

Research report

Relationship between attitudes towards healthy eating and dietary behaviour, lifestyle and demographic factors in a representative sample of Irish adults

Á.P. Hearty^{a,*}, S.N. McCarthy^a, J.M. Kearney^b, M.J. Gibney^a^a*Nutrition Unit, Division of Clinical and Molecular Medicine, Trinity College School of Medicine, St. James's Hospital, Dublin 8, Ireland*^b*School of Biological Sciences, Dublin Institute of Technology, Kevin Street, Dublin 8, Ireland*

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Abstract

Attitudes towards healthy eating were explored according to dietary, lifestyle and socio-demographic correlates in a random sample of 1256 Irish adults. Data were obtained from an Irish cross-sectional survey (1997–1999). A self-administered questionnaire was used to obtain attitudinal information. Food consumption was estimated using a 7-d food diary. A majority of the sample had a positive attitude or motivation towards their healthy eating behaviour. Those who perceived their own eating habits to be healthy were more likely to comply with current dietary guidelines than those who did not. Females, increasing age, higher social class, tertiary education, non-smokers, lower body-weights and increased recreational activity were associated with a lower odds ratio (OR) for having a negative attitude towards their healthy eating behaviour. An increased intake (g/d) of breakfast cereals, vegetables, fruit and poultry dishes were associated with decreased OR for negative attitudes towards their healthy eating behaviour, while an increased intake of high-calorie beverages (g/d) was associated with an increased OR. It can be concluded that attitudes or motivation towards eating healthily was related to measured dietary and lifestyle behaviour in this sample. Future research is warranted to devise appropriate methods of instituting attitude change towards dietary behaviour in certain subgroups of the population.

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Introduction

Recent public health nutrition campaigns have highlighted dietary recommendations to decrease fat and increase fibre consumption to reduce the risk of chronic disease (Department of Health & Children, 1999; WHO, 2003). In many countries, including Ireland, dietary recommendations and actual consumption do not coincide on a general population level (Harrington, McGowan, Kiely, Robson, Livingstone, & Morrissey, 2001). An approach to comprehend the public's response to dietary advice may be offered by the systematic study of the beliefs

and attitudes held by the population, such as the examination of self-perceived dietary behaviour (Gatenby, 1996; Shepherd & Sparks, 1994). The availability of information on personal attitudes and beliefs and the cultural context in which this information is derived can also facilitate comprehension of the relative importance of factors that influence food choice (Kearney & McElhone, 1999; Saba & DiNatale, 1998).

A fundamental assumption underlying the attitude concept is the notion that attitudes in some way guide, influence, direct, shape and predict actual behaviour (Kraus, 1995). However, it is not known to what extent pre-existing attitudes and beliefs about diet and lifestyle modify individual responses to dietary recommendations and subsequent dietary advice. One dilemma regarding the role of attitudinal research in determining food choice behaviour is that people may be unaware of how much

*Corresponding author. Department of Clinical Medicine, Trinity Centre of Health Sciences, St. James Hospital, Dublin 8, Ireland.
Tel.: +353 1 6083956; fax: +353 1 4542043.

E-mail address: aharty@tcd.ie (Á.P. Hearty).

influence a particular factor has on their behaviour. It is therefore necessary to test the relationship between attitudes to particular foods and self-perception of dietary patterns with actual dietary behaviour (Shepherd, 1989).

Relatively few studies have concurrently examined self-perceived dietary behaviour with actual measures of dietary and lifestyle behaviour among the same people. There is also a paucity of research attempting to characterise and compare both perceived and measured dietary behaviour. In the North–South Ireland Food Consumption Survey (NSIFCS), data on self-perceived diet and lifestyle behaviour and objective measures of dietary and lifestyle behaviour were collected. Therefore, the aim of this study was to examine self-perceived healthy eating behaviour and to determine how these perceptions differ according to dietary, lifestyle and socio-demographic correlates, among a representative sample of Irish adults.

Methods

Survey details

The NSIFCS was a randomised cross-sectional study of food and nutrient intakes in a representative sample of adults aged 18–64 years from the Republic of Ireland and Northern Ireland (1997–1999). Detailed descriptions of the sampling protocol (Kiely, Flynn, Harrington, Robson, & Cran, 2001) and methodology have been previously described (Harrington, Robson, Kiely, Livingstone, Lambe, & Gibney, 2001). In brief, the dietary survey was completed by 1379 respondents (662 males and 717 females), with an overall response rate of 63%. Food intake data were collected using a 7-d diet record (DR). Respondents were required to record the amount of each item of food and drink consumed. Food and nutrient analysis was conducted using WISP[®] (Weighed Intake Software Program; Tinuviel Software, Warrington, UK). WISP[®] uses data from McCance & Widdowson's The Composition of Foods (Holland et al., 1995), plus supplemental volumes to generate nutrient intake data (Chan, Brown, & Buss, 1994; Chan, Brown, & Church, 1996; Chan, Brown, & Lee, 1995; Holland, Brown, & Buss, 1993; Holland, Unwin, & Buss, 1988, 1989, 1991, 1992; Holland, Welch, & Buss, 1992). The food intake database consists of approximately 250,000 rows of data that detail the weight and nutrient breakdown of every food and drink item consumed by each respondent.

Weight (kg) and height (m) were measured by standard procedures (McCarthy et al., 2001) and used to calculate Body Mass Index (BMI) (kg/m²). BMI was categorised according to World Health Organisation (WHO) recommendations (WHO, 1998), which are 'Normal' (BMI 18.5–24.9 kg/m²), 'Overweight' (BMI 25.0–29.9 kg/m²) and 'Obese' (BMI ≥ 30.0 kg/m²). 'Underweight' respondents (BMI < 18.5 kg/m²) were not included in the analyses because they accounted for less than 1% of the overall population.

Food analysis

Each food item was assigned to one of 29 food groups and a mean daily food intake file (g/d) containing these 29 groups was generated. An additional group named 'low/high calorie beverages' was created. Respondents in the 'low-calorie' category had a mean daily intake from beverages of less than the sample population median intake of 25.8 kJ (6.14 kcal) and those in the 'high-calorie' category had mean daily intakes ≥ 25.8 kJ. The % contribution of all food groups to intakes of mean daily total and food energy, carbohydrate, fat and saturated fat was also calculated.

Questionnaires

Six questionnaires were self-completed by the respondents (Harrington, Robson et al., 2001). This paper draws its analyses primarily from an 'Attitudinal' questionnaire (previously described by Kearney et al., 2001), but it also extracts information from a Health & Lifestyle and a Physical Activity questionnaire. The Attitudinal questionnaire was composed of three main sections: attitudes or motivation towards healthy eating, self-assessed adequacy of food intake (related to 18 food items) and attitudes towards physical activity. Self-perceived dietary behaviour was evaluated through examination of the responses to these three statements:

- (1) 'I make conscious efforts to try and eat a healthy diet';
- (2) 'I try to keep the amount of fat I eat to a healthy amount';
- (3) 'I don't need to change my diet as it is healthy enough'.

The questionnaire was given to each respondent during the 7 days of the DR and was self-completed during this period. Individuals were required to select the most applicable response to each statement using a 5-point Likert scale which ranged from 'Most of the time' (1), 'Quite Often' (2), 'Now & Again' (3), 'Hardly ever' (4) and 'Don't Know' for statements 1 and 2, and from 'Strongly Agree' (1), 'Tend to Agree' (2), 'Tend to Disagree' (3), 'Strongly Disagree' (4) and 'Don't Know' for statement 3. As only a small percentage of the sample selected the response 'Don't Know' (<7%), it was not included for further analysis.

To determine the internal consistency of the healthy eating attitude scale, Cronbach's alpha was calculated (Cronbach, 1951). For scales, which are used as research tools to compare groups, alpha values of >0.7 are regarded as satisfactory (Bland & Altman, 1997). An alpha value of 0.83 was found when statements 1 and 2 were examined together, and an alpha level of 0.71 was found when all three statements were examined together. This compares favourably with a study by Stafleu, De Graaf, Van Staveren, and de Jong (1994), who obtained an alpha

level of 0.67 when they examined attitudes towards high-fat and low-fat foods.

Comparison with dietary recommendations

Quantitative guidelines for macronutrient intakes have not yet been established in Ireland. Comparative guidelines used in this chapter are carbohydrate intakes of $\geq 50\%$ food energy (i.e. total energy minus the contribution from alcohol) or $\geq 47\%$ total energy (Department of Health, 1991), total fat intakes of $\leq 35\%$ food energy or $\leq 33\%$ total energy, and saturated fat intakes of $\leq 11\%$ food energy or $\leq 10\%$ total energy (Department of Health, 1994), dietary fibre intakes of 30 g/d (Southgate, 1969) and fruit and vegetable intakes of ≥ 400 g/d (WHO, 2003). These dietary recommendations are set as average intakes for the population *not* as individual targets. Therefore, to assess compliance with current dietary guidelines, it is necessary to calculate the maximum size of a subgroup of the population whose mean intake equals these targets (MAFF, 1994; Wearne & Day, 1999). This subgroup is referred to as ‘compliers’ with the remainder of the population referred to as ‘non-compliers’. The fat ‘compliers’ subgroup is identified by ranking contributions to mean daily % energy from total fat or saturated fat for each individual in ascending order from lowest to highest. Starting with the person with the lowest mean daily fat intake, successive individuals were added until the addition of one more caused the group mean to exceed the target. A comparable approach was applied to mean daily carbohydrate (% energy), dietary fibre (g), fruit and vegetables (g) intakes; however in this case, intakes were ranked from highest to lowest and successive individuals added until the addition of one more caused the average intake to fall below the target.

Statistical analyses

Data manipulation and statistical analyses were conducted using SPSS[®] Version 10.0 for Windows[™] (SPSS[®] Inc., Chicago, IL). Cross-tabulation identified the proportion of respondents from different socio-demographic groups and the proportion of ‘compliers’ to dietary recommendations in each of the attitude groups. Significant differences were tested using Pearson Chi-square analysis. Differences in mean macronutrients, fibre and fruit and vegetable intakes and mean BMI across attitudes to healthy eating were evaluated using one-way analysis of variance (ANOVA). Where statistically significant effects were encountered ($P < 0.05$), comparisons of means were made using Scheffe post hoc multiple comparisons test. For values that did not comply with Levene’s test for homogeneity of variance, the Tamhane post hoc multiple comparisons test was used (Coakes & Steed, 1999). The mean score of responses from the Likert scale (1–4) were also calculated and compared across demographic groups.

For ease of analysis, two new variables were calculated to describe the responses for statements 1 and 2: ‘Positive’ attitudes (combined responses ‘Most of the time’ and ‘Quite Often’) and ‘Negative’ attitudes (combined responses ‘Now & Again’ and ‘Hardly Ever’). Differences in mean food group intake (g/d) between respondents with either positive or negative attitudes to statements 1 and 2 were assessed using independent *t*-tests. Due to the high Cronbach’s alpha found which related to the internal consistency between the three statements, it was decided to focus the majority of the analysis on the first, more general statement on healthy eating ‘I make conscious efforts to try and eat a healthy diet’ (unless stated otherwise).

Binary logistic regression analysis was used to determine whether demographics, lifestyle and dietary behaviour could predict self-perception of healthy eating behaviour. Responses to each statement on healthy eating behaviour were grouped as a dichotomous variable comprising ‘positive’ and ‘negative’ attitudes. Predictor variables included demographic and lifestyle factors, macronutrient intakes and mean daily food group intakes. Initially, all predictor variables were assessed independently. The predictive influence of demographic and lifestyle factors, various macro- and micro-nutrients and both mean daily intake (g/d) and percentage of daily energy intake (%/d) from each food group, on the dichotomous variable (positive/negative attitude or motivation to eat healthily) was examined. The models were used to generate odds ratio (OR) with their respective 95% confidence interval (CI) to quantify the likelihood of having a negative self-perception of healthy eating behaviour relative to having a positive self-perception. Energy misreporting was controlled for by including the ratio of energy intake to estimated basal metabolic rate (ei:bmr) as a continuous variable in the nutrient and food group intake models.

The set of variables remaining statistically significant at $P < 0.200$ in these initial models were incorporated to produce multiple logistic regression models. This approach identifies important variables for the final models that may not be identified using the traditional statistical cut-off point of $P < 0.05$ (Hosmer & Lemeshow, 2000). For better interpretation of the food group intake data in the multiple models, new OR and 95% CI values for a median increase of each food group (g/d) were calculated. In each of the final multiple regression models, significance was taken at $P < 0.05$.

Results

In total, 1256 individuals (91% of the sample) completed the Attitudinal questionnaire. Responses to the three statements on healthy eating were examined and it was found that the majority of the sample had a positive perception of their dietary behaviour (Table 1). The percentage of the population who complied with current dietary guidelines for carbohydrate, total fat, saturated fat, dietary fibre, fruit and vegetable intake were compared

Table 1
Comparison of the percentage of subjects who comply with dietary guidelines and mean Body Mass Index with attitudes for the three statements on healthy eating

Recommended target:	n (%)	Food energy (%)		Total energy (%)		Southgate fibre (%)		Fruit and veg. (%)		BMI (kg/m ²)
		Carbohydrate (≥50%)*	Total fat (≤35%) [†]	Saturated fat (≤11%) [†]	Carbohydrate (≥47%)*	Total fat (≤33%) [†]	Saturated fat (≤10%) [†]	(≥30g/d) [‡]	(>400g/d) [§]	
Actual mean intake (per day)		46.4	37.1	14.4	44.3	35.4	13.7	21.6	250.6	26.4
<i>'I make conscious efforts to try eat a healthy diet' (n = 1249)</i>										
Most of the time	505 (40.4)	64.8	83.2	45.7	81.4	80.4	37.2	42.6	58.8	26.2 ^{ns}
Quite often	279 (22.3)	54.8	79.2	32.3	72.4	75.3	28.7	34.4	51.3	26.3
Now & again	317 (25.4)	56.8	68.5	24.9	69.1	67.2	21.1	25.9	28.1	26.8
Hardly ever	148 (11.9)	54.1	70.3	18.2	66.9	66.2	14.9	29.1	20.9	25.8
P [¶]		0.012	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	4.5
<i>'I try to keep the amount of fat I eat to a healthy amount' (n = 1234)</i>										
Most time	481 (39.0)	64.4	83.0	46.8	79.4	80.2	39.3	41.2	57.8	26.3 ^{ns}
Quite often	320 (25.9)	60.0	80.9	32.2	77.5	78.1	26.9	32.5	46.9	26.2
Now & again	237 (19.2)	54.9	70.9	24.5	69.6	69.2	18.6	27	34.6	27.0
Hardly ever	196 (15.9)	50.0	63.8	18.4	63.3	58.7	17.3	33.7	23.0	25.8
P [¶]		0.003	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	0.001	<0.0005	4.7
<i>'I don't need to change my diet as it is healthy enough' (n = 1254)</i>										
Strongly agree	144 (11.5)	63.2	82.6	49.3	75.7	80.6	39.6	44.4	58.3	26.6 ^{ab}
Tend to agree	508 (40.5)	61.6	79.9	35.2	78.5	75.2	29.3	38.4	51.8	25.6 ^b
Tend to disagree	382 (30.5)	55.2	72.0	30.1	71.2	71.2	25.4	28.5	38.2	26.5 ^a
Strongly disagree	132 (10.5)	56.8	75.0	27.3	68.2	75.0	24.2	26.5	29.5	28.8 ^c
Don't know	88 (7.0)	61.4	76.1	30.7	73.9	71.6	27.3	42	30.7	26.0 ^{ab}
P [¶]		0.273	0.029	<0.0005	0.050	0.244	0.018	<0.0005	<0.0005	4.4

*Department of Health, UK (1991).

[†]Department of Health, UK (1994).

[‡]Southgate (1969).

[§]WHO (2003).

[¶]Pearson Chi-square analysis; ^{abc}Different superscripts within columns denote significant differences for BMI across attitudes ($P < 0.05$), ns = non-significant; BMI = Body Mass Index.

across attitudes/motivation towards healthy eating and is also illustrated in Table 1. In general, people who responded ‘Most of the Time’/‘Strongly Agree’ were significantly more likely to be a complier than people who responded ‘Hardly Ever’/‘Strongly Disagree’ ($P < 0.05$). Compliance to the recommendations for saturated fat intake was low regardless of attitude towards healthy eating. A significant effect for BMI was found only in relation to statement 3, respondents who agreed with this statement had significantly lower BMI values than respondents who strongly disagreed with it ($P < 0.05$).

When attitudes/motivation to the first statement on healthy eating were compared to the socio-demographic profile of the sample, it was revealed that groups with the highest mean score were more likely to have negative

attitudes to the statement (Table 2). Respondents who were female, 51–64 years old, with tertiary education, from the highest social class, non-smokers, married and vitamin/mineral supplement users, were the most likely subgroups to have positive rather than negative attitudes ($P < 0.0005$).

The predictive influence of demographic & lifestyle variables and nutrient intakes on negative attitudes towards statement 1 was examined (Table 3). Results for the multiple models are presented. The influence of demographics can be examined in the first model (3a). In general, people most likely to have a negative attitude were male, from the lower social classes, of a young age, educated to primary level only, smokers and have a heavier body-weight. Also, time participating in recreational activities (hrs/week) was associated with a decreased

Table 2

Mean score and the percentage of subjects with either positive or negative attitudes towards the statement ‘I make a conscious effort to try and eat a healthy diet’ classified by socio-demographics, smoking status, BMI and vitamin/mineral usage

	Mean score [†]	Positive attitude		Negative attitude		$P^{\ddagger}$
		%	<i>n</i>	%	<i>n</i>	
Sex						
Male	2.30***	55.7	322	44.3	256	<0.0005
Female	1.90	68.9	462	31.1	209	
Age						
18–35 yr	2.40 ^a	49.7	241	50.3	244	<0.0005
36–50 yr	1.96 ^b	68.5	324	31.5	149	
51–64 yr	1.77 ^c	75.3	219	24.7	72	
Social class						
Professional	1.83 ^a	74.8	394	25.2	133	<0.0005
Non-manual	2.11 ^b	60.8	141	39.2	91	
Skilled manual	2.30 ^{bc}	52.8	122	47.2	109	
Semi-skilled/unskilled	2.40 ^c	48.4	93	51.6	99	
Education						
Primary	2.13 ^{ab}	59.8	152	40.2	102	<0.0005
Intermediate	2.23 ^{ab}	54.3	139	45.7	117	
Secondary	2.12 ^{ab}	62.0	145	38.0	89	
Tertiary	1.96 ^b	69.5	342	30.5	150	
Marital status						
Single	2.36 ^a	50.4	171	49.6	168	<0.0005
Married	2.00 ^b	66.7	562	33.3	280	
Widowed/separated	1.78 ^b	76.9	50	23.1	15	
Smoking						
Current smoker	2.45 ^a	48.4	197	51.6	210	<0.0005
Ex-smoker	1.90 ^b	69.1	206	30.9	92	
Never	1.92 ^b	70.1	377	29.9	161	
BMI (kg/m ²) [§]						
Normal weight	2.09 ^{ns}	62.8	322	37.2	191	ns
Overweight	2.03	65.6	307	34.4	161	
Obese	2.16	57.5	123	42.5	91	
Vitamin/mineral usage						
Yes	1.85***	73.7	264	26.3	94	<0.0005
No	2.19	58.2	511	41.8	367	

*** $P < 0.0005$ Independent *T*-Test; ^{abc}different subscripts denote significant differences within groups ($P < 0.05$).

[†]Score calculated from responses based on Likert Scale.

[‡]Pearson Chi-square analysis; ns = non-significant; BMI = Body Mass Index.

[§]Normal weight: BMI 18.5–24.9 kg/m²; Overweight: BMI 25.0–29.9 kg/m²; Obese: BMI > 30 kg/m² (WHO, 1998).

Table 3

The influence of demographic and lifestyle factors and mean daily nutrient intakes on predicting negative attitudes (Odds Ratio, OR and Confidence Interval, CI) towards the statement 'I make conscious efforts to try and eat a healthy diet'

(a) Demographic and lifestyle model					(b) Nutrient model				
Variables	<i>P</i>	OR	95% CI		Variables	<i>P</i>	OR	95% CI	
			Lower	Upper				Lower	Upper
Sex (Male)					Sex (Male)				
Female	<0.0005	0.46	0.35	0.62	Female	0.162	0.70	0.43	1.15
Social class (Professional)	0.001				Social Class (Professional)	<0.0005			
Non-manual	0.007	1.64	1.14	2.37	Non-manual	0.009	1.66	1.14	2.41
Skilled manual	0.008	1.68	1.15	2.46	Skilled manual	<0.0005	2.42	1.68	3.49
Semiskill/unskilled manual	<0.0005	2.08	1.38	3.12	Semiskill/unskilled manual	<0.0005	2.67	1.81	3.95
Age	<0.0005	0.95	0.94	0.97	Age	<0.0005	0.98	0.96	0.99
Education (Primary)	0.026				Energy (MJ)	<0.0005	1.00	1.00	1.00
Intermediate	ns	0.93	0.61	1.42	Carbohydrate (%) ^a	<0.0005	1.23	1.15	1.31
Secondary	ns	0.77	0.49	1.21	Total fat (%)	<0.0005	1.24	1.15	1.33
Tertiary	0.010	0.57	0.37	0.87	Saturated fat (%)	ns	1.04	0.97	1.12
Smoking (Current)	<0.0005				Alcohol (g)	ns	1.00	1.00	1.00
Ex-smoker	0.001	0.54	0.37	0.78	Fibre southgate (g)	<0.0005	0.91	0.88	0.94
Never smoked	<0.0005	0.49	0.36	0.66	Calcium (mg)	0.014	1.00	1.00	1.00
BMI	0.014	1.04	1.01	1.07	Iron (mg)	ns	1.00	0.99	1.02
Vitamins (User)					Zinc (mg)	0.038	1.04	1.00	1.09
Non-user	ns	1.29	0.95	1.77	Folate (µg)	ns	1.00	1.00	1.00
Recreation (h/week)	0.008	0.97	0.94	0.99	Vitamin C (mg)	0.014	1.00	1.00	1.00
Television viewing (h/week)	ns	1.01	0.99	1.02	ei:bmr	0.039	0.35	0.13	0.95

OR: Odds Ratio; CI: Confidence Interval; MJ: Mega Joule; BMI: Body Mass Index; ei:bmr: ratio of energy intake to basal metabolic rate.

^a% Food energy.

likelihood of having a negative attitude. The influence of nutrient intake as measured by the 7-d DR, on predicting a negative attitude towards eating healthily, is presented in the second model (3b). The likelihood of having a negative attitude increased with increasing energy intake, with increasing intakes % food energy from carbohydrate and total fat, and as zinc intakes (mg) increased. But the likelihood of having a negative attitude decreased as fibre intakes (g), calcium (mg) and vitamin C intakes (mg) increased.

The mean daily intake (g/d) of each food group (consumers only) was calculated for individuals with either positive or negative attitudes (Table 4). Respondents with positive attitudes consumed significantly greater amounts of wholemeal bread, breakfast cereals, cream, ice-cream and desserts, yoghurts, vegetables, fruit, and fish and fish dishes than respondents with negative attitudes ($P < 0.05$). Respondents with negative attitudes consumed greater amounts of white bread, wholemilk, butter and spreads, chips, red meat dishes, meat products, alcohol, sugars and confectionery and savoury snacks than respondents with positive attitudes ($P < 0.05$). The % consumers for each food group were also examined and were found to differ according to attitudes towards healthy eating behaviour. When the effect of the percentage contribution to total

energy from these food groups was examined, similar trends were observed (data not shown).

The final model for mean daily food group intakes is presented in Table 5. Overall, only five food groups predicted a negative attitude/motivation towards healthy eating behaviour in the final model ($P < 0.05$). An increase in the median daily intake (g/d) of breakfast cereals (OR = 0.82), vegetables (OR = 0.66), fruit (OR = 0.63), and poultry dishes (OR = 0.68) decreased the likelihood of predicting a negative attitude towards healthy eating. An increase in the intake of high-calorie beverages (OR = 1.87) increased the likelihood of predicting a negative attitude.

Discussion

The theoretical and empirical research on dietary attitudes begins with the premise that attitudes towards nutrition affect food choice. Indeed, this study has demonstrated a definite link between perception of healthy eating behaviour and dietary behaviour as measured by a 7-d DR. Overall, this study has revealed that individuals with positive attitudes or motivation towards healthy eating behaviour (positive attitudes) had, in general, a better dietary profile and were more likely to comply with

Table 4

Comparison of mean daily food group intake of subjects with either a positive or negative attitude towards the statement ‘I make conscious efforts to try and eat a healthy diet’

Food group	Mean daily intakes (g)							
	Positive attitudes				Negative attitudes			
	Intake (g/d) ^a	SD	<i>n</i>	% Con	Intake (g/d) ^a	SD	<i>n</i>	% Con
Vegetables	133***	83	783	99.9	103	62	456	98.1
White breads and rolls	91***	59	752	95.9	105	62	457	98.0
Potatoes	155 ^{ns}	158	749	95.5	158	148	432	92.9
Soups, sauces, misc.	53 ^{ns}	56	731	93.2	48	48	429	92.3
Red meat (fresh)	58 ^{ns}	45	716	91.3	59	45	432	92.9
Sugars and confectionary	30***	26	713	90.9	41	39	447	96.1
Biscuits, cakes and pastries	36 ^{ns}	32	692	88.3	39	33	389	83.7
Fruit	143***	123	682	87.0	83	88	295	63.4
Butter and spreads	19**	15	666	85.0	21	16	421	90.5
Meat products	39***	33	664	84.7	59	45	435	93.6
Chips and processed potatoes	65***	52	646	82.4	91	67	433	93.1
Wholemeal bread and rolls	64**	57	622	79.3	51	54	281	60.4
Breakfast cereals	55***	65	614	78.3	37	41	298	64.1
Cheeses	17 ^{ns}	15	585	74.6	17	16	336	72.3
Poultry and game	30 ^{ns}	22	575	73.3	33	28	313	67.3
Fish and fish dishes	40**	30	574	73.2	33	26	291	62.6
Cream, icecream and desserts	45*	44	555	70.8	39	33	305	65.6
Wholemilk	184***	178	551	70.3	234	196	367	78.9
Egg and egg dishes	25 ^{ns}	22	522	66.6	25	23	331	71.2
Alcoholic beverages	385***	489	517	65.9	684	765	301	64.7
Savouries	40 ^{ns}	45	441	56.3	47	48	268	57.6
Low-fat milk	64 ^{ns}	49	425	54.2	67	51	170	36.6
Red meat dishes	65*	47	418	53.3	74	56	268	57.6
Savoury snacks	11***	12	407	51.9	15	16	295	63.4
Rice and pasta	48 ^{ns}	34	394	50.3	44	30	163	35.1
Fruit juice	84 ^{ns}	75	348	44.4	78	62	166	35.7
Yogurts	53*	43	299	38.1	43	39	106	22.8
Poultry dishes	61 ^{ns}	44	296	37.8	57	34	134	28.8
Low-fat spreads	15 ^{ns}	15	244	31.1	17	15	105	22.6

Independent samples *T*-Test: *P*: ****P* < 0.001, ***P* < 0.01, **P* < 0.05, ns = non significant.

^aConsumers only; % Con = Percentage consumers of food group; misc. = miscellaneous.

dietary guidelines, than those with negative perceptions of their behaviour (negative attitudes). This study also provides specific data on both the socio-demographic and dietary characteristics of Irish respondents in relation to their perceived healthy eating behaviour.

The findings in the present study suggest that the groups most likely to have negative attitudes or motivation towards their healthy eating behaviour are men, those aged 18–35 years, from the lowest social class, and with primary level education only. These findings also corroborate the nutrition literature in this area. In general, women have been found to be more aware of diet and health issues and embrace dietary change to a greater degree than men (Barker, Thompson, & McClean, 1995; Brug, VanAssema, Kok, Lenderink, & Glanz, 1994; Friel, NicGabhainn, & Kelleher, 1999; Girois, Kumanykia, Morabia, & Mauger, 2001; Griffiths, Chipperfield, Todd, & Rushton, 1994). Social class has also been shown to have a major influence on dietary attitudes with many studies demonstrating a striking difference in attitudes between the non-manual

and manual social classes (Barker et al., 1995; Blaxter, 1990; Buttriss, 1997; Cotugna, Subar, Heimendinger, & Kahle, 1992; Shepherd & Stockley, 1987). In a nationally representative sample of Irish adults, Kearney, Kelly, and Gibney (1998) found that young males with minimal education were the most likely subgroup to have negative attitudes towards healthy eating. Increased levels of education may empower people to be better able to make use of written material like newspaper articles and leaflets to gain dietary and health-related information and implement this in their lifestyles (Parmenter, Waller, & Wardle, 2000). Interest in health and nutrition has also been shown to increase with age (Kearney et al., 1998). Reasons for this trend include disease avoidance, death of a family member and life-stage changes in family roles (Olsen, 2003). Regarding lifestyle behaviour, negative attitude or motivation towards healthy eating behaviour is significantly associated with those who smoked and respondents with low levels of recreational activity, associations that have been previously noted in the literature (Boutelle, Murray,

Table 5

Influence of socio-demographics and specific mean food group intake (g/d) on negative attitudes (Odds Ratio, OR; and Confidence Intervals, CI), towards the statement 'I make conscious efforts to try and eat a healthy diet' (consumers only)

Variable in model	Median (g/d)	<i>p</i>	OR ^a	95% CI	
				Lower	Upper
Sex (Male)					
Female		0.010	0.63	0.44	0.89
Social class (Professional)		0.002			
Non-manual		0.048	1.48	1.00	2.18
Skilled manual		0.003	1.80	1.22	2.65
Semiskilled/unskilled manual		0.001	2.00	1.33	3.01
Age		0.028	0.98	0.97	1.00
Food groups					
Wholemilk	160	ns	1.16	0.99	1.35
Red meat dishes	52	ns	1.16	1.00	1.35
Meat products	36	ns	1.16	1.00	1.35
Sugars and confectionary	27	ns	1.15	1.00	1.33
Chips and processed potatoes	60	ns	1.14	0.97	1.35
Butter and spreads	16	ns	1.11	0.93	1.31
Savoury snacks	9	ns	1.06	0.94	1.19
Fruit juices	66	ns	1.04	0.87	1.24
Biscuits, cakes and pastries	29	ns	1.03	0.90	1.19
White bread	87	ns	0.93	0.72	1.21
Low-fat milk	56	ns	0.90	0.74	1.10
Yogurts	36	ns	0.90	0.74	1.10
Cheeses	13	ns	0.89	0.78	1.02
Fish and fish dishes	29	ns	0.88	0.75	1.03
Wholemeal bread	43	ns	0.87	0.76	1.01
Rice and Pasta	36	ns	0.83	0.69	1.00
Breakfast cereals	30	0.001	0.82	0.74	0.92
Poultry dishes	50	0.001	0.68	0.55	0.86
Vegetables	107	0.001	0.66	0.52	0.85
Fruit	92	<0.0005	0.63	0.54	0.75
ei:bmr		ns	1.29	0.69	2.43
Beverage categories (Low-calorie)					
High-calorie		<0.0005	1.87	1.38	2.53

OR: Odds ratio.

CI: Confidence interval; ei:bmr: ratio of energy intake to basal metabolic rate.

^aOR values are presented per median increase food group intake (g).

Jeffery, Hennrikus, & Lando, 2000; Steptoe et al., 1997). Therefore, findings from both this study and from the literature suggest that many risky or detrimental health practices occur collectively. The widely described 'phenomenon' of healthy or unhealthy lifestyle characteristics was apparent in this study population and reveals the potential role that attitudes or motivation towards diet may play in contributing to these lifestyles.

To the best of our knowledge, this is one of the first studies to explore attitudes or motivation towards healthy eating behaviour and associations with estimated food intake and lifestyle measures using logistical regression techniques. Regarding dietary intake, this study reveals that an increased intake of breakfast cereals, fruit, vegetables and poultry coupled with a decreased intake of high-calorie beverages is associated with having positive perceptions of healthy eating behaviour. Other studies have attempted to model the influence of attitudes on food

choice using structured frameworks stemming from social psychology, such as the Theory of Planned Behaviour (TPB) (Ajzen, 1988, 1991) and the Transtheoretical Model (TTM) (Prochaska & Velicer, 1997) and many have identified strong relationships between attitudes and food choice (DeGraaf, Van der Gaag, Kafatos, Lennernas, & Kearney, 1997; Paisley, Lloyd, Sparks, Phil, & Mela, 1995; Sparks, Shepherd, Wieringa, & Zimmermanns, 1995). However, many of these studies have been limited by the precision of dietary assessment. Food frequency questionnaires have been widely used (generally < 100 food items (Gallacher, Yarnell, Limb, & Beswick, 1995; Shepherd & Stockley, 1987; Stafleu et al., 1994; Stubenitsky & Mela, 2000; Tepper, Choi, & Nayga, 1997) compared to > 3000 food items in this survey), and dietary classification has frequently been into broad food categories such as low- and high-fat foods (Lloyd, Paisley, & Mela, 1993; Paisley et al., 1995). As the attitudinal questionnaire accompanied

the NSIFCS, this allowed comparisons to be made between attitudes towards healthy eating and dietary intake as measured by a 7-d DR.

An important issue that needs to be considered when conducting attitudinal research is the accurate measurement of public attitudes. As attitudes cannot be directly observed, their existence and strength must be inferred from what is observable. This study measured attitudes using a Likert scale (Likert, 1932), which has proven to be a relevant method in studying attitude patterning (Sims, 1981). However, presence of the phenomenon known as ‘attitude ambivalence’ (‘the intra-individual co-presence of positive and negative evaluations of the same object’ (Povey, Wellens, & Conner, 2001)) must be considered as food choice has been shown to attract ambivalent attitudes (Sparks, Hedderley, & Shephard, 1992). Attitudes have been found to be stronger predictors of intentions and behaviour at lower levels of ambivalence (Shepherd, 2002). Therefore, as this study provides evidence of accordance between dietary attitudes/motivation and measures of dietary behaviour within the same respondents, it can be assumed that the prevalence of attitudinal ambivalence was low. As attitudes towards diet and lifestyle behaviours were measured retrospectively, this fails to resolve the issue of temporal patterning of attitudes and behaviour, i.e. do attitudes cause the behaviour, or does the behaviour produce the attitudes? Although a cross-sectional survey such as this does not allow any causal conclusions to be drawn, comparison of these data with previous studies (Fishbein, 1973; Kraus, 1995) and with models of food choice (Ajzen & Fishbein, 1980; Shepherd & Stockley, 1985) suggests that the direction of this intricate relationship follows that dietary attitudes exert their influence on dietary behaviour.

This study raises the possibility of two novel approaches in the field of nutrition research. Firstly, this study has determined that considerable accordance exists between perceived dietary behaviour and dietary behaviour as measured by a 7-d DR. This suggests that Irish adults can reasonably evaluate their diets in relation to attitudinal parameters such as ‘healthy’ and ‘unhealthy’ diets. Attitudinal questionnaires, which allow the individual to self-rate their dietary habits, may be used independent of time-consuming and labour-intensive food surveys to indicate dietary patterns of relatively large populations. However, questionnaires such as these would need further validation alongside food surveys such as the NSIFCS before their true value would be indicated. Time of completion of these types of questionnaires may need some consideration as when they are given during a dietary survey, such as the NSIFCS, respondents may be more aware of their actual dietary habits, thereby influencing their responses in the questionnaire. However, this issue was not looked into in this study.

Secondly, this study also highlights the importance of considering *attitude* itself or motivation as a target variable for improving dietary behaviour. Issues relating to diet and

health probably form attitudes that are strongly held and consequently relatively resistant to change. The role of knowledge and self-efficacy in relation to attitude change and dietary behaviour has been discussed in the literature (Biddle, Goudas, & Page, 1994; Buttriss, 1997). For example, implementation of community activities designed to increase sense of control (self-efficacy) over personal dietary behaviour, such as food preparation skills (knowledge), could help achieve desired attitude change. Attitude formation and change may also occur as a by-product of social interaction and be achieved using the role of incentives (e.g. communication of physical benefits) (Eagly & Chaiken, 1993), or by using strategies targeting group norms by working with families and/or persuasive communication via the media. The possible putative role of various emotive and motivational influences, taste and sensory factors and lifestyle behaviours in instituting attitude change need also to be considered.

This work confirms that attitudes or motivation towards healthy eating behaviour is related to dietary and lifestyle behaviour in this cross-sectional sample of the Irish population. Subgroups of the Irish population with an increased likelihood of having negative attitudes towards healthy eating behaviour include young males from the lower social classes and those with minimal levels of education. The findings of this study propose that the challenge of increasing population compliance to dietary guidelines may lie in the promotion of positive attitudes and motivational influences towards healthy dietary and lifestyle behaviour.

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