

Can we predict who adopts health-promoting foods? Users of functional foods in Finland

Mari Niva

National Consumer Research Centre, Helsinki, Finland

Abstract

Background: Healthy eating has a social pattern, with women and those in high socioeconomic positions most likely to follow dietary guidelines. However, little is known about the association of sociodemographic and health factors with the use of health-promoting functional foods.

Objective: The study examined the use of functional foods in Finland. Four widely used product types were examined in detail with respect to sociodemographic factors and personal efforts to promote health.

Design: Data were obtained by computer-assisted telephone interviews of 1210 respondents representing the Finnish population above 15 years of age. Logistic regression analysis was applied to analyse the predictors of use of functional foods.

Results: Sociodemographic variables were associated with the use of functional foods. The role of gender and age varied. In most cases, high education or high occupational position predicted use. Use was also associated with viewing healthy eating as important and consuming other functional foods. Efforts to lower cholesterol levels predicted the use of cholesterol-lowering spreads.

Conclusions: Both sociodemographic factors and personal health efforts play a role in the adoption of functional foods. High socioeconomic position predicts use, whereas age and gender remain product specific. An important aspect is the connection of functional foods with efforts to lead a healthy life. For health-orientated consumers, functional foods may represent a complementary health practice.

Keywords: consumers; eating; functional foods; health; sociodemographics

Received: 19 Jan. 2006; Revised: 22 Feb. 2006; Accepted: 24 Feb. 2006

Introduction

Since the early 1990s, advances in life sciences and food technologies have resulted in the new food concept of functional foods, designed to improve health and even to reduce the risks of diseases beyond the effects of conventional foods (1). Functional foods provide new opportunities with great expectations for both the food industry and nutrition research. In Western countries, product development is intense and new functional food products are proliferating on the market. In Finland, the number of functional foods available to consumers was estimated to exceed 100 in 2004 (2).

Consequently, since the late 1990s functional foods have become a subject in consumer research. Several studies have examined consumers' willingness to use hypothetical functional foods with varying product characteristics, such as different processing methods, tastes, health effects or health

claims (3–5). In addition, surveys have investigated attitudes towards functional foods (6, 7). Qualitative studies have focused on the meanings of functional foods to consumers and pointed out that the acceptability of functional foods cannot be taken for granted. People place functional foods in between foods and medicine, and between the “natural” and the “technological”. In addition, consumers doubt the necessity for new health-promoting foods and the credibility of health claims (8–11).

However, so far few studies have focused on functional foods in everyday life by examining the use of products that are already on the market. In this article, factors that may explain the adoption of functional foods are investigated. The user shares of 10 functional foods on the Finnish market are studied, and four products with the largest user shares are examined in more detail by analysing the

relationship between use and background factors. In addition, the reasons for use and non-use, as well as users' experiences of the products, are studied. The final section presents a discussion on the extent to which the use of functional foods can be predicted by background factors, and whether it is better explained by sociodemographic variation or efforts to lead a healthy life.

Sociodemographic differences and the role of healthiness in eating

In modern societies consumers face a more varied and complex food supply than ever before. Recent developments in food production and global trade have both increased variety in terms of culinary options and diminished contrasts between socioeconomic groups (12). The role of individual preferences, deliberate choices and diversity of lifestyles in eating is more salient than ever (13). From this perspective, eating is regarded as a personal choice, an expression of identity and a sign of lifestyle.

However, sociodemographic and economic factors such as age, gender, education and occupational status remain central differentiating principles in eating habits, and sociodemographic discrepancies in food behaviour and nutrition have far from vanished (14–17). Both in Finland and in other Western countries, women and highly educated people still eat more healthily than men and less educated people (18), and older people are more willing than young people to adopt eating habits in accordance with recommendations (19). In addition, having children has been found to improve the nutritional quality of the diet (16). Roos (18) concluded that food choices of different classes express “modernity” and “traditionality” to varying degrees. High socioeconomic position is associated with eating “modern”, high-status foods such as fruits and vegetables, juice, cheese and candies. The less advantaged are more likely to eat traditional, low-status foods, such as butter, milk, bread and potatoes.

Thus, the developments relating to increasing diversity of lifestyles as well as the enduring role of socioeconomic differences seem to occupy a role in modern patterns of eating. Beardsworth and Keil (20) illustrate this two-dimensionality with the concepts of “menu differentiation” and “menu pluralism”, in which “menu” refers to the guiding principles of food choice. Even in modern societies menus are differentiated based on gender, age,

education and occupation, but at the same time, people increasingly face a plurality of competing principles, such as traditional, rational, hedonistic or moral menus, by which to organize their diets [cf. “food rationales” by Germov and Williams (21)].

The concept of functional foods concurs with individualizing eating patterns and the view of food as a lifestyle choice, and especially with the idea of health as an organizing principle of eating. Functional foods depart from the conventional conceptions of healthy eating characterized by balance, moderation and variety, and assume a targeted orientation to eating with the focus on food-specific health promotion. This is an aspect that some critics of functional foods have characterized as a “reductionist” approach to eating (22). Against this background, it is important to understand by whom functional foods are used and in what ways their use is connected to everyday practices of maintaining health.

The first objective was to study the patterns in which sociodemographic backgrounds are related to the use of functional foods. The few earlier studies about use-related factors have given somewhat contradicting results. In the Netherlands, de Jong et al. found that sociodemographic factors were only weakly associated with the use of functional foods. In certain products, women and young people were the most likely users (23). The study by Laatikainen et al. (24) indicated that in Finland, older consumers and women were more active users of functional or vitamin-enriched foods than young people and men. According to Anttolainen et al. (25) and de Jong et al. (26), the Finnish users of plant stanol ester margarine were likely to be above 45 years of age, men, married, with high education and income and in white-collar occupations, and there was an association with non-smoking and otherwise healthy eating. These partly dissimilar results of different studies suggest that the relationship between sociodemographics and the use of functional foods is multifaceted. The second objective was to study the association of the use of functional foods with other activities that can be regarded as part of striving for healthiness, such as exercise, weight control, paying attention to cholesterol levels or using dietary supplements, aspects that were not focused on in earlier studies.

Data and methods

Data collection

The data were collected by computer-assisted telephone interviews (CATI) in spring 2002 by the Finnish marketing research institution Taloustutkimus Oy by commission of the National Consumer Research Centre. A systematic sampling method based on regional telephone directories was used and quotas were applied to gain a sample representing the Finnish population with regard to age (15 years or older), gender and geographical distribution (Table 1). The net sample comprised 1210 respondents.

At the beginning of the interview the respondents were asked whether they would like to participate in a study on consumer views on food and functional foods. The interviewees did not receive any reward for their participation. To protect the anonymity of the interviewees the data did not contain any identifying information. The interviews lasted on average for 16 min and consisted of four thematic sections. The first part concerned general views of healthy eating. In the second part, the respondents were asked how often they used 10 functional food products, reasons for use and health effects experi-

Table 1. Comparison of the sample to the population aged 15 years or over at the beginning of 2002.

	Sample (%)	Population (% of the over 15-year-old population in 2002) ^a
Gender		
Men	50	48
Women	50	52
Age (years)		
15–29	19	23
30–44	29	26
45–59	27	27
≥60	25	25
Area of residence		
Southern Finland	46	50
Western Finland	25	25
Eastern Finland	18	13
Northern Finland	10	12
Education		
Basic	29	41
Intermediary (upper secondary school, vocational school)	52	36
Higher level (university)	19	23

^a Source: Statistical Yearbook of Finland 2003 (27).

enced. The third section focused on the acceptability of functional foods and the last part asked about sociodemographic background, food habits and health efforts.

Products in the analysis

The products chosen for the study represented a variety of functional foods on the Finnish market. Three criteria were used in the selection of the products: (i) they had been marketed as functional; (ii) they had been categorized as functional foods by experts in the field (28); and (iii) they had been on the market long enough to be recognized by consumers (a year was regarded as a minimum). The following products were included: xylitol chewing gum, two brands of probiotic foods (mainly milk products), spreads containing plant stanol or sterol (both with an effect on blood cholesterol), rolled oats enriched with oat bran (henceforth referred to as rolled oats and bran), “well-being” drinks with added fibre or omega-3 fatty acids, convenience foods with plant stanol, milk drink with bioactive peptides (effect on blood pressure), meat-based convenience foods with added vegetable oils and fibre, and a yoghurt-type fermented oat product with fibre and lactic acid bacteria. To aid respondents in identifying the products, the foods were presented with their brand names, including examples of the product types. Only xylitol chewing gum was presented as a generic product, because of the variety of xylitol brands on the market (29).

The user shares of all 10 products were examined and the four most widely used products or combinations of similar products were selected for a more detailed analysis. The four products represented a variety of types of functional foods and included xylitol chewing gum, probiotic foods (two brands combined so that the models predicted the probability of using one or both probiotic foods), cholesterol-lowering spreads (two brands in the original question), and rolled oats and bran.

Methods of analysis

The data were analysed by logistic regression analysis, with the probability of each respondent using a particular functional food as the dependent variable (30). Initially, the frequency of use was measured on a six-point scale consisting of non-use, trial, occasional, monthly, weekly and (almost) daily use. From this, a true dichotomy was created and the study focused on only two groups: the regular

(weekly/daily) users and those who did not use the products at all. Daily or weekly use for each of the four products was coded as 1 (regular use) and non-use as 0. The irregular users (i.e. those who had tried or used the products only occasionally or monthly) were left out of the analysis since they were a less clearly definable group than users and non-users.

All analyses were conducted using SPSS statistical software version 12.0.1. First, the unadjusted effects of each explanatory categorical variable were analysed, including gender, age, education, occupational status, evaluation of the importance of healthy eating, frequency of exercise, efforts to lower cholesterol levels and the use of other functional foods. The variable “importance of healthy eating” was constructed based on a summated scale variable (Cronbach’s $\alpha=0.6314$) including five statements on which the respondents were asked to take a stand using a five-point Likert scale (1 = totally disagree, . . . , 5 = totally agree). The scale variable included the following items: (a) I don’t pay much attention to the healthfulness of food (reversed); (b) I pay attention to the fibre contents of foods; (c) I prefer to eat foods that are processed as little as possible; (d) I often eat ready meals (reversed); and (e) I prefer organically produced foods. The scale variable was transformed into a two-category variable so that values of $x < 3.5$ were coded as “not very important” and $x \geq 3.5$ as “very important”. The variable “use of other functional foods” was a dichotomous variable depicting the use of one or more of the other products in the list. The unadjusted effects of the explanatory variables are presented in Tables 2 and 3 under the heading “crude effects” for each product.

Some additional variables with a hypothesized association with use were tested, including household composition (children in the household or not), region of residence (southern, western, eastern or northern Finland), size of the community (more than or fewer than 100 000 inhabitants), use of vitamins and supplements (yes or no) and weight management (controls one’s weight or not). These variables showed some significant unadjusted effects, but were insignificant in the models that took the multicollinearity into account and adjusted for other variables. They were therefore left out of the models and are not reported here in detail.

Models consisting of blocks of variables were constructed. In the models, the variables were added so that in the first block, only sociodemographic

variables (gender, age group, education level and occupational status) were included (model 1). The second block added two variables related to generic health efforts, i.e. the importance of healthy eating and the frequency of physical exercise (model 2). In the third block, further variables relating to two specific health effort variables were added, i.e. efforts to lower blood cholesterol levels and the use of one or more other functional foods in addition to the target variable (model 3).

In addition, it was hypothesized that the socio-demographic variables gender, age and education may interact with each other. Hence, the models were elaborated by studying two-way interactions between the three sociodemographic variables. The interaction terms were added in the models as separate blocks and their significance levels were examined. Only one significant interaction was detected, i.e. an interaction between gender and age in the use of cholesterol-lowering spreads when adding the interaction term into the main effect model 2. The nature of this interaction is specified in Table 4.

Results

Study sample

The study sample was representative of the Finnish population with regard to age (15 years or older), gender and geographical distribution. However, Table 1 shows that respondents with intermediary education were somewhat overrepresented and those with basic education underrepresented compared with the whole population.

The rate of co-operation was 26%. However, many respondents had to be rejected owing to the quota procedure. When the particular quota taking into account gender, age and the province of residence was filled no more respondents in this quota could be accepted. Hence, the final number of respondents (1210) represented 18% of those with whom contact was made (see Discussion).

User shares of 10 products

The most popular product was xylitol chewing gum, which was used at least sometimes by nearly four of out of five respondents, and regularly by more than a half (Fig. 1). Owing to a programming error in data collection, the frequency of use of xylitol chewing gum remains unknown for 55 consumers. Probiotic foods were the second most popular

Table 2. Factors explaining the use of probiotic foods and rolled oats and oat bran^a

Variable		Probiotic foods					Rolled oats and oat bran				
		Crude effects ^b		Adjusted models (model no.)			Crude effects ^b		Adjusted models (model no.)		
		n	OR	1 OR	2 OR	3 OR	n	OR	1 OR	2 OR	3 OR
Gender	Men	197	1	1	1	1	458	1	1	1	1
	Women	205	1.75**	1.45	1.19	1.15	463	1.77**	1.87***	1.65**	1.66**
Age group (years)	15–29	54	1	1	1	1	179	1	1	1	1
	30–44	105	1.58	1.24	1.04	1.25	258	0.95	0.93	0.94	0.92
	45–59	116	2.02*	1.40	1.06	1.42	244	1.44	1.37	1.24	1.25
	≥60	127	0.79	1.20	0.86	1.27	240	1.92**	1.91*	1.60	1.61
Education	Basic	118	1	1	1	1	262	1	1	1	1
	Intermediary	217	1.44	1.29	1.28	1.15	474	0.90	1.05	1.08	1.04
	Higher	67	1.74	1.58	1.62	1.39	185	0.49**	0.45*	0.45*	0.42**
Occupational status	Not working	164	1	1	1	1	379	1	1	1	1
	Farmer or private entrepreneur	47	1.14	0.93	0.82	0.81	96	0.87	1.21	1.21	1.21
	Blue-collar or lower white-collar	122	1.66*	1.71	1.67	1.65	277	0.79	1.00	0.99	0.95
	Upper white-collar or executive	69	1.76*	1.79	1.88	1.90	169	0.85	1.64	1.69	1.67
Importance of healthy eating	Not very important	117	1	1	1	1	279	1	1	1	1
	Very important	285	2.30***	2.10**	1.88*	1.88*	642	2.26***	1.59*	1.59*	1.50
Frequency of exercise	Weekly or less	116	1	1	1	1	294	1	1	1	1
	Several times a week or daily	286	1.45	1.28	1.19	1.19	627	2.27***	1.97**	1.97**	1.95**
Trying to lower cholesterol level	No	250	1	1	1	1	617	1	1	1	1
	Yes	152	1.34	0.92	0.92	0.92	304	1.56**	1.40	1.40	1.40
Use of other functional foods (from Fig. 1)	No	115	1	1	1	1	240	1	1	1	1
	Yes, at least weekly	287	2.52***	2.29**	2.29**	2.29**	681	1.43	1.61*	1.61*	1.61*
Constant				0.70	0.50	0.28			0.14***	0.07***	0.05***
Nagelkerke R ²				0.06	0.09	0.13			0.06	0.09	0.10
–2 log likelihood				534.14	506.23	495.25			894.24	875.78	866.49

^a Results from logistic regression analyses. The table presents crude effects and adjusted odds ratios (ORs) (variables entered in blocks) for the likelihood of being a regular as opposed to a non-user.

^b Constants not shown.

****p* < 0.001, ***p* < 0.01, **p* < 0.05.

Table 3. Factors explaining the use of xylitol chewing gum and cholesterol-lowering spreads^a

Variable		Xylitol chewing gum					Cholesterol-lowering spreads				
		Crude effects ^b		Adjusted models (model no.)			Crude effects ^b		Adjusted models (model no.)		
		<i>n</i>	OR	1 OR	2 OR	3 OR	<i>n</i>	OR	1 OR	2 OR	3 OR
Gender	Men	436					416				
	Women	471	1.61**	1.81**	1.74**	1.75**	417	0.65**	0.61**	0.55**	0.56**
Age group (years)	15–29	197					160				
	30–44	270	0.48	0.19**	0.18**	0.18**	221	0.93	0.85	0.78	0.67
	45–59	224	0.10***	0.06***	0.05***	0.05***	229	1.61	1.62	1.40	0.91
	≥60	216	0.01***	0.01***	0.01***	0.01***	223	2.07**	2.24**	1.92*	1.32
Education	Basic	264					243				
	Intermediary	468	3.93***	2.43***	2.44***	2.28***	443	1.21	1.52*	1.52*	1.47
	Higher	175	5.11***	3.10**	3.13**	2.92**	147	1.61*	2.05*	2.09**	1.74
Occupational status	Not working	364					349				
	Farmer or private entrepreneur	95	1.73*	1.39	1.38	1.47	99	0.57	0.58	0.57	0.57
	Blue-collar or lower white-collar	296	5.37***	2.69**	2.68**	2.64**	253	0.77	0.96	0.94	0.75
	Upper white-collar or executive	152	5.23***	2.08	2.07	1.99	132	1.11	1.08	1.09	1.07
Importance of healthy eating	Not very important	262					234				
	Very important	645	.69*		1.17	1.07	599	1.56*		1.60*	1.37
Frequency of exercise	Weekly or less	275					243				
	Several times a week or daily	632	.74		1.10	1.07	590	1.15		1.06	1.04
Trying to lower cholesterol level	No	619					555				
	Yes	288	0.57***			1.26	278	5.30***			5.07***
Use of other functional foods (Fig. 1)	No	404					215				
	Yes, at least weekly	503	1.36*			1.81**	618	2.00**			2.51***
Constant				9.22***	8.13***	3.75***			0.22***	0.17***	0.07***
Nagelkerke <i>R</i> ²				0.51	0.52	0.53			0.07	0.08	0.23
–2 log likelihood				680.37	679.70	669.19			887.25	881.60	784.28

^a Results from logistic regression analyses. The table presents crude effects and adjusted odds ratios (ORs) (variables entered in blocks) for the likelihood of being a regular as opposed to a non-user.

^b Constants not shown.

****p* < 0.001, ***p* < 0.01, **p* < 0.05.

Table 4. Specification of the interaction between gender and age for cholesterol-lowering spreads^a

Variable	<i>n</i>	Cholesterol-lowering spreads
		(specification of model 2) OR
Age and gender	45–59-year-old men	1
	15–29-year-old men	0.54
	30–44-year-old men	0.51*
	≥60-year-old men	0.82
	15–29-year-old women	0.34**
	30–44-year-old women	0.21***
	45–59-year-old women	0.31***
	≥60-year-old women	0.83
Education	Basic	1
	Intermediary	1.60*
	Higher	2.21**
Occupational status	Not working	1
	Farmer or private entrepreneur	0.56
	Blue-collar or lower white-collar	0.95
	Upper white-collar or executive	1.09
Importance of healthy eating	Not very important	1
	Very important	1.65*
Frequency of exercise	Weekly or less	1
	Several times a week or daily	1.10
Constant		0.27***
Nagelkerke <i>R</i> ²		0.09
–2 log likelihood		873.46

^a When the term gender*age was added into model 2 there was a significant interaction ($p=0.046$, no table). In this specification, age and gender were combined into an eight-class variable and 45–59-year old men were selected as the reference class. The table presents adjusted odds ratios (ORs) for the likelihood of being a regular as opposed to a non-user.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

product, with more than one in three respondents reporting daily or weekly use (34% for brand 1 and 6% for brand 2; 36% used one or both). The regular user shares of cholesterol-lowering spreads and rolled oats and bran were also relatively high, about one in six respondents, respectively. For the other products, regular use was much less common.

Factors related to use of functional foods

The results of the logistic regression analyses for each of the four selected products are presented in Tables 2 and 3 for the main effects models. Table 4 presents a specification of model 2 for cholesterol-lowering spreads that takes into account the interaction between gender and age.

Probiotic foods. The significant crude effects for probiotic foods (Table 2) included gender, age, occupational status, importance of healthy eating and the use of other functional foods. The most likely users were women, middle-aged people, those in blue-collar, white-collar or executive occupations,

those regarding healthy eating as important and those using other functional foods. When adjusting for other variables, however, most explanatory variables showed no significant effects. Only the importance of healthy eating proved significant in model 2, and in model 3 the importance of healthy eating and the use of other functional foods showed significant effects. The share of explained variance remained at the modest level of 13%. Unlike for the other products, the use of probiotic foods was not related to age in the models reported above, even though in model 1 the effect was close to significant ($p=0.089$). However, models that were constructed separately for the two brands showed some brand-based variation with respect to age (data not shown). Elderly people were the group most likely to use brand 1 and young people were most likely to use brand 2.

Rolled oats and bran. The significant crude effects of rolled oats and bran (Table 2) included all independent variables except for occupational status

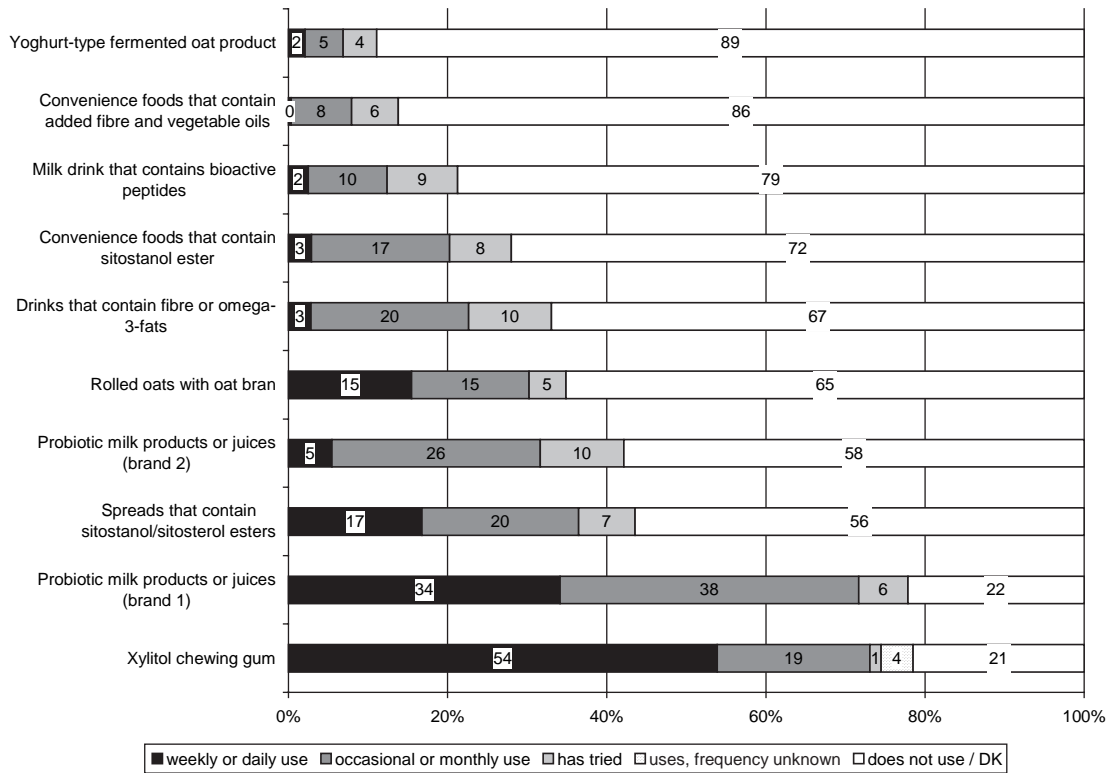


Fig. 1. User shares of 10 functional foods (n = 1210, percentages shown in the bars). DK: don't know.

and the use of other functional foods. In the adjusted effects, the order of magnitude of the odds ratios did not change remarkably, but age group, importance of healthy eating and trying to lower cholesterol lost their significance. Thus, the adjusted effects indicated that rolled oats and bran were most likely to be used by women, elderly people (although age was significant only when not adjusting for health efforts), and those with basic or intermediary education, exercising on a regular basis and using other functional foods. As a traditional and relatively inexpensive Finnish breakfast food, this product seems to be used more often by less educated people (19). As for probiotic foods, the share of explained variance was relatively low, at 10%.

Xylitol chewing gum. For xylitol chewing gum (Table 3), the only variable with no significant unadjusted association was the frequency of exercise. An interesting detail in the crude effects was that those appreciating healthy eating were less likely to use xylitol chewing gum. This was due to the fact that elderly people, who were the least active users, rated the importance of healthy eating considerably higher than young people. The ad-

justed effects indicated that the most probable users of xylitol chewing gum were women, young people, highly educated people, those in blue- or lower white-collar occupations and those also using other functional foods. Xylitol use was exceptionally strongly divided by age. Compared with the other products, it was also more strongly related to education and occupational status. In this case, the share of explained variance was 53%.

Cholesterol-lowering spreads. For cholesterol-lowering spreads (Table 3), the unadjusted effects showed that men, elderly people, highly educated people, and those regarding healthy eating as important, trying to lower their cholesterol levels and using other functional foods were the most likely users. The only age group differing from the reference group of 15–29-year-olds was the oldest one, those over 60 years of age. Entering variables in blocks did not substantially change the results, except that some odds ratios were no longer significant when adjusting for other variables. Thus, the effects of age group, education and the importance of healthy eating disappeared when adjusting for efforts to lower cholesterol level and the use of other functional foods. In contrast, efforts to

lower cholesterol and using other functional foods predicted the use of cholesterol-lowering spreads. The percentage of explained variance in model 3 was 23%.

However, for cholesterol-lowering spreads a significant interaction effect between gender and age ($p=0.046$) was found when adding the interaction term in the main effects model 2 (no table). In other models no significant interactions were found. The nature of the interaction was examined by recoding gender and age into an eight-class combination variable. To clarify where the largest differences between the categories were, the 45–59-year-old men were selected as the reference class. In this specification of model 2 (Table 4), 30–44-year-old men and women between the ages of 15 and 59 were less likely users of cholesterol-lowering spreads than the reference group. Young, 15–29-year-old men (although here $p=0.107$), and men and women over 60 years old did not differ significantly from the reference group. This suggests that cholesterol-lowering spreads become a likely option at an older age for women than for men. However, when adjusting for efforts to lower cholesterol level and the use of other functional foods (model 3), such an interaction could no longer be found.

Reasons for use and non-use

The expressed reasons (based on open-ended questions) for using functional foods were most often related to health arguments. Cholesterol-lowering foods were primarily used for their effect on cholesterol (46% of regular users), probiotic foods for the well-being of the stomach (49% for brand 1 and 17% for brand 2) and xylitol chewing gum for the well-being of the teeth (74%). Other reasons for the use of these products that were mentioned relatively often included general healthiness, functionality and good taste. The motives for using rolled oats and bran included healthiness in general, well-being of the stomach and good taste. Around half of the regular users of each product had felt an effect on their well-being. For xylitol chewing gum, this share was 52%, for probiotic foods 62% and 47% (brands 1 and 2, respectively), for cholesterol-lowering spreads 43% and for rolled oats and bran 56%. The experienced effects included good condition of teeth (xylitol) or stomach (probiotic foods and oatmeal), and decreased levels of cholesterol (spreads).

Regarding respondents who had not used any of the products or had used only xylitol chewing gum (7% of the respondents), the most common reasons for non-use were a general lack of interest in or knowledge about functional foods, high prices and not seeing any reasons to use the products.

Discussion

Before discussing the findings in detail, a note on the generalizability of the results is needed. The response rate (18%) was relatively low, but comparisons with other studies suggested that the sample was not more biased than samples in dietary surveys in general with respect to respondents' views on healthy eating and health-related practices (19, 24). However, the respondents seemed somewhat more active users of functional foods compared with some other Finnish surveys (24, 25). As the sample was representative of the Finnish population with regard to age, gender and geographical distribution, there are no substantive reasons to believe that the low response rate as such would bias the results concerning the factors relating to the use of functional foods. Nevertheless, it should be remembered that the markets for functional foods are evolving and that the patterns of use may well shift in time.

It is noteworthy that even though many functional foods require regular use to provide health benefits, considerable numbers of consumers ate the products only on an occasional basis (Fig. 1). This suggests that people are curious about trying out new products marketed with health arguments, but for various reasons they decide not to adopt these foods into their diets. In addition, the findings concerning the experiences of functional foods suggest that people do not necessarily think that the health effects would or should be immediately experienced on a bodily level. Apart from consuming functional foods simply because of their good taste, use is thus largely based on the trust that the health claims are true and that the products promote health in the long run.

Some earlier studies on consumption of and attitudes towards functional foods have concluded that sociodemographic factors explain differences only poorly (6, 7, 23). This would support the hypothesis of increasingly fragmented and lifestyle-based notions and practices of eating. However, the present results indicated that the use of functional foods was associated with both sociodemographic

factors and health-related practices, although the strength and direction of these factors varied depending on the type of food. In a sense, this study proposes a role for both menu differentiation and menu pluralism (20) in the practices of healthy eating.

Gender, age, education and occupational status all proved significant predictors of use. However, the importance and explanatory power of these factors were largely product specific. It is also notable that some sociodemographic variables such as the presence of children in the household or the region and size of the municipality of residence showed no significant effects.

Even though healthy eating is generally a prime concern for women, more educated people, elderly people and those in good economic positions, the results showed that the relevance of these factors varied in the adoption of functional foods. In general, women were more active users of functional foods, but an important exception was cholesterol-lowering foods. Products targeted to such a specific health problem as cholesterol attracted men, particularly middle-aged men, more than women. A similar gender division in the use of plant stanol ester margarines was found by Anttolainen et al. (25) and de Jong et al. (26). Here, one may speculate on whether this reflects a more general gender difference with respect to healthy eating and functional foods. It may be that women, with their more health-orientated outlook on eating, are more inclined to adopt functional foods with general health-promoting features, whereas men take on products that they feel they need in specific conditions.

In many cases, people concern themselves with healthy eating only when they face health problems in their own lives or in their social surroundings, often only in older age. Two of the case products were clearly more popular among middle-aged and older consumers (cholesterol-lowering spreads and rolled oats and bran). However, the youngest age group was also relatively active in using cholesterol-lowering spreads. Young people often lived with their parents and it is likely that they used a cholesterol-lowering spread simply because of its availability in the fridge. In addition, there was a weaker indication of some probiotic foods being more popular among middle-aged people. In these products, different brands interested different age groups. It may thus not be a straightforward

conclusion that functional foods would be adopted as part of a general health orientation of only middle-aged and older consumers. Some products attract young people in particular, such as xylitol products for enhancing dental health. In Finland, xylitol chewing gum has had a salient position in health education since the 1970s, and dentists recommend the use of xylitol chewing gum after meals to prevent acid attack. Xylitol is thus a prime example of how powerful health education can be, provided that the product is regarded as credible and simple to use, and can be easily habitualized as part of daily routines.

Even though the effects of education and occupational group varied somewhat with different products, it may be concluded that the use of functional foods was associated with good socioeconomic status. This result is in line with the finding of Roos (18) that people in high socioeconomic positions favour “modern” healthy foods, whereas those in lower positions prefer more traditional foods. Should functional foods become a tool in health promotion, as suggested by their proponents, the socioeconomic aspect would present a challenge. Intense development and promotion of relatively expensive functional foods might even aggravate the socioeconomic segregation of eating. However, the data indicate that functional foods with “traditionally” healthy elements and a reasonable price margin (such as rolled oats enriched with oat bran) may to some extent escape this segregating effect of socioeconomic position.

Apart from sociodemographic factors, the use of functional foods was associated with practices of maintaining health and thus with a lifestyle-related factor in eating. However, the associations were not straightforward. Evidently, the use of functional foods and efforts to eat healthily are interlinked, but possibly less so for products that are used especially by the younger generation and for products that do not implicate existing health problems, such as xylitol. Frequency of exercise was not connected with the use functional foods (except for rolled oats and bran), nor were factors such as vitamin and supplement use or weight management (not included in the models presented).

The use of a certain functional food was connected with the use of others. This supports the view that the active use of functional foods can be interpreted as a part of a rational orientation towards health and instrumental use of foods to

promote health (31). Thus, functional foods could be part of rational menus designed to achieve specified goals, such as optimum health. However, as the use of functional foods was to some extent also connected with emphasizing healthy eating in general, it seems that the conventional holistic view of healthy eating and the novel reductionist (22) ideas of targeted health-promoting foods are not mutually exclusive. In this sense, functional foods can be interpreted as representing a complementary health practice. However, functional foods may well be used without a health-rational orientation to eating and without special health concerns. The multitude of competing rationales in eating allows for a variety of practices in using functional foods.

Acknowledgements

The study was financially supported by the Academy of Finland (research funding no. 206438) and the Jenny and Antti Wihuri Foundation. I would like to thank the two anonymous referees and the editorial staff of the Scandinavian Journal of Food and Nutrition for their valuable comments on the manuscript.

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Mari Niva

National Consumer Research Centre
PO Box 5 (Kaikukatu 3)
FI-00531 Helsinki
Finland
Tel: +358 9 7726 7760
Fax: +358 9 7726 7715
Email: mari.niva@ncrc.fi