged from 0.87 to 0.95, thus well above the threshold value for satisfactory scales.

3.2. Segmentation analysis

Respondents' mean scores on health involvement, interest in healthy eating, and subjective health have subsequently been used

as segmentation variables. A four-segment solution emerged as the optimal solution from the analysis (Table 3). Effect sizes, as an estimate of the proportion of variance in the dependent variable (i.e. health-related attitudes in this case) explained by an independent variable (i.e. segment membership), are expressed as partial eta-squared. The partial eta-squared measure has been included in the analysis as our sample size is large and therefore even trivial effects can have impressive looking p -values. The obtained values show that differences between the four segments are significant with the greatest importance/effects for health involvement, followed by interest in healthy eating, and subjective health.

Segment 1 accounts for 29.4% of the sample. Consumers in this segment displayed the lowest interest in healthy eating. They perceived themselves as less healthy than consumers in segments 2 and 4, while they evaluated their own health as just as good as consumers in segment 3. Therefore, we refer to this segment as "low interest in healthy eating".

Segment 2 accounts for 28.2% of the sample. Consumers in this segment were very interested in health and healthy eating and at the same time they evaluated themselves as very healthy and felt very satisfied with their lives. In fact these consumers had the most positive view on own health and life among all consumers; we refer to this segment as "positive health enthusiasts".

Segment 3 is the largest segment (35.0%). Individuals belonging to this segment were the most involved with health and, together with segment 2, the most interested in healthy eating among the four consumer segments. However, consumers in this segment perceive themselves as rather unhealthy. Therefore, we refer to this segment as "health strivers". Segment 4 is the smallest segment (7.4%). Consumers in this segment are rather interested in healthy eating but not at all involved in health in general. Health might not be a major goal for them. But as soon as food comes into play, food-health associations and related attitudes seem to be triggered, which may explain their interest in healthy eating despite a low interest in health in general. Those consumers are referred to as "health uninvolved".

3.3. Differences in segments' consumption of and attitudes related to fish

The low interest in healthy eating consumers reported the lowest fish consumption frequency and the lowest intention to eat fish as compared with consumers belonging to the other segments. The intention to eat fish among positive health enthusiasts is higher than that of either the low interested in healthy eating or the health uninvolved, but on the same level as is among the health strivers. Positive health enthusiasts displayed the highest frequency of fish consumption; however, their consumption is only marginally higher than for health uninvolved. Consumers' overall attitudes towards fish were very positive, though they varied significantly between segments (mean values between 4.91 and 5.81). Positive health enthusiasts and health strivers felt more positive towards fish than low interested in healthy eating and health uninvolved (Table 4).

Consumers' interest in healthy eating was positively associated with fish consumption, which confirms previous studies focussing

Table 3

Mean ratings of the segments on the classification variables.

	Low interested in healthy eating	Positive health enthusiasts	Health strivers	Health uninvolved	F-value	Partial eta-squared	p-value
Size (% of the sample)	29.4	28.2	35.0	7.4			
Size (% of the sample)	29.4	28.2	35.0	7.4			
Health involvement	5.51	6.46	6.49	1.96	2086.05	0.728	<0.001
Interest in healthy eating	4.37	6.41	6.43	5.62	999.06	0.577	<0.001
Subjective health	3.96	6.12	3.99	4.19	514.67	0.542	<0.001

Table 4
Profile of the segments on behaviour and attitudes towards fish consumption.

Behavioural and attitudinal profile	Low interested in healthy eating	Positive health enthusiasts	Health strivers	Health uninvolved	Total sample	F-value	Partial eta-squared	p-value
Total fish consumption ^e	1.50 ^a	2.38 ^b	2.12 ^b	2.07 ^b	2.01	26.57	0.032	<0.001
Intention to eat fish [*]	3.96 ^a	4.95 ^c	4.96 ^c	4.42 ^b	4.67	44.17	0.052	<0.001
General attitude ^d	4.91 ^a	5.81 ^b	5.69 ^b	5.04 ^a	5.45	58.47	0.068	<0.001

Different superscripts indicate significantly different means following ANOVA post hoc Tukey test.

^a Indicates the lowest value.

^b Indicates the highest one in the case of total fish consumption and general attitude.

^c Indicates the highest value for intention to eat fish.

^d 7-Point interval scale.

^e Times per week.

on fish consumption (Pieniak et al., 2008; Olsen, 2003), as well as food choice motives in general (e.g. Sumner and Ross (2002)). However, in this study two groups of consumers with a particularly strong interest in health and food have appeared. One possible explanation, in line with the regulatory focus theory (van Kleef et al., 2005; Higgins, 1997) would be that positive health enthusiasts regulate their behaviours towards positive outcomes, and are interested in health and healthy eating as a means of feeling satisfied with their lives. On the contrary, health strivers would be rather persons with a prevention focus, who will try to regulate their behaviours away from possible negative outcomes, thus are very interested in health and food because they want to prevent from feeling or being unhealthy.

3.4. Differences in segments' knowledge and interest in information about fish

In general consumers did not evaluate themselves as very knowledgeable about fish (Table 5). Positive health enthusiasts reported the highest subjective knowledge, followed by health strivers. The low interest in healthy eating consumers perceived themselves as the least knowledgeable about fish. In contrast with subjective knowledge, consumers' objective knowledge was on a relatively high level in this study. On average more than four of the six presented statements were answered correctly. Health uninvolved and positive health enthusiasts reported significantly higher factual knowledge about fish than consumer segments with a lower interest in healthy eating.

With regard to interest in potential information on the package, on the supermarket shelf or on the product label when buying fish, positive health enthusiasts as well as health strivers scored the highest on all four potential information cues, i.e. health benefits, safety guarantee, quality mark and nutritional composition. They were simply very interested in obtaining information about fish. On the other hand, consumers belonging to "low interest in

healthy eating" segment scored the lowest (close to the neutral point of the scale) on those cues as compared to the other segments. Interestingly, a larger proportion of variance in segment membership is explained by interest in additional information cues as compared to the effects of knowledge, attitudes and behaviour towards fish.

3.5. Socio demographic profiling of the segments

As compared to the distribution in the total sample, there were relatively more women to men among the health uninvolved and more men to women among the low interested in healthy eating (Table 6). The gender distribution of positive health enthusiasts as well as health strivers was very similar to the one of the total sample. Health uninvolved and low interested in healthy eating were the youngest segments with relatively more of the youngest respondents and less of the older ones (>50 years of age). Positive health enthusiasts and health strivers were older. Previous studies found that people most likely to have negative attitudes or low motivation towards healthy eating are mainly young low-educated men from the lowest social class (Hearty et al., 2007). Our findings corroborate nutrition literature in this area. In this study, individuals belonging to the segment low interest in healthy eating consist of relatively more young men who show the lowest interest in healthy eating. Women have been found to be more aware of diet and health issues and embrace dietary change to a greater degree than men (Girois et al., 2001). Low interested in healthy eating consisted also of significantly more respondents from the youngest age class and less of the oldest respondents. Wądołowska et al. (2008) also found a group of consumers who were low interested in the influence of food on health. Those results correspond with our low interested in healthy eating consumers.

The low interest and low involvement in health and healthy eating as well as the very low subjective health might be related to the age of consumers belonging to low interested in healthy eat-

Table 5
Profile of the segments on knowledge and interest in information related to fish.

	Low interested in healthy eating	Positive health enthusiasts	Health strivers	health uninvolved	F-value	Partial eta-squared	p-value
Subjective knowledge	3.19 ^a	4.13 ^c	3.53 ^b	3.30 ^{a,b}	50.99	0.060	<0.001
Objective knowledge [*]	4.35 ^a	4.71 ^b	4.65 ^b	4.74 ^b	10.58	0.013	<0.001
Health benefits	4.32 ^a	5.82 ^c	5.73 ^c	5.06 ^b	173.45	0.178	<0.001
Safety guarantee	4.65 ^a	6.24 ^c	6.11 ^c	5.35 ^b	214.80	0.212	<0.001
Quality mark	4.72 ^a	6.16 ^c	6.05 ^c	5.33 ^b	177.37	0.182	<0.001
Nutritional composition	4.61 ^a	5.99 ^c	5.97 ^c	5.39 ^b	164.97	0.171	<0.001

Different superscripts indicate significantly different means following ANOVA post hoc Tukey test.

^a Indicates the lowest value.

^b Indicates the middle one.

^c Indicates the highest value.

^{*} Number of correct answers (0 = none answer correct; 6 = all answers correct).

Table 6
Socio-demographic profile of the segments (%).

Socio-demographic profile	Low interested in healthy eating	Positive health enthusiasts	Health strivers	Health uninvolved	Total sample	p-value	Pearson χ^2 /F-value
Mean age (years) ^a	39.4 ^a	44.6 ^c	42.3 ^b	38.2 ^a	42.7	<0.001	23.98
Age (classes)						<0.001	84.28
20–29 years	29.2	17.5	19.9	34.2	23.0		
30–39 years	23.1	21.2	25.7	23.0	23.5		
40–49 years	24.6	20.4	21.8	20.2	22.1		
50–59 years	14.4	22.8	19.4	15.2	18.6		
60–70 years	8.6	18.2	13.2	7.3	12.8		
Gender						0.010	11.30
Male	39.1	35.4	32.9	27.5	35.0		
Female	60.9	64.6	67.1	72.5	65.0		
Education						0.153	5.27
Primary or secondary	46.7	50.9	46.3	52.8	48.2		
Higher education	53.3	49.1	53.7	47.2	51.8		
Country						<0.001	100.90
France	41.4	33.1	31.2	12.4	33.3		
Poland	32.0	27.7	33.5	59.6	33.3		
Spain	26.6	39.2	35.4	28.1	33.3		
Nutritional status						0.003	25.32
Underweight (BMI < 18.5)	2.8	3.9	2.9	3.9	3.2		
Normal (18.5 ≤ BMI < 25)	45.0	52.6	49.8	49.4	49.1		
Overweight (25 ≤ BMI < 30)	32.5	33.0	31.1	30.3	32.1		
Obesity (BMI ≥ 30)	19.7	10.5	16.2	16.3	15.6		

^a Different superscripts indicate significantly different mean ages following ANOVA post hoc Tukey test.

^a Indicates the lowest value.

^b Indicates the middle one.

^c Indicates the highest value.

ing, which was significantly lower than among consumers in positive health enthusiasts and health strivers, while not significantly different from the average age in health uninvolved.

Education levels were not found to be significantly different between the segments. With regard to country distribution between the segments, relatively more French consumers and less Spanish belonged to low interested in healthy eating. Positive health enthusiasts consisted of relatively more Spanish consumers and of less Polish ones. In the segment of health strivers the nationalities are equally represented. Finally, the majority of health uninvolved consumers were living in Poland. There were significantly less French and Spanish consumers in this segment as compared to the total profile of the sample.

Considering the nutritional status, there were relatively fewer normal weight consumers and more obese among consumers characterised as low interest in healthy eating; and relatively more normal weight and fewer obese people among the positive health enthusiasts. The distribution of the nutritional status in health strivers and health uninvolved was very similar to the total sample.

4. Implications and conclusions

Four consumer segments, based on health-related attitude constructs, for which the within-group differences were significantly smaller than between-group differences, were identified. The four segments could be distinguished based on their consumption of and attitudes towards fish, knowledge level, interest in potential information cues about fish and finally classical socio-demographic characteristics such as age, gender, education, and nationality, which yields opportunities with respect to targeted information provision and communication efforts.

Earlier research on generic advertising has shown that knowledge about consumer involvement, attitudes and perceived problems is crucial in order to design the right communication strategy as well as message content (Verbeke and Ward, 2001;

Scholderer and Grunert, 2001). Also it was revealed that generic campaigns have the weakness of dealing with the so-called average consumer as well as with generic products. In their study about the potential impact of health advertising on fruit and vegetable consumption, Geeroms et al. (2008) concluded that consumers' reactions in terms of attitudes and behavioural intentions were more positive towards advertising targeted to a particular segment's health-related motives than towards a more general and generic advertisement. One way to overcome these limitations is to target communication to consumer segments that differ significantly on relevant aspects that influence how different segments may perceive and evaluate information.

First, the segment of consumers with low interest in healthy eating emerges as a quite vulnerable group, deserving special attention from both food and health policymakers. This segment accounts for 29.4% of the sample and consists of relatively more French and fewer Spanish consumers, as well as relatively younger and more male consumers. They are also characterised by a much higher obesity rate than other segments, and they report very low/neutral interest in healthy eating. This associates with the lowest intention to eat fish and the lowest rate of fish consumption, as well as the lowest interest in information related to fish. Raising their interest in healthy eating, for instance through stressing personal health benefits from healthy eating in general, as well as advantages of fish consumption for human health, emerges as the most challenging communication objective for this particular segment. Furthermore, arguments relating to hedonic values or pleasure from eating tasty fish might have a better chance for having an impact among this low interested in healthy eating consumer segment.

Second, relatively high partial eta-squared values were observed for interest in potential fish informational cues. This indicates that a larger proportion of variance in segment membership is explained by interest in additional information cues as compared to the effects of knowledge, attitudes and behaviour towards fish. Fish marketers and policy makers could take advan-

tage of positive health enthusiasts' and health strivers' high interest in potential information cues placed on fish labels, particularly in a safety guarantee and a quality mark. This high interest in fish information might provide opportunities for effective and efficient communication through seafood labels. Providing new or stressing existing information cues (related to nutrition, safety or quality) can create new areas of competition and associated opportunities for product differentiation, between producers by increasing consumer awareness and stimulating demand for new products attributes (Golan and Unnevehr, 2008). Additionally, it might improve a brand's or labelling scheme's image with consumers.

Third, the size and current behaviour of some segments make them quite appealing for food marketers. The segment of positive health enthusiasts accounts for 28.2% of the sample. This segment includes less of the youngest respondents and more of the older participants (50–70 years of age); relatively more Spanish consumers and less Polish ones. In fact these consumers have the most positive view on their own health. Additionally, members of this segment display already the highest levels of fish consumption and the highest intention to eat fish. Members of this segment, together with health strivers, reported the most positive overall attitude towards fish and are the most interested in additional information cues. The segment of health strivers is the biggest consumer segment and accounts for 35.0% of the sample. Individuals belonging to this segment are the most involved with health and the most interested in healthy eating among the four consumer segments. On the other hand consumers in this segment evaluate their own health relatively low, which may be due to the fact that they are already concerned about their health and have a strong interest in healthy eating, meaning that they have high requirements about what to eat and how to stay healthy. Members of this segment and the positive health enthusiasts display the highest intention to eat fish and a high fish consumption level. They also report the most positive overall attitude towards fish.

Fourth, this study reveals that there is a group of consumers who report very low health involvement (health uninvolved), but at the same time moderate to relatively high interest in healthy eating which seems a bit confusing. This is the smallest segment and accounts for 7.4% of the sample. Additionally, together with consumers with low interest in healthy eating, this is the youngest segment. The health uninvolved segment consists of relatively more women to men; more Polish respondents (59.6% of the segment) and less Spanish and French. They are rather interested in healthy eating but not at all involved in health. Therefore health may not be a major goal for them. But as soon as food comes into play, food-health associations emerges. Individuals belonging to this segment display moderate interest in additional information cues and hold moderate attitudes towards fish consumption. Despite their highest level of factual nutritional knowledge related to fish (together with positive health enthusiasts), their subjective knowledge about fish was on a moderate level.

These health-uninvolved individuals are least likely to actively utilise health information sources and thus lose out important opportunities to develop health prevention and maintenance types of activities to stay healthy, for instance cancer screenings. There is a need for nutrition education and more effective communication about links between diet and personal health, thus stressing the importance of healthy eating and fish consumption as a part of a healthy eating pattern, to those consumers from both public and private sector.

Nevertheless, it is important to acknowledge that increased fish consumption for all segments of consumers is not necessarily more healthful. The identified segments can be used to help health and policy professionals to better target particular population groups who might be at higher risk for e.g. environmental contaminants such as child-bearing aged and especially pregnant women who

should avoid consumption of fish with high levels of methylmercury or dioxin-like PCBs.

One of the most cited models discussing persuasion, e.g. when and how information (such as advertising) works, is the Elaboration Likelihood Model (ELM) originally proposed by Petty and Cacioppo (Petty and Cacioppo, 1981). The ELM distinguishes between elaborate and non-elaborate information evaluation. Elaborate processing is when the information in a message (e.g. attributes and arguments) is cognitively evaluated and used to form attitudes about the message and the message object (e.g. fish products and/or health). When this is the case a communication strategy emphasising product attributes, benefits and arguments is most persuasive. This is also referred to as the Central Route to Persuasion. Non-elaborate information processing is when other aspects than 'serious' or rational information is provided, perceived and processed in order to form an attitude towards the message or message object. In this case a communication strategy emphasising repetition, humour, size and colours or celebrity endorsers will be more effective. This is referred to as the Peripheral Route to Persuasion.

The major determinant of which route consumers will be most likely to use for processing information is their level of involvement. The higher the involvement in the product or situation, the more likely it is that the Central Route will be applied, and reversely, the lower the involvement in the given product or situation, the more likely it is that the Peripheral Route will be chosen.

Since the discriminating factors among segments found in this study represent levels of involvement, we may expect a clear difference in the likelihood of processing information, which will demand a targeted communication strategy. Different types of arguments, information complexity and cues will be necessary to appeal to the different segment profiles. The two lowest level involved segments (low interested in healthy eating and healthy uninvolved segments) will require easy comprehensible and appealing communication in order to achieve persuasion to eat more fish, while the two higher level involved segment (positive health enthusiasts and health strivers segments) will require advanced and complex messages including not too simple arguments in order to be persuaded. Furthermore, both streams of communications should be targeted to the attitudes expressed by the individual segments in order to be most appealing. Last, but not least, the source of the message (public versus commercial) is also important to take into account, since earlier research showed that public sources in general have a higher credibility compared to commercial sources (Pieniak et al., 2007).

Therefore, in order to be efficient and effective, food marketers, food policy makers and health practitioners are recommended to deliver tailored marketing and communication messages, including the provision of specific fish information to each of the identified consumer segments. The present study sheds light on the existence of distinct segments, and it has revealed the basic characteristics of these consumers, which are relevant to future food policy, marketing and communication efforts.

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