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Quality of diet and food choices of Finnish young men: a sociodemographic and health behaviour approach

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Abstract

Objective: Eating habits of Finns have improved dramatically in 40 years. The proportion of fat in the diet has decreased and vegetable and fruit consumption increased. Knowledge of Finnish young men's dietary habits is limited. The aim was to assess food choices and quality of diet among young men and to analyse how background and health behaviour factors explain it.

Design: In 2007, data on eating habits, sociodemographic background factors and health behaviours of 17–21-year-old men (*n* 2905) entering military service were collected by self-administrated questionnaire. Two indexes – core food index (CFI) and extra food index (EFI) – were formed to describe daily and redundant snacking-type eating, respectively. Associations of background factors and health behaviours on the indexes were analysed by general linear modelling.

Results: In all, 13 % consumed fruits and berries daily and 8 % consumed vegetables, whereas 24 % consumed pizza and 19 % consumed hamburgers more than once a week. CFI increased with educational level ($P < 0{\cdot}001$) and was explained by background and health behaviour (smoking, physical activity and eating breakfast). EFI was inversely associated with BMI ($P < 0{\cdot}001$) and explained by health behaviour: (smoking, physical activity, drinking beer and eating breakfast).

Conclusions: These results indicate that in early adulthood, eating habits cluster with other health behaviours among men. In this age group, education is associated with core food but not with extra food eating habits. Furthermore, seasonal variation is seen in both types of eating. When promoting healthy eating, a distinction between core foods and extra foods by using feasible indexes will be helpful in targeting the efforts.

Keywords
Food choices
Health behaviour
Quality of diet
Young men

Eating habits at the population level have changed dramatically in Finland since the early 1970s. Intakes of total and saturated fats were high compared to other European countries[1,2]. In 40 years, the proportion of total fat has decreased from 38 %[2] to 33 %[1,3] and that of saturated fat from 21 % to 13 %[3]. High-fat milk and butter have largely been replaced by skimmed milk and margarine. Simultaneously, vegetable and fruit consumption has increased substantially[1,3,4], but does not reach the national nutrition recommendations[5].

In the 1980s, the proportion of fat was still high (39–41 %) and consumption of potato, vegetables, cereals and milk products abundant among 18-year-old Finnish men[6,7]. After a 21-years' follow-up among these men, the overall proportion of fat was 36 % and the consumption of vegetables and fruit was higher than in youth[8].

These findings reflect positive changes in the prime everyday i.e. core diet. Despite these improvements, the prevalence of obesity and overweight has increased especially in young adults and adolescents in Finland[9]. Among 18-year-old boys, the prevalence of overweight (BMI $> 25\,kg/m^2$) and obesity (BMI $> 30\,kg/m^2$) increased 2·5-fold in 1977–1999[10].

One possible explanation for this development is excess consumption of extra foods that are not recommended in the daily diet e.g. fast food, sweets and soft drinks. In a population-based study from 2002, snacking-type eating was found frequently among Finnish men of whom 36 % ate at least four snacks daily[11]. A more recent limited study among young men in military service revealed a preference for energy-rich, nutrient-poor foods like pizza and soft drinks[12]. More recent population-based data on dietary habits of Finnish young men is lacking.

Furthermore, neither the overweight epidemic[9] nor healthy eating habits are equally distributed in different population groups[13]. Those with lower socio-economic

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status are more overweight[14] and most studies suggest that among adults higher education, occupational class and household income are related with healthier food habits[15]. In addition, adults' health habits tend to cluster i.e. unhealthy eating, smoking and lack of physical activity are associated[16,17].

Eventually, population-based studies focusing on different aspects of eating habits and their socio-economic background and health behaviour correlates among young men are lacking. The present study aims to describe Finnish young men's quality of diet, and to determine how background and health behaviour factors explain young men's eating habits.

Subjects and methods

In Finland, military service is compulsory for 18–29-year-old men and 80 % of them complete it[18]. This study was conducted as a part of the DefenceNutri research project, which is a controlled two-phase intervention trial taking place in two garrisons during 2007–2009. The garrisons are Armoured Brigade in Southern Finland (Southern Brigade) and Kainuu Brigade in Northern Finland (Northern Brigade). The study protocol has been approved by the ethics committee of the Hospital District of Helsinki and Uusimaa.

In the present study, baseline data on eating habits of two cohorts of men entering military service in January 2007 and July 2007 are presented. One month before the start of service, questionnaires were sent home to all men (n 6605) starting their military service at the garrisons. Men entering Southern Brigade live mostly in Southern Finland and the majority comes from big and medium size cities. In comparison, Northern Brigade recruits men from Western, Central and Northern Finland, and the majority living in semi-urban areas.

Responding to the questionnaire was possible by Internet or by returning it when entering service. Altogether, 3034 men replied (45·9 %). Incompletely filled questionnaires (n 23) were discarded. In addition, those respondents whose age was ≥ 22 years (n 70) and whose basic education could not be classified (n 36) were not included. The final number of respondents included was 2905. Their characteristics are shown in Table 1.

The questionnaire covered sociodemographic background, health behaviours and psychosocial factors. Regarding eating habits, it included questions on food choices and a 36-item FFQ in which consumption was assessed as number of days during the previous week. Items of the questionnaire represented all major food groups of the diet. In the present study, the following data were used: basic education, self-reported weight and height to compute BMI and smoking habits; frequencies of physical exercise and eating breakfast, FFQ, overall monthly eating frequency of fast food (kebab, hamburgers, pizza, French fries and meat pastries), types of bread fat and milk. To control for regional and seasonal dietary variation, garrison and season (winter-summer) were taken into account.

Table 1 Characteristics of the study population (n 2905, all male)

	%	
Marital status		
Single	91·3	
Married or co-habiting	8·3	
Other	0·4	
Season		
Winter	52·4	
Summer	47·6	
Region		
Southern Brigade	38·0	
Northern Brigade	62·0	
Basic education level		
Comprehensive school	12·4	
Vocational school	41·9	
Upper secondary school or college	45·7	
Smoking status		
Regular smoker, >10/d	14·4	
Regular smoker, 1–10 d	15·6	
Occasional smoker	36·6	
Never smoker	33·5	
Physical activity (moderate intensity)		
Maximum once per week	41·5	
2–3 times/week	33·5	
4–7 times/week	25·0	
	Mean	SD
BMI (kg/m^2)*	23·9	4·0
Age (years)	18·8	0·6

*Calculated from self-reported height and weight.

In order to characterize quality of diet of young men, two separate indexes were formed. One was formed to measure daily healthy eating habits (core food index, CFI). It was designed to measure compliance to national nutrition recommendations[5] that promote everyday healthy food choices such as low-fat milk, vegetables and rye bread. The other index was designed to measure consumption of food items not recommended for daily use (extra food index, EFI, Table 2). It was built on previous knowledge on Finnish conscripts' diet indicating that extra foods such as pizza are the most significant sources of saturated fat and soft drinks of sucrose[12]. Thus, the ultimate purpose of the indexes was to capture the core elements of a healthy diet as defined in dietary recommendations and the most significant sources of extra energy acquired by young men. In addition, aspects to be noticed in formation of indexes (items included in the indexes, continuous scoring and defining purposes of the indexes) were catered for[19].

The five dietary factors included in CFI (weekly consumption frequencies of rye bread, fresh vegetables and fruit and berries and type of milk and bread fat) and the four factors in EFI (weekly consumption frequencies of soft drinks, chocolate, candy; monthly consumption frequency of all fast food) and their scoring are shown in Table 2. All items describing weekly consumption were

Table 2 Composition and scoring of core food index (CFI) and extra food index (EFI)

CFI		EFI	
Dietary factor	Points	Dietary factor	Points
Fresh vegetables (frequency)	0–7*	Fast food (frequency)	0–10†
Fruits (frequency)	0–7*	Soft drink (frequency)	0–7*
Rye bread (frequency)	0–7*	Candy (frequency)	0–7*
		Chocolate (frequency)	0–7*
Type of milk			
Milk from the farm	0		
Full milk	1		
Semi-skimmed milk	2		
Milk with 1 % fat	3		
No milk	4		
Skimmed milk	5		
Type of bread fat			
Butter	0		
Butter–vegetable oil spread	1		
No fat	2		
Low-fat spread	3		
Margarine	4		
Total points	0–30	Total points	0–31
Mean	14·4	Mean	9·1
SD	5·3	SD	5·1

*Number of points equal to consumption frequency as number or days per week.
†Number of points equal to consumption frequency of all fast food as times per month. If consumed more than nine times per month, 10 points were given.

given 1 point for each day the food item was used per week (range: 0–7). For the overall monthly consumption of fast food, all values >9 were combined into one category, resulting in a scale of 0–10 points. In total, the score of CFI ranges between 0 and 30 and of EFI between 0 and 31. Scoring of the indexes gives a high value for CFI when the diet consists of healthy food choices and a high value for EFI when the diet includes plenty of extra foods.

Statistical analyses were performed using Statistical Package for Social Sciences statistical software package version 15 (SPSS Inc., Chicago, IL, USA). First, descriptive statistics of eating habits and correlations between background and health behaviour variables were calculated. Next, univariate associations between index scores and background and health behaviour were analysed using general linear modelling (GLM). Categorical variables were inserted into the model as fixed factors and continuous variables as covariates. In subsequent multivariate analyses, all statistically significant variables from univariate analyses were first incorporated as independent variables to a GLM and the index score as the dependent variable (Model 1). Then, non-significant variables were dropped and only significant variables retained (Model 2). CFI and EFI were analysed separately at all times.

Results

Weekly food consumption frequencies are presented in Table 3.

Regarding core foods, rye bread was the most frequently consumed cereal product as 30 % ate it on 6–7 d/week. Daily consumption of fruit and berries and vegetables was infrequent, 8 % and 13 %, respectively. Fresh vegetables were preferred to be cooked ones.

Red meat was the most frequently eaten type of meat. Sausages and chicken were also relatively frequent in the weekly but not in the daily diet. Consumption of fish was rare since 90 % of the men reported eating it on 0–1 d/week. Of dairy products, milk and sour milk were most frequently consumed belonging to the daily diet of 65 % of the men. In addition, cheese was usually consumed daily.

Regarding all fast food classes (French fries, crisps, pizza, kebab, hamburgers, hot dogs, meat pastries and pastries), a clear minority consumed them more than once a week. Candy was preferred to chocolate (46 % *v.* 26 %, respectively, >1 d/week) and sugar-sweetened soft drinks to artificially sweetened ('light') ones. Beer was the most common alcoholic beverage and others were consumed marginally.

Effects of background and health behaviour factors on CFI are shown in Table 4.

The mean CFI value was 14·4. Of background factors, basic education explained CFI the most ($R^2 = 0{\cdot}078$) and of health behaviour factors frequency of eating breakfast ($R^2 = 0{\cdot}100$). All background and health behaviour factors had significant ($P < 0{\cdot}04$) effect on CFI in univariate analyses. CFI score was higher in summer than in winter ($P < 0{\cdot}001$) and in Southern Brigade compared to Northern Brigade ($P < 0{\cdot}001$). CFI also increased significantly with basic education ($P < 0{\cdot}001$ between all classes). BMI was inversely associated with CFI ($P = 0{\cdot}03$). Regular smokers had a significantly lower score than in other smoking classes ($P < 0{\cdot}001$). As frequencies for physical exercise and eating

Table 3 Food consumption frequencies

	0–1 d/week %	2–3 d/week %	4–5 d/week %	6–7 d/week %
Core foods				
Rye bread	21	26	23	30
Mixed bread	33	34	21	13
White bread	82	14	3	1
Porridge, breakfast cereal	67	18	8	7
Rice, pasta	45	44	10	2
Fruits, berries	44	35	13	8
Fresh vegetables, salads	29	38	20	13
Cooked vegetables	71	22	6	1
Cooked potato	21	42	29	9
Milk, sour milk	12	10	12	66
Yoghurt, sour whole milk	53	28	12	6
Cheese	14	22	23	40
Salmon, rainbow trout	86	12	1	0
Other fish	90	9	1	0
Chicken	59	37	4	1
Meat, meat dishes	11	46	30	14
Sausage	64	27	7	3
Extra foods				
Soft drinks (sugar-sweetened)	35	39	17	9
Soft drinks (artificially sweetened)	76	16	5	3
French fries*	78	19	3	1
Potato crisps and other snacks*	83	15	1	0
Pizza, kebab*	76	22	2	0
Hamburgers, hot dogs*	81	17	2	1
Meat pastries*	89	10	1	0
Sweet pastries (buns, biscuits)	54	34	9	4
Desserts	82	16	2	0
Candy	55	37	6	2
Chocolate	74	20	4	2
Icecream	72	23	4	1
Beverages				
Juices	18	33	24	25
Beer	65	28	6	2
Cider	92	7	1	0
Wine	96	3	0	0
Spirit	91	9	1	0

Consumption frequency as number of days per week that food item has been used.
*Classified as fast food.

breakfast increased, so did the score ($P < 0{\cdot}001$ between all classes). The score was higher for those drinking beer once a week ($P = 0{\cdot}006$) and non-drinkers ($P < 0{\cdot}001$) comparing to more frequent beer drinkers.

In the first multivariate model (Model 1), all factors except region, BMI and beer drinking frequency remained significant. The coefficient of determination was 0·205 for the model. In Model 2, all independently significant background and health behaviour factors were included. All factors in the model explained CFI significantly ($P < 0{\cdot}003$ for all explanatory variables) and the associations found were similar to those observed in Model 1. The coefficient of determination was similar to that in Model 1 ($R^2 = 0{\cdot}200$).

Effects of background and health behaviour factors on EFI are shown in Table 5.

The mean EFI was 9·1 with frequencies of drinking beer ($R^2 = 0{\cdot}031$) and eating breakfast ($R^2 = 0{\cdot}026$) as the most important factors contributing to the score. In univariate analyses, all background and health behaviour factors except region had significant ($P < 0{\cdot}001$) effect. The index score was higher in winter ($P < 0{\cdot}001$) than in summer. The score was higher for those having comprehensive school as basic education than for those having completed upper secondary school ($P = 0{\cdot}001$). Interestingly, EFI was inversely associated with BMI ($P < 0{\cdot}001$). Regular smokers had a significantly higher score than in other smoking classes ($P < 0{\cdot}001$). Furthermore, the score increased significantly as physical exercise frequency decreased ($P < 0{\cdot}001$ between classes). The index score was lowest for those drinking beer once a week. Finally, the mean index score increased also as frequency of eating breakfast decreased. The coefficient of determination remained relatively low ($R^2 \leq 0{\cdot}03$) for all factors.

In Model 1, the background and health behaviour factors, which were significant in univariate analyses, were included. All explanatory variables in the model except basic education remained significant. Effects of season and BMI were similar as in univariate analyses. EFI was higher for occasional smokers than for regular smokers (1–10/d); R^2 for the model was 0·082.

Table 4 Effect of background and health behaviour factors on CFI

	Univariate analyses			Model 1		Model 2	
	Mean index score	*P*	R^2	Mean index score	*P*	Mean index score	*P*
Season							
Winter	13·7	0·001	0·022	13·59		13·60	
Summer	15·27			14·74	0·001	14·69	0·001
Region							
Northern Brigade	14·22	0·001	0·003	13·98			
Southern Brigade	14·89			14·35	0·053		
Basic education level		0·001	0·078		0·001		0·001
Comprehensive school	12·02	r.c.		13·22	r.c.	13·28	r.c.
Vocational school	13·43	0·001		13·93	0·026	13·57	0·051
Upper secondary school or college	15·97	0·001		15·34	0·001	14·94	0·001
BMI (kg/m^2)	14·46	0·032	0·001		0·169		
Smoking status		0·001	0·064		0·001		0·003
Regular smoker, >10/d	11·88	r.c.		13·43	r.c.	13·58	r.c.
Regular smoker, 1–10 d	13·02	0·001		13·98	0·120	13·92	0·325
Occasional smoker	14·88	0·001		14·43	0·002	14·38	0·011
Never smoker	15·70	0·001		14·82	0·001	14·71	0·001
Physical activity		0·001	0·095		0·001		0·001
Maximum once a week	12·70	r.c.		12·93	r.c.	12·88	r.c.
2–3 times/week	14·89	0·001		14·05	0·001	14·06	0·001
4–7 times/week	16·78	0·001		15·51	0·001	15·50	0·001
Drinking beer		0·001	0·004		0·280		
2–7 d/week	13·94	r.c.		13·96	r.c.		
1 d/week	14·64	0·006		14·34	0·534		
0 d/week	14·77	0·001		14·19	0·319		
Eating breakfast		0·001	0·100		0·001		0·001
3–4 times/week or less	12·34	r.c.		12·77	r.c.	12·45	r.c.
5–6 times/week	14·71	0·001		14·38	0·001	14·86	0·001
Daily	16·01	0·001		15·34	0·001	15·00	0·001

r.c., reference class.
In Model 1, all univariately significant factors were included. In Model 2, all factors significant in Model 1 were included.

Table 5 Effect of background and health behaviour factors on EFI

	Univariate analyses			Model 1		Model 2	
	Mean index score	*P*	R^2	Mean index score	*P*	Mean index score	*P*
Season							
Winter	9·42			9·42		9·43	
Summer	8·73	0·001	0·004	8·97	0·004	8·88	0·004
Region							
Southern Brigade	9·20						
Northern Brigade	9·03	0·396	0·001				
Basic education level		0·001	0·007		0·769		
Comprehensive school	9·65	r.c.		9·13	r.c.		
Vocational school	9·47	0·575		9·23	0·749		
Upper secondary school or college	8·64	0·001		9·08	0·885		
BMI (kg/m^2)	9·08	0·001	0·007		0·001		0·001
Smoking status		0·001	0·020		0·002		0·001
Regular smoker, <10/d	10·62	r.c.		9·86	r.c.	9·89	r.c.
Regular smoker, 1–10 d	9·34	0·001		8·87	0·006	8·88	0·005
Occasional smoker	9·14	0·001		9·22	0·052	9·21	0·031
Never smoker	8·29	0·001		8·64	0·001	8·62	0·001
Physical activity		0·001	0·018		0·001		0·001
Maximum once a week	9·86	r.c.		9·63	r.c.	9·65	r.c.
2–3 times/week	8·80	0·001		9·12	0·023	9·12	0·019
4–7 times/week	8·19	0·001		8·67	0·001	8·68	0·001
Drinking beer		0·001	0·031		0·001		0·001
2–7 days/week	10·33	r.c.		10·26	r.c.	10·27	r.c.
1 d/week	8·29	0·001		8·35	0·001	8·35	0·001
0 d/week	8·54	0·001		8·83	0·001	8·83	0·001
Eating breakfast		0·001	0·026		0·001		0·001
3–4 times/week or less	10·11	r.c.		9·77	r.c.	9·78	r.c.
5–6 times/week	9·36	0·012		9·27	0·098	9·27	0·090
Daily	8·29	0·001		8·40	0·001	8·40	0·001

r.c., reference class.
In Model 1, all univariately significant factors were included. In Model 2, all factors significant in Model 1 were included.

In Model 2, the coefficient of determination ($R^2 = 0{\cdot}083$) was equal to that in Model 1. The effect of all factors on EFI was highly significant ($P \leq 0{\cdot}01$ for all explanatory variables).

Discussion

In the present study, examination of consumption frequencies of several core foods and extra foods showed that daily consumption of fruits, berries and vegetables is rare, but rye bread is favoured. In addition, milk, sour milk and cheese form a part of the daily diet. Sugar-sweetened soft drinks are preferred to artificially sweetened ones and candy to chocolate.

When healthy core food eating was analysed by CFI, background factors and other health behaviours had significant associations with core food eating. These eating habits varied notably between different classes of explanatory variables. BMI was negatively associated with CFI in univariate analysis, but not in multivariate analyses. As with CFI, all health behaviour factors were related to EFI, but of background factors; season did not predict this type of eating. Furthermore, individuals with a lower rather than higher BMI ate extra foods significantly more often.

The low use of fruits and berries found in the present study resembles that of 15–24-year-old Finnish men[20]. Only 8 % used fruit and berries and 13 % fresh vegetables daily or almost daily, which is far from the recommended 400 g/d[5]. Fresh vegetables were more frequently consumed than cooked ones, which is in line with previous studies among Finnish men[3,11,20]. Rye bread was the most common bread and similar results have been reported among 25–34-year-old men too[3].

Several international diet quality scores exist, some of which were widely used[21–28]. However, their application to the present study has limitations as they do not take into account special characteristics of the Finnish diet, e.g. uses of rye bread and berries. Three Finnish indexes also exist. Two of them have been used to evaluate intake of saturated fat[29] that offers a constricted scope for use in the present study. The third one was formed to describe the quality of diet of subjects who had been followed from childhood. Its adaptation for our study of young men is not feasible because of our population's homogeneous sex, age and situation-of-life structure. Formation of CFI and EFI also caters for previous knowledge of a resembling population[12].

Seasonal differences in eating habits exist as found in the present study. In general, the consumption of fruits, berries and vegetables is high in the summer. Regional differences like higher consumption of vegetables in Southern Finland have been found earlier[3]. Previous studies among Finnish men have shown that daily consumption of vegetables is higher among those with higher education and income than among men with low education and income[13] and the first-mentioned have lower energy intake[30]. The basic education was the second strongest explanatory factor for CFI. Breakfast eating habits explained variation in CFI the most.

An earlier study that followed Finnish children to adulthood found no differences in eating habits based on either the subjects or their parents' educational level. However, the study also showed that physical activity level was associated with eating habits[8], an association confirmed also in our study, and for both types of eating habits. This same pattern was also extended to other health behaviours. Both CFI and EFI were negatively associated with BMI. Regarding EFI there are several underlying reasons. The vast majority of these men are of normal weight and further analysis requires examination of this association in subgroups according to physical activity. It may be that among young men there are other food items popularly consumed which were not measured here. In addition, consumption quantities that are not reported here may explicate this association. It is worth noticing that the finding does not indicate causality.

There are also some limitations to the present study. First, the response rate is moderate being 46 %. Still, it is at the same level as the current response rate of 15–24-year-old Finnish men in a large health behaviour population study, and responding increases with educational level[31], age[32,33] and socio-economic status[33]. Moreover, as 20 % of men do not serve in the military due to medical, ethical and religious reasons[34], conscripts form a somewhat selected population. Second, the coefficients of determination for both CFI and EFI models are relatively modest. This is probably due to other underlying explanatory factors such as family situation, subjects' parental education and household income[16]. Of these, especially the latter is exposed to change as the study population is in a transition period between youth and independent adult life.

However, despite these limitations, the present study offers new knowledge on young Finnish men's quality of diet and food choices. Clustering of physical inactivity and smoking have been reported[16,17], but the additional association of drinking beer and breakfast eating habits on quality of diet have not been studied earlier among Finnish young men. Furthermore, the relationship of education and eating habits has been established earlier[15,16]. However, a notable finding is that educational differences were found to affect only core daily eating. It should also be remembered that dietary items included in our indexes represent active personal choices regarding quality of diet.

Future research should explore in more detail the components of young men's core food and extra food choices. Further research is required to analyse the development of the quality of diet among young men in later adulthood and also during military service.

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