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Do socio-demographic and anthropometric characteristics predict food choice motives in an Irish working population?

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Abstract

Dietary behaviour is influenced by a complex web of biological, psychological, physiological, social, economic and cultural factors. Understanding socio-demographic and anthropometric characteristics that influence food choice may be important in guiding dietary interventions. The present study aimed to identify whether socio-demographic and anthropometric characteristics influence food choice in an Irish working population. A cross-sectional survey was conducted in 2014 as part of the Food Choice at Work Study, a large clustered non-randomised, controlled trial based in county Cork, Ireland. Information regarding food motives was collected at the 3–4 months follow-up. The 'Food Choice Questionnaire' was used to measure food motives. Multiple linear regression was conducted to test the association between socio-demographic and anthropometric characteristics (age, sex, BMI, education, type of accommodation, living situation, marital status, parental status) and worksite and food motives. A total of 678 employees were included in the analysis. Overall, only a small percentage of food choice was influenced by the characteristics included in this analysis (1·6 to 8·8 %). Sensory appeal and satisfaction were scored most important by all sub-populations. Sex was most often associated with differences in food motives (i.e. all food motives except for familiarity and ethical concern were significantly more important to females compared with males; $P = 0{\cdot}001/P < 0{\cdot}001$). Worksite, age, BMI and marital status also seemed to play a small role in influencing food choice. The results show that food choice is complex and not easily explained by differences in socio-demographic or anthropometric population characteristics.

Key words: **Food choice: Eating motives: Socio-demographic characteristics: BMI: Workplaces: Dietary behaviour**

Prevalence of diet-related diseases is increasing globally, highlighting the ongoing need for dietary behaviour improvement[1]. Evidence suggests that diet can vary between population subgroups with different socio-demographic characteristics. For example, sex differences are commonly analysed as part of nutrition surveillance programmes, and results from the Healthy Ireland Survey 2017 suggest that women, on average, consume more fruits and vegetables (FV) compared with men[2]. Similarly, dietary behaviour is analysed by age groups and socio-economic status, and findings suggest that some differences exist between older and younger adults as well as people from disadvantaged *v.* people from affluent backgrounds[2]. However, less is known about the difference in food choice motives between these subgroups.

It is accepted that modifying existing environments in which individuals spend most of their time can positively influence dietary behaviours[3]. Although the workplace has been identified as one of these priority environments, there is a lack of evidence to suggest how workplace dietary interventions should be developed to target different sub-populations. Research suggests that there is often a difference in intervention effectiveness between different working populations even within the same workplace (e.g. younger and older study populations, between high- *v.* low-risk groups, and between sexes, white and blue collar workers, etc.)[4,5]. Understanding what shapes employees' dietary behaviours may help researchers and public health practitioners to develop better-tailored workplace dietary interventions for different working populations.

Other than for satisfying hunger and energy needs, dietary behaviour is influenced by a complex web of biological, psychological, social, economic and cultural factors[6–8]. The 'Food Choice Questionnaire' is a tool which has been designed to measure the motives underlying food choice[9]. The questionnaire consists of nine scales including convenience, natural content, weight control, price, health, mood, sensory appeal, familiarity and ethical concern. Some (workplace) dietary behaviour change studies have used the motives identified in the Food

Abbreviation: FV, fruits and vegetables.

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Choice Questionnaire to inform their intervention design. 'Nudging' the environment to make healthy choices more accessible is an example of how studies can increase the convenience of eating healthily[3,10,11]. Other examples include labelling foods as 'low-fat' or 'low calories' which supports weight control and health motives, while offering discounts on healthier food choices supports price motives[12,13]. However, these studies have not reported whether these strategies have been developed or specifically adapted for the particular study population.

To increase the effectiveness of dietary behaviour change interventions, researchers need to tailor their intervention to the specific population group. The Food Choice Questionnaire may be effective in determining why people eat what they eat prior to an intervention, and could be used, when collected at baseline, to tailor an intervention accordingly. A recent online survey has used this tool, for example, to assess factors that influence food choice of young adults (aged between 19 and 24 years) in Australia. The results suggested that taste was most important to the survey participants, followed by convenience, cost and nutritional properties. Differences were reported for adults who were overweight or obese, for example, male participants with a waist circumference >94 cm rated weight loss motives and 'help me cope with stress' significantly higher than healthy weight participants. Furthermore, participants who reported being more active prioritised the nutritional value of food and rated 'it keeps me healthy' significantly higher than participants who were less active[14]. However, research examining factors affecting food choice in different working populations, and the use of that information to guide dietary interventions, is not available. Therefore, this research aims to examine the differences in food choice motives in working populations according to sex, age, BMI, parental status, marital status, accommodation, living situation and education level.

Methods

Data were collected as part of the Food Choice at Work Study which has been described elsewhere[15–17] and is summarised below (trial registration: ISRCTN35108237). Ethical approval was granted by the Clinical Research Ethics Committee of the Cork Teaching Hospitals in the Republic of Ireland, and research was conducted according to the Declaration of Helsinki.

Study design

The Food Choice at Work Study was a large clustered non-randomised, controlled trial to assess the effectiveness of a range of complex workplace dietary interventions. Study worksites either received nutrition education only, environmental dietary modifications only, both nutrition education and environmental dietary modification or no changes to the workplace (control group), to test which intervention was more effective in improving diet and health-related outcomes[15,16].

Study population

Four manufacturing worksites (i.e. worksite A: automotive industry; worksite B: IT industry; worksite C: medical device industry; worksite D: food and beverage industry) based in county Cork with an employee population of over 250 staff were recruited for the study. All worksites employed shift-workers and had workplace canteens. Only employees who worked full-time on site, purchased and consumed one main meal daily from the canteen were eligible to take part in the study. Employees were excluded if they took part in any weight loss programme outside work. Only employees who completed all information were included in the analysis.

Measurements

Diet and health measures were taken at four different stages. The Food Choice Questionnaire was an adapted version from Steptoe *et al.* that included the nine categories described earlier[9] as well as 'satisfaction', that is, 'It is important to me that the food I eat is satisfying' and '. . . makes me feel full'. The questionnaire was completed once, at the 3–4 months follow-up. This tool was used to identify what influences people's food choice. Participants could rate their response on a five-point Likert scale (1 score – not at all important, 5 scores – very important). Socio-demographic information was collected as part of a health and lifestyle questionnaire that participants completed at each stage. The socio-demographic information included in this analysis was sex, age, education, parental status, marital status, accommodation and living situation. All questionnaires were self-completed online by the participants. BMI was the only anthropometric measure included in this analysis and was assessed by trained research assistants during study visits at each worksite[15].

Statistical analysis

Data were analysed using SPSS v24. Descriptive statistics were carried out on socio-demographic and anthropometric information and are displayed as frequencies and percentages. Multiple linear regressions were conducted with food motive as the outcome and socio-demographic and anthropometric variables as the exposure. The final model from which adjusted estimates were calculated contained age, BMI, sex (male, female), education (lower, higher), marital status, living situation (alone/with others), parental status (children/no children), accommodation (owning *v.* renting) and worksite. For quantitative variables (i.e. age and BMI), the increase in each food motive was calculated per unit increase in the socio-demographic/anthropometric variable (along with 95 % CI) after adjustment for all other variables. For categorical variables (e.g. accommodation), the adjusted difference in mean food motive (along with 95 % CI) was calculated for one category and compared with a reference category. The assumptions of the linear regression models were checked using residuals. The normality of residuals was checked using a histogram, residuals were plotted against fitted values and residuals were plotted against variables in the model. These plots (not shown) did not reveal any serious departures from the assumptions.

Justification of sample size

The present analysis was a secondary analysis of baseline data from a dietary intervention study, and therefore power calculations were not performed in advance. However, *post hoc*

Table 1. Descriptive characteristics of population (Numbers of participants and percentages)

	n	%
Worksite		
A	96	14·3
B	338	49·9
C	160	23·6
D	84	12·4
Sex		
Males	491	72·4
Females	187	27·6
Age		
≤35 years	202	29·8
36–50 years	391	57·7
≥51 years	85	12·5
BMI (kg/m^2)		
<25	193	28·5
25–30	329	48·5
>30	156	23·0
Education		
Leaving certificate	146	21·5
Diploma	189	27·9
Primary degree	214	31·6
Postgraduate degree	129	19·0
Is your home		
Owned with mortgage	406	59·9
Rented from a local authority	12	1·8
Rented privately	136	20·1
Owned outright	96	14·2
Other	24	3·5
Living situation		
Living alone	84	12·4
Living with others	589	86·9
Marital status		
Single	170	25·1
Cohabitating	62	9·1
Married	419	61·8
Separated/divorced/widowed	26	3·8
Parental status		
Children	397	58·6
No children	279	41·2

analyses indicate that, for example, comparing males (491) and females (187) we had over 80 % power to detect a difference in mean, as statistically significant at the 5 % level, of 0·25 standard deviations for any outcome.

Results

Descriptive characteristics

Table 1 demonstrates the descriptive characteristics of the 678 employees who completed the Food Motives Questionnaire at the 3–4 months follow-up (worksite A: *n* 96, worksite B: *n* 338, worksite C: *n* 160, worksite D: *n* 84). The majority of the population was male (72·4 %), with a mean age of 40·5 (SD 8·7) years, had a third-level education (50·6 %) and were classified as either overweight or obese (71·5 %).

Food motives

The results in Table 2 demonstrate that sensory appeal, together with satisfaction and followed by health, was rated as most important by Irish workers regardless of socio-demographic or anthropometric characteristics. Differences in food motives scores were most often associated with sex, that is, sex contributed to eight out of the ten models, followed by worksite, BMI, marital status, age and accommodation. The factors included in the model only explain between 1·6 and 8·8 % of the variation in food motives, that is, the selected factors account for 3·6 % of convenience, 8·8 % of natural content, 3·9 % of weight control, 3·4 % of price, 2·9 % of sensory appeal, 3·0 % of mood, 4·3 % of health, 2·3 % of familiarity, 4·1 % of ethical concern and 1·6 % of the satisfaction score.

The regression model showed that *convenience* was significantly associated with sex (after adjustment, males rated convenience less important than females by −0·29, 95 % CI −0·44, −0·14 scores) and worksite (after adjustment, worksites B and C rated convenience less important than worksite D by −0·24, 95 % CI −0·46, −0·03 scores and −0·36, 95 % CI −0·59, −0·13 scores, respectively).

Factors significantly associated with *natural content* were age (after adjustment, with every increase in 10 years, importance increased by 0·20, 95 % CI 0·01, 0·03 scores), BMI (after adjustment, with every increase in one unit kg/m^2 importance decreased by −0·02, 95 % CI −0·03, −0·001 scores), sex (after adjustment, males rated natural content less important than females by −0·38, 95 % CI −0·54, −0·22 scores), accommodation (after adjustment, participants who owned accommodation rated importance of natural content −0·20, 95 % CI −0·35, 0·03 scores lower than participants who rented accommodation), marital status (after adjustment, participants who were either single or separated rated natural content less important by −0·29, 95 % CI −0·50, −0·09 scores than participant who were cohabitating or married) and worksite (after adjustment, worksite B rated natural content significantly more important than worksite D by 0·34, 95 % CI 0·11, 0·56 scores).

Weight control was significantly associated with sex (after adjustment, males rated weight control lower than females by an average of −0·42, 95 % CI −0·59, −0·24 scores), BMI (after adjustment, with every increase in one unit kg/m^2 importance increased by 0·03, 95 % CI 0·01, 0·05 scores) and marital status (after adjustment, participants who were either single or separated rated weight control −0·31, 95 % CI −0·53, −0·09 scores lower than people who were cohabitating or married).

In addition, factors significantly associated with *price* were sex (after adjustment, males rated price lower than females by an average of −0·25, 95 % CI −0·40, −0·11 scores), BMI (after adjustment, with every increase in one unit kg/m^2 importance of price increased by 0·02, 95 % CI 0·001, 0·03 scores), parental status (after adjustment, participants who had no children rated price −0·16, 95 % CI −0·32, −0·01 scores lower than parents) and worksite (after adjustment, worksite C rated price significantly less important than worksite D by −0·28, 95 % CI −0·50, −0·06 scores).

Socio-demographic characteristics that were significantly associated with *sensory appeal* were sex (after adjustment, males rated sensory appeal lower than females by an average of −0·28, 95 % CI −0·40, −0·16 scores) and marital status (after adjustment, participants who were single rated sensory appeal on average −0·19, 95 % CI −0·34, −0·04 scores lower than people who were not).

The two factors significantly associated with *mood* were sex (after adjustment, males rated mood lower than females by an

Table 2. Multiple linear regression analysis for the effect of different socio-demographic and anthropometric factors on food motives
(Mean values and standard deviations; adjusted estimates (est.) and 95 % confidence intervals)

	Convenience (R^2 0·036)					Natural content (R^2 0·088)					Weight control (R^2 0·039)				
	Mean	SD	Adjusted est.	95 % CI	*P*	Mean	SD	Adjusted est.	95 % CI	*P*	Mean	SD	Adjusted est.	95 % CI	*P*
Worksite															
A	3·6	0·9	−0·47	−0·30, 0·21	0·71	3·4	0·9	−0·10	−0·37, 0·17	0·46	3·5	1·1	−0·24	−0·32, 0·27	0·87
B	3·4	0·8	−0·24	−0·46, −0·03	<0·05	3·8	0·9	0·34	0·11, 0·56	<0·01	3·6	0·9	0·12	−0·12, 0·37	0·32
C	3·3	0·8	−0·36	−0·59, −0·13	<0·01	3·5	0·9	0·08	−0·16, 0·32	0·52	3·5	0·9	0·01	−0·25, 0·27	0·95
D	3·7	0·8	Reference			3·4	1·9	Reference			3·4	1·1	Reference		
Sex															
Male	3·4	0·8	−0·29	−0·44, −0·14	<0·001	3·5	0·9	−0·38	−0·54, −0·22	<0·001	3·4	1·0	−0·42	−0·59, −0·24	<0·001
Female	3·7	0·9	Reference			3·8	0·8	Reference			3·7	1·0	Reference		
Age (per 10-year increase)	–		− 0·10	−0·09, 0·08	0·84	–		0·20	0·01, 0·03	<0·01	–		0·04	−0·05, 0·14	0·36
BMI (kg/m^2; per unit increase)	–		0·12	−0·004, 0·03	0·13	–		−0·02	−0·03, −0·001	<0·05	–		0·03	0·01, 0·05	0·001
Education*															
Lower	3·5	0·8	−0·09	−0·27, 0·08	0·29	3·5	0·9	−0·11	−0·29, −0·08	0·26	3·5	1·0	−0·11	−0·31, 0·09	0·27
Higher	3·4	0·9	Reference			3·6	0·9	Reference			3·5	1·0	Reference		
Accommodation															
Owning	3·5	0·8	0·058	−0·11, 0·22	0·49	3·6	0·9	−0·20	−0·37, −0·02	<0·05	3·5	1·0	−0·18	−0·37, 0·01	0·07
Renting	3·4	0·8	Reference			3·6	0·9	Reference			3·5	0·9	Reference		
Living situation															
Alone	3·6	0·8	0·18	−0·04, 0·41	0·11	3·7	0·9	0·18	−0·06, 0·42	0·15	3·5	1·1	0·13	−0·13, 0·39	0·33
Others	3·4	0·8	Reference			3·6	0·9	Reference			3·5	1·0	Reference		
Marital status															
Single	3·5	0·9	−0·03	−0·23, 0·16	0·74	3·5	0·9	−0·29	−0·50, −0·09	<0·01	3·4	1·0	−0·31	−0·53, −0·09	<0·01
With partner	3·4	0·8	Reference			3·7	0·9	Reference			3·5	1·0	Reference		
Parental status															
No children	3·5	0·9	0·06	−0·11, 0·22	0·49	3·5	1·9	0·01	−0·17, 0·18	0·95	3·5	1·0	0·09	−0·10, 0·28	0·35
Children	3·4	0·8	Reference			3·7	0·9	Reference			3·7	0·9	Reference		

	Price (R^2 0·034)					Sensory appeal (R^2 0·029)					Mood (R^2 0·030)				
	Mean	SD	Adjusted est.	95 % CI	*P*	Mean	SD	Adjusted est.	95 % CI	*P*	Mean	SD	Adjusted est.	95 % CI	*P*
Worksite															
A	3·7	0·8	0·03	−0·22, 0·27	0·82	3·9	0·7	−0·05	−0·25, 0·15	0·61	3·5	0·8	0·28	0·03, 0·52	<0·05
B	3·5	0·9	−0·18	−0·39, 0·22	0·08	4·0	0·7	0·02	−0·15, 0·18	0·81	3·3	0·8	0·12	−0·08, 0·32	0·25
C	3·4	0·8	−0·28	−0·50, −0·06	<0·05	4·0	0·6	0·02	−0·16, 0·20	0·80	3·2	0·8	0·02	−0·20, 0·25	0·84
D	3·7	0·7	Reference			3·9	0·7	Reference			3·2	0·9	Reference		
Sex															
Male	3·4	1·0	−0·25	−0·40, −0·11	0·001	3·9	0·7	−0·28	−0·40, −0·16	<0·001	3·2	0·8	−0·25	−0·40, −0·10	0·001
Female	3·6	0·9	Reference			4·1	0·6	Reference			3·5	0·8	Reference		
Age (per 10-year increase)	–		−0·05	−0·13, 0·03	0·25	–		0·04	−0·02, 0·11	0·19	–		0·02	−0·07, 0·10	0·69
BMI (kg/m^2; per unit increase)	–		0·02	0·001, 0·03	<0·05	–		0·003	−0·01, 0·02	0·65	–		0·01	−0·01, 0·02	0·31
Education*															
Lower	3·5	0·8	−0·15	−0·32, 0·01	0·07	3·9	0·6	−0·09	−0·22, 0·05	0·21	3·4	0·8	0·12	−0·05, 0·27	0·17
Higher	3·5	0·8	Reference			4·0	0·6	Reference			3·2	0·8	Reference		
Accommodation															
Owning	3·5	0·8	0·02	−0·14, 0·17	0·86	4·0	0·7	−0·12	−0·24, 0·01	0·07	3·3	0·8	−0·06	−0·22, 0·10	0·45
Renting	3·4	0·8	Reference			4·0	0·6	Reference			3·3	0·8	Reference		
Living situation															
Alone	3·5	0·8	0·10	−0·12, 0·32	0·37	4·1	0·6	0·16	−0·01, 0·34	0·07	3·4	0·8	0·20	−0·02, 0·42	0·07
Others	3·5	0·8	Reference			4·0	0·7	Reference			3·3	0·8	Reference		

Table 2. (*Continued*)

	Price (R^2 0·034)					Sensory appeal (R^2 0·029)					Mood (R^2 0·030)				
	Mean	SD	Adjusted est.	95 % CI	*P*	Mean	SD	Adjusted est.	95 % CI	*P*	Mean	SD	Adjusted est.	95 % CI	*P*
Marital status															
Single	3·4	0·8	−0·07	−0·25, −0·12	0·50	3·9	0·7	−0·19	−0·34, −0·04	<0·05	3·3	0·8	−0·13	−0·33, 0·05	0·18
With partner	3·5	0·8	Reference			4·0	0·6	Reference			3·3	0·8	Reference		
Parental status															
No children	3·4	0·8	−0·16	−0·32 −0·01	<0·05	4·0	0·7	0·06	−0·07 0·19	0·36	3·3	0·8	0·04	−0·12, 0·20	0·61
Children	3·6	0·8	Reference			4·0	0·6	Reference			3·3	0·8	Reference		

	Health (R^2 0·043)					Familiarity (R^2 0·023)					Ethical concern (R^2 0·041)					Satisfaction (R^2 0·016)				
	Mean	SD	Adjusted est.	95 % CI	*P*	Mean	SD	Adjusted est.	95 % CI	*P*	Mean	SD	Adjusted est.	95 % CI	*P*	Mean	SD	Adjusted est.	95 % CI	*P*
Worksite																				
A	3·8	0·7	0·02	−0·19, 0·23	0·85	2·6	0·9	−0·40	−0·67, −0·14	<0·01	2·5	1·0	−0·32	−0·62, −0·30	<0·05	4·0	0·8	−0·10	−0·32, 0·12	0·36
B	3·9	0·7	0·08	−0·10, 0·26	0·37	2·8	0·9	−0·21	−0·43, 0·02	0·07	2·9	0·9	0·23	−0·01, 0·48	0·06	4·0	0·7	−0·07	−0·26, 0·11	0·43
C	3·7	0·7	−0·07	−0·26, 0·12	0·47	3·0	0·9	0·04	−0·20, 0·28	0·75	2·8	0·9	0·05	−0·21, ·31	0·72	4·0	0·6	−0·14	−0·34, 0·05	0·15
D	3·8	0·7	Reference			3·0	0·8	Reference			2·7	1·0	Reference			4·1	0·7			
Sex																				
Male	3·8	0·7	−0·26	−0·38, −0·13	<0·001	2·8	0·9	0·04	−0·12, 0·20	0·61	2·8	1·0	−0·09	−0·26, 0·08	0·31	3·9	0·7	−0·26	−0·39, −0·13	<0·001
Female	4·0	0·6	Reference			2·8	0·9	Reference			2·8	1·0	Reference			4·2	0·7	Reference		
Age (per 10-year increase)	–		0·10	0·04, 0·18	<0·01	–		0·03	−0·06, 0·12	0·53	–		0·15	0·06, 0·25	<0·01	–		−0·01	−0·09, 0·06	0·74
BMI (kg/m^2; per unit increase)	–		−0·01	−0·03, −0·001	<0·05	–		0·004	−0·01, 0·02	0·61	–		−0·01	−0·03, 0·01	0·36	–		0·01	<0·001, 0·03	0·06
Education*																				
Lower	3·8	0·7	−0·09	−0·23, 0·06	0·24	2·9	0·9	0·17	−0·01, 0·35	0·07	2·8	1·0	0·16	−0·04, 0·36	0·12	4·0	0·8	−0·08	−0·23, 0·07	0·29
Higher	3·8	0·7	Reference			2·8	0·9	Reference			2·8	0·9	Reference			4·0	0·7	Reference		
Accommodation																				
Owning	3·8	0·7	−0·16	−0·29, −0·02	<0·05	2·8	0·9	0·13	−0·04, 0·30	0·14	2·8	1·0	0·10	−0·09, 0·29	0·31	4·0	0·7	0·01	−0·13, 0·15	0·90
Renting	3·8	0·6	Reference			2·8	0·9	Reference			2·7	0·9	Reference			4·0	0·7	Reference		
Living situation																				
Alone	3·9	0·7	0·11	−0·08, 0·30	0·24	2·8	0·9	−0·03	−0·27, 0·21	0·79	2·9	1·0	−0·02	−0·28, 0·24	0·88	4·0	0·7	0·07	−0·13, 0·26	0·52
Others	3·8	0·7	Reference			2·8	0·9	Reference			2·8	1·0	Reference			4·0	0·7	Reference		
Marital status																				
Single	3·8	0·7	−0·14	−0·30, 0·02	0·09	2·8	0·9	0·003	−0·20, 0·21	0·98	2·8	0·9	−0·01	−0·24, 0·21	0·91	4·0	0·7	−0·12	−0·29, 0·04	0·15
With partner	3·8	0·7	Reference			2·8	0·9	Reference			2·8	1·0	Reference			4·0	0·7	Reference		
Parental status																				
No children	3·8	0·7	0·04	−0·10, 0·18	0·57	2·9	0·9	0·12	−0·06, 0·29	0·18	2·8	1·0	0·18	−0·01, 0·37	0·06	4·0	0·7	0·09	−0·05, 0·23	0·2
Children	3·8	0·7	Reference			2·8	0·9	Reference			2·8	1·0	Reference			4·0	0·7	Reference		

* Education is categorised into lower education, that is, participants graduating with leaving certificate or below and higher education, that is, participant graduating with diploma or any degree level.

average of −0·25, 95 % CI −0·07, −0·10 scores) and worksite (after adjustment, worksite A rated mood significantly more important than worksite D by 0·28, 95 % CI 0·03, 0·52 scores).

Four factors were significantly associated with *health*, that is, age (after adjustment, with every increase in 10 years, importance of health increased by 0·10, 95 % CI 0·04, 0·18 scores), BMI (after adjustment, with every increase in one unit kg/m^2 importance of health decreased by −0·01, 95 % CI −0·03, −0·001 scores), sex (after adjustment males rated health lower than females by an average of −0·26, 95 % CI −0·38, −0·13 scores) and accommodation (after adjustment, people who owned accommodation rated importance of health −0·16, 95 % CI −0·29, −0·02 scores lower than people who rented accommodation).

Worksite was the only factor in the adjusted model significantly associated with *familiarity* (after adjustment, worksite B rated familiarity less important than worksite D by −0·40, 95 % CI −0·67, −0·14 scores).

Ethical concern was significantly associated with age (after adjustment, with every increase in 10 years, importance of ethical concern increased by 0·15, 95 % CI 0·06, 0·25 scores) and worksite (after adjustment, worksite A rated ethical concern significantly less important than worksite D by −0·32, 95 % CI −0·62, −0·30 scores).

Lastly, *satisfaction* was significantly associated with sex only (after adjustment, males rated satisfaction lower than females by −0·26, 95 % CI −0·39, −0·13 scores).

Discussion

Overall findings

This was the first study to examine the differences in food choice motives in an Irish manufacturing working population according to socio-demographic and anthropometric characteristics (sex, BMI, parental status, marital status, living situation, accommodation and education level). The results demonstrate that difference in food motives was greatest between sexes and differed between worksites. Furthermore, participants valued health, natural content and ethical concern more with increasing age. Natural content was more important to people with higher education (diploma or degree) than to people with lower education. Furthermore, overweight and obese participants perceived weight control more important than healthy weight participants did, and price was of higher concern in people who had children compared with people who did not have children. However, socio-demographic and anthropometric characteristics only explained a small proportion of food choice determinants in this population, and there are other factors that have not been assessed which must play an important part, such as culture and the development of dietary habits over years[7]. These findings indicate the complexity of people's food choice.

Comparison with the literature

The overall finding that taste was generally more important to participants than health was also highlighted by McCarthy[6]. Another survey by Blanck *et al.*[18] in American working adults reports the relationship between lunch time habits (i.e. frequency of lunch purchases per week, food motives, purchasing of healthy foods and food sources, e.g. vending, canteen) and socio-demographic and anthropometric characteristics (sex, age, ethnicity, weight, education and marital status). They found that convenience, followed by taste, cost and health were most important to the study participants.

As described earlier, differences in dietary behaviour between males and females have been well documented,[19] and sex differences in food motives as identified in the present study may explain the differences in eating behaviour between males and females as observed in other studies. There are a number of studies that have proposed psychological reasons for these differences between males and females, such as greater health beliefs and weight consciousness in women[20] and social pressure about having a slim body[21], more favourable attitudes and greater behaviour control towards consuming FV as well as higher knowledge on the benefits of FV consumption in women[22,23]. Possible explanations for these differences are differences in biological, social and emotional factors[7] as well as differences in body image between sexes[24].

Findings from the present study further suggest that age may have a positive influence on food choice. This is in line with dietary behaviour as measured in the Healthy Ireland Survey 2017 which suggests that adults aged 65 years and older are more likely to eat cakes and biscuits compared with younger adults[2]. A systematic review looking at change in eating habits after retirement, on the other hand, reported inconclusive findings[25]. Evidence about the evolvement of food choice from young adults to middle-aged adults is limited. Middle-aged adults experience different influences than younger adults, such as having children, experiencing risk factors for non-communicable diseases, having parents and other family members who experience non-communicable diseases, which may explain a more health-conscious mindset.

In addition, findings reported here indicate that overweight and obese participants perceived weight control more important than healthy weight participants, which is in line with previous research reporting participants with a higher waist circumference viewed weight control food motives more important than healthy-weight study participants[14]. One reason why overweight and obese participants choose their food based on weight loss motives may be because most commercial diets advertise low-energy and low-fat products for weight loss, such as weight loss shakes, low-fat yoghurts and other low-energy products, and often do not highlight the importance of a well-balanced diet.

There is little evidence on the association between food motives and education. Results from a cross-sectional study in a Finnish study population suggested that lower-educated people prioritised price and familiarity which was negatively associated with healthy eating, whereas higher-educated participants prioritised health motives which was positively associated with healthy eating[26]. There is, however, a vast literature concerning the association between education level and dietary intake. Findings suggest that people with higher education, on average, consume more FV[27,28] and less unhealthy snacks and energy-dense foods compared with people with lower education[26,29].

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A report by Public Health England also found that obesity rates were highest in people who had no qualification, certificate of secondary education qualification or equivalent and lowest in people who had a degree[28] which is likely to result from less favourable lifestyle choices. Another factor that is often reported with education is income, which together make up socio-economic status[7,26,30]. Participants with lower education may have a lower income as well which could be a confounding factor that was not assessed as part of this research.

Research looking at eating patterns of parents is very limited. The study described here was one of few studies that compared food motives of parents with non-parents and found that price was of higher concern in people who had children compared with people who did not have children. To our knowledge, no other study has looked at the importance of food prices for parents compared with non-parents and other factors, for example, sensory appeal and health may override the importance of price for parents. Investigators who have examined the difference of eating patterns between parents and non-parents found that young mothers had a higher intake of sugar-sweetened beverages and saturated fats compared with young women who did not have children[31]. Other research has not found a difference in eating habits between parents and non-parents after a follow-up period of 7 years[32].

No other study, to our knowledge, has reported associations between marital status and food motives yet, and therefore these results cannot be compared with other literature. However, some research has looked at the associations between marital status and dietary behaviour. A systematic review of observational studies found that there is some evidence to suggest that married people consumed more FV intake than single people[33]. This review is, however, limited in its conclusions, as the number of studies included was small. Furthermore, the European Prospective Investigation into Cancer and Nutrition (EPIC) UK study researched the association between the diet and marital status of participants who were over 50 years of age and found that single and widowed participants had a less varied diet, particularly in vegetable intake in males[34]. The study also highlighted that living arrangements and social contact should be taken into consideration in single or separated people. Furthermore, low friend contact has been associated with a limited variety of FV intake in both men and women, whereas only in women, regular family contact seemed to be associated with a more varied vegetable consumption[34]. Our findings suggest that living situation (living alone *v.* living with others) played an important role in food choice motives. No other research was found studying these associations.

The observed differences between worksites suggest that interventions may need to be specifically tailored to each worksite. This is in line with a commentary by O'Donnell who advocates for addressing the 'unique circumstances of the organization' when designing an intervention[35].

Strengths and limitations

The characteristics analysed in the present study regarding food choice were broader than most studies have reported. The sample size was relatively large so that any differences observed are likely to be true for the population studied. However, multiple comparisons were carried out so that some of the findings may have been due to chance.

One limitation of the present study is that some of the categories within the individual characteristics were very small (e.g. only twelve people rented accommodation from a local authority), although broader categories were created for the final model. However, combining categories we may have disregarded some important differences between some of the groups, and it may not be a true representation of all people in that group.

Another limitation of the present study is the involvement of atypical multinational manufacturing workplaces which potentially limits the generalisability of the findings. The workplaces were purposively selected to ensure all intervention components could be implemented successfully. Random selection of the participating workplaces for interventions at this level of intensity or blinding was not feasible. However, the characteristics of the study population are similar to the general Irish workforce in terms of sex and age (i.e. labour force participation is higher in males than females and among the 35–44 year age group) and to the European Union workforce in terms of sex[36]. Furthermore, we do not have information about the length of time participants were employed at the workplaces studied. However, we do know that most employees were not in a managerial or supervisory role, ranging from 66 % in the control to 80 % in the combined intervention, usually worked during the day (56–78 %) and had a regular working schedule (59–97 %).

As part of this research, the association between food motives and actual eating behaviour was not studied, for example, whether participants who valued 'health' ultimately consumed a healthier diet. There is, however, evidence to suggest that 'weight control' and 'health' food motives are positively associated with healthy diet patterns[26,37]. On the other hand, social desirability bias may have influenced answers provided by overweight or obese individuals as it has been shown to influence dietary reporting[38].

Implications

Researchers should take into consideration the sensory appeal and satiating aspect of meals when designing dietary interventions. Furthermore, sex, age, BMI, marital status and worksite specifics may be important to consider when designing an intervention. Education, living situation, type of accommodation and parental status did not seem to play an important role in the present study population. Other factors that have been suggested, such as social context, eating environment and social norms, should also be considered with regard to food choice[7,39,40]; however, these may be more difficult to accurately assess. Whether food motives are assessed qualitatively or quantitatively, we recommend assessing them before designing an intervention to inform the study design. Future dietary intervention studies should explore whether taking into account employees' socio-demographic and anthropometric characteristics and food motives at baseline prior to the implementation of an intervention can increase intervention effectiveness in influencing employees' dietary behaviour.

Conclusion

Food choice is complex, and the socio-demographic and anthropometric factors assessed here only seem to explain a small proportion of individuals' food choice. The largest differences in motives were seen between sexes, and the highest-rated food motive was taste in all subgroups. Most research to date has looked at differences in dietary behaviour between subgroups of the population. Fewer studies have reported food choice motives of subgroups reported in the present study and how they may affect dietary behaviour. The results from this research may inform the design of interventions for different populations or subgroups of a population; however, further research is required to see how food choice motives translate into dietary behaviour. The challenge for public health practitioners is that most people prioritise sensory appeal and satisfaction over healthfulness and natural content of food. To encourage people to change dietary behaviour, interventions should consider a focus on demonstrating that healthy foods can be tasty and satisfying.

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