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Sociodemographic and behavioural determinants of a healthy diet in Switzerland

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ABSTRACT

Background/aims: The determinants of a healthy diet have not been studied in Switzerland. This study aimed to assess the individual and behavioural factors associated to a healthy diet in a Swiss city.

Methods: Cross-sectional, population-based study conducted between 2009 and 2013 (N=4439, 2383 women, mean age 57.5±10.3 years) in Lausanne. Food consumption was assessed using a validated food frequency questionnaire. Two Mediterranean diet scores (classic score and specific for Switzerland) and the Harvard School of Public Health alternate healthy eating index (AHEI) were computed.

Results: For all three dietary scores considered, living in couple and having a high education were associated with a healthier diet, an unhealthy lifestyle (smoking, sedentary behaviour or high body mass index) was associated with an unhealthier diet. Participants born in Italy, Portugal and Spain also had healthier diets than participants born in France or Switzerland. Women and elderly participants had healthier diets than men and young participants according to two scores, while no differences were found for the Swiss-built Mediterranean score.

Conclusions: In Switzerland, healthy eating is associated with high education, a healthy lifestyle, marital status and country of origin. The associations with gender and age depend on the dietary score considered.

Keywords: diet; dietary scores; population-based sample; Switzerland.

INTRODUCTION

Diet is a major determinant of health and disease. The associations between diet and health can be assessed at several levels, from single nutrients to complex dietary patterns. For instance, the Mediterranean diet is characterised by a high consumption of whole grains, cereals, olive oil, vegetables, pulses and fruits, a moderate to high consumption of fish, and moderate to low consumption of meat, meat products, milk and dairy products, with wine consumption during meals [1]. The Mediterranean diet has been shown to be protective towards obesity [2], diabetes [3], hypertension [4], hypercholesterolemia [4], the metabolic syndrome [5], and cardiovascular and total mortality [6-8]. Several scores assessing the compliance to the Mediterranean dietary pattern have been proposed [3, 5, 7, 8]. They differ regarding the number of foods and/or nutrients included and the scoring system. For instance, the Mediterranean diet score derived for the Swiss population considers dairy products as beneficial [8], which is not the case for the other scores [3, 7]. Other healthy diet scores have been proposed such as the healthy eating index (HEI) or the alternate healthy eating index (AHEI) [9, 10], which have been related to decreased risk of cardiovascular morbidity and mortality [9].

Switzerland is a small European country characterized by a low mortality from cardiovascular disease and a relatively low prevalence of cardiovascular risk factors compared to neighbouring countries such as France or Germany [11, 12]. Previous studies showed that compliance to national dietary guidelines is rather low [13, 14] and that male gender, being born in Switzerland, having a lower educational level or being obese were negatively associated with compliance [14]. However, to our knowledge no study has ever assessed the individual and behavioural determinants of a healthy dietary pattern in the Swiss population.

Thus, we aimed to assess the determinants of a healthy diet, as measured through two Mediterranean diet scores and the AHEI, in a population-based sample in Switzerland.

METHODS

The Cohorte Lausannoise (CoLaus) study.

The CoLaus study is a population-based study assessing the clinical, biological and genetic determinants of cardiovascular disease in the city of Lausanne, Switzerland [15]. The study was approved by the Institutional Ethics Committee of the University of Lausanne and all participants provided written informed consent. The initial recruitment took place between June 2003 and May 2006 and enrolled 6,733 participants (3,544 women) aged 35-75 years; participation rate was 41%.

Follow-up was conducted between April 2009 and September 2012 and included all participants willing to be re-contacted. At follow-up, participants attended a single visit, which included an interview and a physical exam. Average follow-up time was 5.5 years. We only consider data from the follow-up examination as dietary intake assessment was first introduced here.

Clinical and anthropometric data

Educational level was categorized as low (primary), middle (apprenticeship or secondary school) and high (university). Marital status was categorized into living alone (single, divorced or widowed) and living in a couple. Nationality was based on the country in which the participant was born, and two variables were created: one with two categories (Swiss-born yes/no) and one with six categories: Swiss-born, the four most frequent migrant communities (France, Italy, Spain and Portugal) and other (>90 different countries).

Receiving social help was assessed with the question: “Do you receive social help?”. In Switzerland, social help is provided as financial support to people with disabilities or whose income is insufficient to support themselves or their family, and can thus be considered as an indicator of financial adversity. Because all individuals residing in Switzerland receive financial compensation after retirement, the positive response to this

question was only considered for participants who were not retired. Positive responses were set to negative for retired patients. It was not possible to distinguish people receiving support in form of disability benefit.

Smoking status was defined as never, former (irrespective of the time since quitting) and current (irrespective of the amount smoked). Body weight and height were measured using standard procedures [15]. Body mass index (BMI) was defined as weight (kg)/height(m)^2. Overweight was defined as 25≤BMI<30 kg/m^2 and obesity as BMI≥30 kg/m^2. Participants were considered to be on a diet if they responded positively to the question "are you currently on a diet", irrespective of the type of diet considered (for slimming, diabetes, high cholesterol, other). Physical activity was assessed by a validated questionnaire (PAFQ) where the participant indicated the average daily duration of different types of physical activity (i.e. household, at work, sports) [16]. Sedentarity was defined as expending less than 10% of the daily energy in the performance of moderate- and high-intensity activities (at least 4 times the basal metabolism rate) [17, 18].

Dietary intake

Dietary intake was assessed using a self-administered, semi quantitative Food Frequency Questionnaire (FFQ) which also included portion size [19]. This FFQ has been validated in the Geneva population [19, 20] and several studies have been published previously [13, 20]. For each item, consumption frequencies ranging from "less than once during the last 4 weeks" to "2 or more times per day" were provided, and the participants also indicated the average serving size (smaller, equal or bigger) compared to a reference size. Each participant brought along her/his filled-in FFQ, which was checked for completion by trained interviewers the day of the visit.

Three healthy eating scores were computed. They are detailed below

Mediterranean score 1

The first Mediterranean dietary score (hereby designated as "Mediterranean score 1") was derived from the one suggested by Trichopoulou et al. [7] that uses consumption frequencies instead of amounts. Briefly, a score of zero or one is assigned to each of seven food components using their sex-specific medians as cut-off. Hence, for beneficial foods (vegetables, fruits, fish, cereal), participants whose consumption was above the median were assigned the value of one; while for detrimental foods (meat, dairy products), participants whose consumption was below the median were assigned the value of one. Two other items were considered: ratio of monounsaturated to saturated fats and moderate alcohol consumption (between 5 and 25 g/day for women and 10 to 50 g/day for men). The score ranges between zero and eight.

Mediterranean score 2

The second Mediterranean dietary score (hereby designated as "Mediterranean score 2") adapted to the Swiss population was computed according to Vormund et al. [8]. It uses the same scoring system but considers nine types of beneficial foods: fruits, vegetables, fish, cereal, salads, poultry, dairy products and wine. Contrary to the previous score, dairy products are considered as beneficial. The score thus ranges between zero and nine.

Alternate healthy eating index (AHEI)

The AHEI was developed by the Harvard School of Public Health and was computed according to McCullough et al. [21], with some modifications. Briefly, this score is composed of several items: vegetables, fruit, nuts & soy and alcohol consumption (all expressed as number of servings per day); ratio of white to red meat; cereal fibre (g/day); *trans* fat (% of energy); polyunsaturated to saturated fat ratio; and duration of multivitamin use. For each item, a value between 0 and 10 is given based on the consumption of the item. In our study, the amount of *trans* fat could not be assessed, and we considered all

participants taking multivitamins as taking them for a duration ≥5 years. Thus, the modified AHEI score ranges between 2.5 and 77.5 instead of 2.5 and 87.5 for the original AHEI score [21], with higher scores representing healthier diet.

Exclusion criteria

Participants were excluded if they presented at least one of the following characteristics: 1) No FFQ completed; 2) No data for factors previously reported to be associated with such scores such as smoking, BMI, gender or education [22] and 3) not enough information to calculate one of the three healthy diet scores.

Statistical analysis

Statistical analyses were performed using Stata version 13.1 for Windows (Stata Corp, College Station, Texas, USA). Descriptive results were expressed as number of participants (percentage) or as average ± standard deviation. The associations between dietary scores were assessed by nonparametric Spearman correlation analysis. Analysis of the associations between individual and behaviour characteristics and dietary patterns was performed using the scores as continuous variables. Bivariate analyses comparing genders or dietary scores between groups were performed using chi-square for qualitative variables and Student's t-test or analysis of variance for quantitative variables. Multivariable analysis was performed using analysis of covariance adjusting simultaneously for all the following covariates: gender, age, marital status, nationality, receiving social help, educational level, smoking status, being on a diet or sedentary, and BMI categories. Results were expressed as multivariable-adjusted mean±standard error. Linear trends were assessed using the contrast orthogonal polynomial operator command p. of Stata. We ran the following sensitivity analysis: a) models without participants with missing information on PAFQ; b) models splitting BMI into normal and overweight (BMI ≥25 kg/m^2) and c) models without participants on a diet. Statistical significance was considered for two-sided tests with $p<0.05$.

RESULTS

Characteristics of participants

Overall, data from 4439 (87.6% of the overall cohort) participants was analyzed. The selection procedure is summarized in **figure 1**. Excluded participants were significantly older, lived more frequently alone, were more frequently born outside Switzerland, received more frequently social help, had a lower educational level, were more frequently smokers, were less frequently on a diet and had a higher BMI than included participants (**supplementary table 1**).

The main characteristics of the participants overall and by gender are summarized in **table 1**. Women were slightly older, more frequently never smokers, reported more frequently to be on a diet, had a lower educational level and were thinner than men.

Determinants of dietary scores

Mean values of the dietary scores according to participants' characteristics are summarized in **table 2**. The three scores were positively correlated, with Spearman's correlation coefficients of 0.652 between the two Mediterranean scores, 0.544 between the Mediterranean score 1 and the AHEI, and 0.545 between the Mediterranean score 2 and the AHEI, all $p<0.001$ (**supplementary figure 1**).

Women scored higher than men for the AHEI score, while no consistent differences were found for the Mediterranean scores. Higher age was positively associated with the Mediterranean score 1 and the AHEI score, while no differences were found for the Swiss-based Mediterranean score 2. Participants with higher BMI had lower values for all dietary scores: the multivariable-adjusted differences and (95% CI) between obese participants and participants with normal weight were 0.33 (0.19; 0.46), 0.46 (0.28; 0.64) and 3.0 (2.0; 3.9) for the Mediterranean score 1, the Mediterranean score 2 and the AHEI, respectively (**table 2**).

Smoking status was associated with lower scores for the Mediterranean score 2 and the AHEI, while no differences were found for the Greek-based Mediterranean score 1. Participants reporting being on a diet scored higher in all dietary scores: the multivariable-adjusted differences and (95% CI) between participants on a diet and participants not on a diet were 0.31 (0.21; 0.41), 0.40 (0.27; 0.53) and 3.0 (2.3; 3.6) for the Mediterranean score 1, the Mediterranean score 2 and the AHEI, respectively. Sedentary participants scored lower in all dietary scores: the multivariable-adjusted differences and (95% CI) between non-sedentary and sedentary participants were 0.22 (0.13; 0.32), 0.25 (0.13; 0.37) and 2.1 (1.5; 2.7) for the Mediterranean score 1, the Mediterranean score 2 and the AHEI, respectively (**table 2**).

Participants with higher education scored higher in all dietary scores: the multivariable-adjusted differences and (95% CI) between participants with university and participants with basic education were 0.47 (0.64; 0.30), 0.58 (0.35; 0.80) and 3.3 (2.2; 4.4) for the Mediterranean score 1, the Mediterranean score 2 and the AHEI, respectively (**table 2**).

Participants living in a couple scored higher in all dietary scores: the multivariable-adjusted differences and (95% CI) between participants living in a couple and participants living alone were 0.26 (0.36; 0.17), 0.52 (0.40; 0.64) and 0.9 (0.3; 1.6) for the Mediterranean score 1, the Mediterranean score 2 and the AHEI, respectively. Participants of Italian, Portuguese or Spanish origin scored higher in all dietary scores than participants of Swiss or French nationality. No association was found between receiving social help and dietary scores (**table 2**).

Similar findings were obtained when the analysis was stratified by gender (**supplementary table 2**), when the analysis was expanded to participants without data for sedentarity (**supplementary table 3**), when BMI was categorized into normal and overweight

(i.e. BMI≥25 kg/m^2, **supplementary table 4**) or when participants on a diet were excluded (**supplementary table 5**).

DISCUSSION

To our knowledge, this is the first study to characterize the sociodemographic and behavioural determinants of healthy eating in a population-based Swiss study. Our results indicate that higher education is positively associated with a healthy diet, while markers of an unhealthy lifestyle such as smoking, sedentarity and high body mass index are negatively associated with a healthy diet. Our findings are important for targeting the promotion of healthy eating in the Swiss population.

Dietary patterns can be either empirical (i.e. their composition is derived from estimated dietary intakes) or hypothesis-driven (i.e. composed of foods and/or nutrients individually associated with disease). The Mediterranean scores and the AHEI are of the former type, i.e. they are derived from a list of foods and/or nutrients know to provide health benefits. Contrary to empirical scores, their composition is fixed and, for AHEI, the results can be compared between studies. Thus, the scores obtained for this population (32.9±10.1 for women and 30.6±9.9 for men) were lower than those reported in a Chinese study (43.8±8.1 for women and 42.2±8.3 for men) [23] and in a British study (51.6±12.4 for the whole sample) [24]. Although the difference might partly be due to the fact that we couldn't take into account *trans* fatty acids (resulting in lower values of the AHEI score), our results still suggest that dietary quality in this Swiss population is lower than in other countries.

Conversely, some Mediterranean scores are based on the median distribution of given foods and/or nutrients for the population of interest and not on given thresholds [7]. Thus, the same consumption of the foods/nutrients of interest may lead to a high score in a non-Mediterranean country and to a low score in a Mediterranean country. Interestingly, all three

scores were positively correlated, but the strength of the correlation was relatively modest, with all correlation coefficients below 0.7. These results suggest that dietary scores are not fully interchangeable, and that they assess different facets of dietary intake. However, associations with socio-demographic and behavioural factors were similar for the three scores.

Factors associated with dietary scores.

Women and elderly people tended to score higher than men or younger subjects, respectively, a finding in agreement with the literature [25]. Women are more health conscious than men, pay more attention to their weight, prepare meals more frequently [26], which could improve dietary quality [27], although this statement has been challenged [28]. The fact that elderly people scored higher could be due to their tendency in keeping their dietary habits, in spending more time preparing meals [26], in consuming take-away meals less frequently [29], among others.

Participants who were married or living in couple scored higher than participants who lived alone, a finding in agreement with the literature [30]. The differences according to marital status appeared to be higher in women than in men for all dietary scores, a finding in agreement with another study [30]. A possible explanation would be that women living in couple care more for their family's health and thus have healthier dietary habits, but further studies are needed to better assess this point.

Country of birth was strongly associated with healthy eating, independently of other individual, social or behavioural factors. Participants born in Southern European countries scored higher, reflecting their traditional diet [31] and the fact that migrants tend to retain their behaviours (including dietary intake) in their host country [32]. Further, a ranking Portuguese > Spanish > Italian > French ≅ Swiss regarding all healthy eating scores was found. This ranking could be related to the time spent in Switzerland and consequent dietary

acculturation to an “unhealthier” diet [33]. Indeed, average length of stay in Switzerland was shorter for Portuguese (average ± standard deviation: 19.5±8.1 years) compared to Spanish (28.1±10.4) or Italian (35.8±11.7) migrants, although no association between years spent in Switzerland and dietary scores was found (not shown). Overall, our results suggest that dietary habits in the country of origin strongly influence adherence to healthy eating, and that acculturation does not seem to change this pattern.

Participants with the highest education scored highest in all dietary scores, a finding in agreement with the literature [22, 34]. Participants with higher education tend to have higher earnings, which leads to a better access to healthy, but relatively expensive, foods including fruits and vegetables [35]. Indeed, limited financial resources lead to a reduction in fruits and vegetable consumption, with a parallel increase in the consumption of fat and sugar [36] and improving a Mediterranean diet score carries a significant economic cost [37]. This statement is further strengthened by the fact that high income has been associated with diet independently of education [38]. Hence, education and income should be both considered in preventive or promotional policies aimed at improving the quality of dietary intake, and targeted accordingly. Thus, promotion of healthy eating among lesser educated, lower income groups might not be effective if no action on food costs is undertaken [39]. Interestingly, no association was found between receiving social help and dietary scores. A possible explanation is that the number of participants receiving social help was relatively low (11.4%), which limits statistical power. Another explanation is the fact that social help is provided to people with financial difficulties (i.e. jobless) but also to people with total or partial disability. As people with partial disability can also have other sources of income (i.e. working), it is possible that receiving social help might not be proxy for financial difficulties sufficiently independent of education level in this study.

Participants who smoked, who were sedentary or who presented with obesity scored lower on all dietary scores, a finding also reported in the literature [14, 34]. Indeed, such unhealthy lifestyle behaviours tend to cluster, making these people particularly at risk for lifestyle-related diseases [40]. Behavioural changes in these individuals might also be particularly difficult to manage, as the intervention on a single behaviour (i.e. smoking cessation or becoming physically active) might not be sufficient to change the other unhealthy behaviours, which act as a disincentive for change.

Study limitations

This study has several limitations. Initial participation rate was low, but in line with other studies [41]. The cross-sectional nature of the study limits causal inferences. The study was conducted in a French-speaking canton; as Switzerland is a multilingual country, it is likely that dietary behaviours in Italian or German-speaking regions will be different. Yet, a study conducted in the three linguistic regions of Switzerland found a Mediterranean diet to be associated with lower all-cause, CVD and cancer mortality across cultural backgrounds [8]. In the absence of a nationally representative study, this is the best assessment of factors associated with dietary patterns in the Swiss population. Receiving social help did not allow distinguishing individuals receiving invalidity insurance from those receiving social help because of low income; overall this study did not allow to consistently evaluating the impact of financial difficulties on dietary patterns.

Conclusions

In Switzerland, healthy eating is associated with high education a healthy lifestyle, marital status and country of origin, and these associations are valid irrespective of the dietary score considered. Conversely, the associations between healthy eating and gender or age depend on the dietary score.

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AUTHORS' CONTRIBUTIONS

GW, PV, MB and IG designed research; PM-V analyzed data and wrote part of the paper; SG wrote part of the paper. PM-V has primary responsibility for the final content. All authors have read and approved the final manuscript.

CONFLICT OF INTEREST

PV and GW received funding from the Swiss National Science Foundation (Bern, Switzerland); GlaxoSmithKline (Philadelphia, PA, USA) and the Faculty of Biology and Medicine of Lausanne (Lausanne, Switzerland) to conduct the CoLaus study. MB, IG, SS and PM-V indicate no conflict of interest.

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500 **TABLES**

501 **Table 1**: characteristics of the participants, overall and by gender, Lausanne, Switzerland,
502 2009-2012

	All	Women	Men	p-value
Sample size (%)	4,439 (100%)	2,383 (53.7%)	2,056 (46.3%)	
Age (years)	57.5 ± 10.3	57.8 ± 10.3	57.1 ± 10.4	0.02
Age groups (%)				
40-49	1278 (28.8)	653 (27.4)	625 (30.4)	0.009
50-59	1355 (30.5)	713 (29.9)	642 (31.2)	
60-69	1204 (27.1)	694 (29.1)	510 (24.8)	
70-79	602 (13.6)	323 (13.6)	279 (13.6)	
Marital status (%)				
Living alone	1860 (41.9)	1185 (49.7)	675 (32.8)	<0.001
Living in a couple	2579 (58.1)	1198 (50.3)	1381 (67.2)	
Country of birth (%)				
Switzerland	2877 (64.8)	1537 (64.5)	1340 (65.2)	<0.001
France	296 (6.7)	168 (7.1)	128 (6.2)	
Italy	221 (5.0)	90 (3.8)	131 (6.4)	
Portugal	206 (4.6)	98 (4.1)	108 (5.3)	
Spain	140 (3.2)	70 (2.9)	70 (3.4)	
Other	699 (15.8)	420 (17.6)	279 (13.6)	
Receiving social help (%)	505 (11.4)	275 (11.5)	230 (11.2)	0.71
Smoking status (%)				
Never	1815 (40.9)	1095 (46.0)	720 (35.0)	<0.001
Former	1693 (38.1)	813 (34.1)	880 (42.8)	
Current	931 (21.0)	475 (19.9)	456 (22.2)	
Educational level (%)				
University	973 (21.9)	434 (18.2)	539 (26.2)	<0.001
High school/college	1174 (26.5)	647 (27.2)	527 (25.6)	
Apprenticeship	1599 (36.0)	863 (36.2)	736 (35.8)	
Basic	693 (15.6)	439 (18.4)	254 (12.4)	
On a diet (%)	1405 (31.7)	807 (33.9)	598 (29.1)	0.001
Sedentary (%)	2302 (57.4)	1360 (63.0)	942 (51.0)	<0.001

BMI (kg/m^2)	26.1 ± 4.6	25.5 ± 4.9	26.9 ± 4.0	<0.001
BMI categories (%)				
Normal	1970 (44.4)	1267 (53.2)	703 (34.2)	<0.001
Overweight	1722 (38.8)	743 (31.2)	979 (47.6)	
Obese	747 (16.8)	373 (15.7)	374 (18.2)	

503

504 Results are expressed as mean ± standard deviation or as number of participants and (%).

505 BMI, body mass index. Between-gender comparisons using chi-square or student's t-test.

Table 2: bivariable and multivariable analysis of personal and behavioural determinants of healthy diet scores, Lausanne, Switzerland, 2009-2012

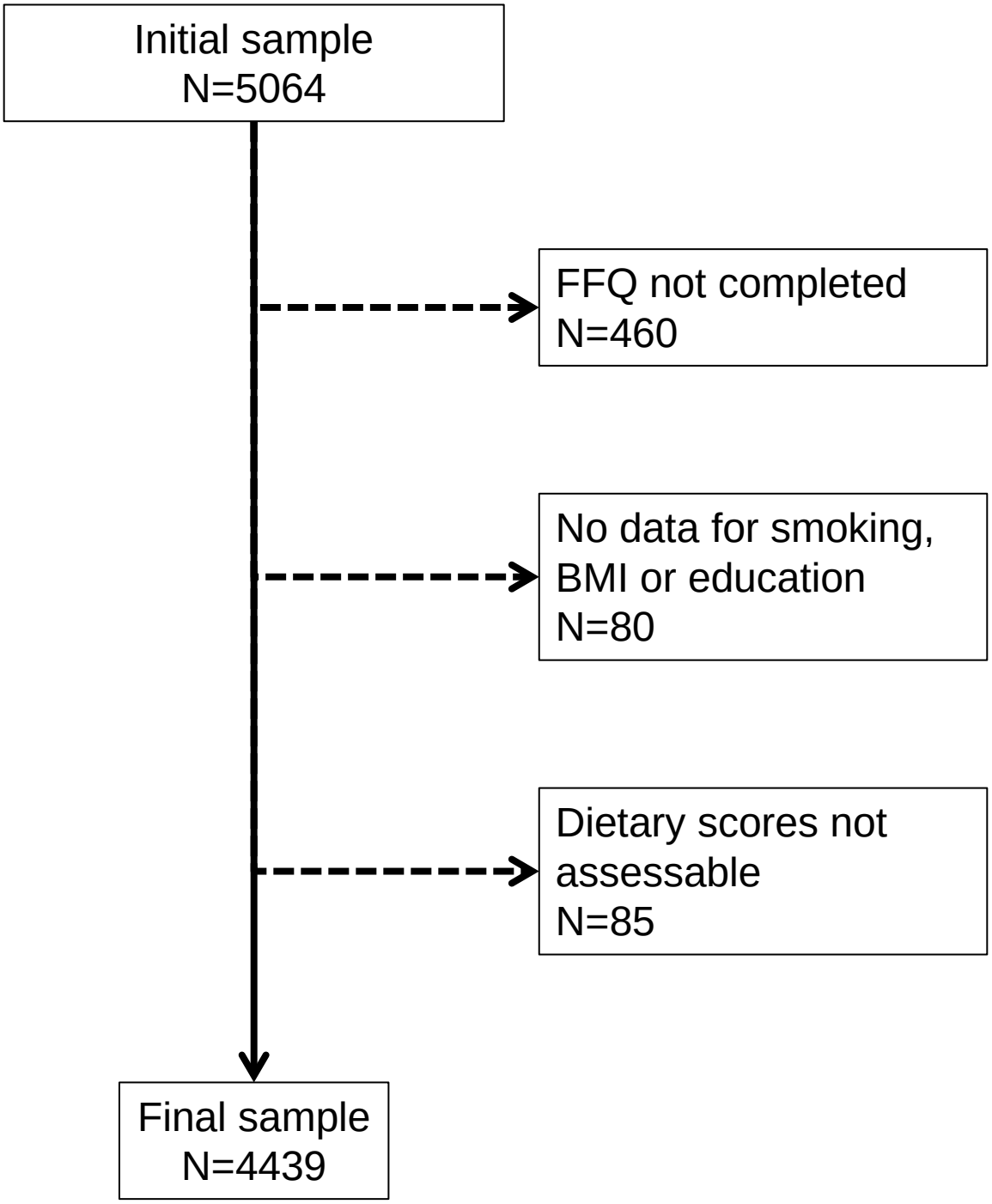
	Mediterranean score 1		Mediterranean score 2		Alternate healthy eating index	
	Bivariable	**Multivariable**	**Bivariable**	**Multivariable**	**Bivariable**	**Multivariable**
Sample size	4,439	4,008	4,439	4,008	4,439	4,439
Gender						
Woman	3.9 ± 1.5	3.9 ± 0.1	4.6 ± 2.0	4.7 ± 0.1	32.9 ± 10.1	33.2 ± 0.2
Man	4.0 ± 1.5	4.0 ± 0.1	4.6 ± 2.0	4.6 ± 0.1	30.6 ± 9.9	30.7 ± 0.2
p-value	0.003	0.16	0.79	0.03	0.008	<0.001
Age group						
40-49	3.9 ± 1.5	3.8 ± 0.1	4.6 ± 2.0	4.6 ± 0.1	31.5 ± 10.0	31.2 ± 0.3
50-59	3.9 ± 1.5	3.9 ± 0.1	4.7 ± 1.9	4.7 ± 0.1	32.0 ± 10.1	32.1 ± 0.3
60-69	4.0 ± 1.5	4.1 ± 0.1	4.6 ± 2.0	4.7 ± 0.1	32.2 ± 10.3	32.6 ± 0.3
70-79	4.0 ± 1.4	4.1 ± 0.1	4.5 ± 2.0	4.7 ± 0.1	31.6 ± 9.8	32.5 ± 0.4
p-value §	0.12	<0.001	0.19	0.21	0.38	<0.001
Marital status						
Alone	3.7 ± 1.5	3.8 ± 0.1	4.3 ± 1.9	4.4 ± 0.1	31.2 ± 10.2	31.5 ± 0.2
In a couple	4.1 ± 1.5	4.1 ± 0.1	4.9 ± 1.9	4.9 ± 0.1	32.3 ± 10.0	32.4 ± 0.2
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	0.003
Nationality						
Swiss	3.8 ± 1.5	3.9 ± 0.1	4.5 ± 2.0	4.5 ± 0.1	31.1 ± 10.3	31.3 ± 0.2
French	4.0 ± 1.5	3.9 ± 0.1	4.8 ± 1.9	4.7 ± 0.1	32.0 ± 9.9	31.2 ± 0.6
Italian	4.3 ± 1.6	4.4 ± 0.1	4.8 ± 1.9	5.0 ± 0.1	32.5 ± 9.7	34.5 ± 0.7
Portuguese	4.5 ± 1.5	4.8 ± 0.1	5.4 ± 1.9	5.6 ± 0.2	34.5 ± 9.4	36.6 ± 0.8
Spanish	4.4 ± 1.3	4.5 ± 0.1	5.2 ± 1.7	5.2 ± 0.2	33.2 ± 8.6	34.0 ± 0.9
Other	3.8 ± 1.5	4.0 ± 0.1	4.5 ± 2.0	4.6 ± 0.1	31.1 ± 10.3	32.9 ± 0.4
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Social help						
No	4.0 ± 1.5	4.0 ± 0.1	4.6 ± 2.0	4.7 ± 0.1	31.9 ± 10	32.0 ± 0.2
Yes	3.8 ± 1.6	3.9 ± 0.1	4.4 ± 2.0	4.6 ± 0.1	31 ± 10.8	31.9 ± 0.5
p-value	0.007	0.26	0.006	0.50	0.04	0.79
Education						
University	4.2 ± 1.5	4.2 ± 0.1	4.9 ± 1.9	5.0 ± 0.1	33.5 ± 10.1	33.7 ± 0.3
High school	4.0 ± 1.5	4.1 ± 0.1	4.8 ± 2.0	4.8 ± 0.1	32.6 ± 9.7	32.7 ± 0.3
Apprenticeship	3.8 ± 1.5	3.8 ± 0.1	4.4 ± 2.0	4.5 ± 0.1	30.5 ± 10.4	31.1 ± 0.3
Primary	3.9 ± 1.5	3.7 ± 0.1	4.5 ± 2.0	4.4 ± 0.1	31.2 ± 9.9	30.4 ± 0.4
p-value §	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Smoking status						
Never	3.9 ± 1.5	3.9 ± 0.1	4.7 ± 1.9	4.7 ± 0.1	32.4 ± 9.9	32.2 ± 0.2
Former	4.1 ± 1.5	4.1 ± 0.1	4.7 ± 2.0	4.8 ± 0.1	32.4 ± 10.2	32.7 ± 0.2
Current	3.7 ± 1.5	3.8 ± 0.1	4.3 ± 2.0	4.4 ± 0.1	29.7 ± 10.1	30.4 ± 0.3
p-value §	0.01	0.06	<0.001	<0.001	<0.001	<0.001
On a diet						
No	3.9 ± 1.5	3.9 ± 0.1	4.5 ± 2.0	4.5 ± 0.1	30.9 ± 10.0	31.1 ± 0.2
Yes	4.1 ± 1.5	4.2 ± 0.1	4.9 ± 1.9	4.9 ± 0.1	33.8 ± 10.2	34.1 ± 0.3
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sedentary						
No	4.1 ± 1.5	4.1 ± 0.1	4.8 ± 1.9	4.8 ± 0.1	33.2 ± 10.1	33.2 ± 0.2
Yes	3.9 ± 1.5	3.9 ± 0.1	4.5 ± 2.0	4.6 ± 0.1	31.2 ± 9.9	31.1 ± 0.2
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BMI categories						
Normal	4.0 ± 1.5	4.1 ± 0.1	4.7 ± 1.9	4.8 ± 0.1	32.9 ± 10.2	33.0 ± 0.2
Overweight	4.0 ± 1.5	3.9 ± 0.1	4.7 ± 2.0	4.7 ± 0.1	31.5 ± 9.8	31.7 ± 0.2
Obese	3.7 ± 1.5	3.7 ± 0.1	4.3 ± 2.0	4.3 ± 0.1	29.7 ± 10.1	30.0 ± 0.4
p-value §	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

Results are expressed as mean ± standard deviation. Associations were assessed using analysis of variance. Multivariable analysis adjusted for gender, age, marital status, nationality, receiving social help, educational level, smoking status, being on a diet or sedentary, and BMI categories. § p-value for linear trend.

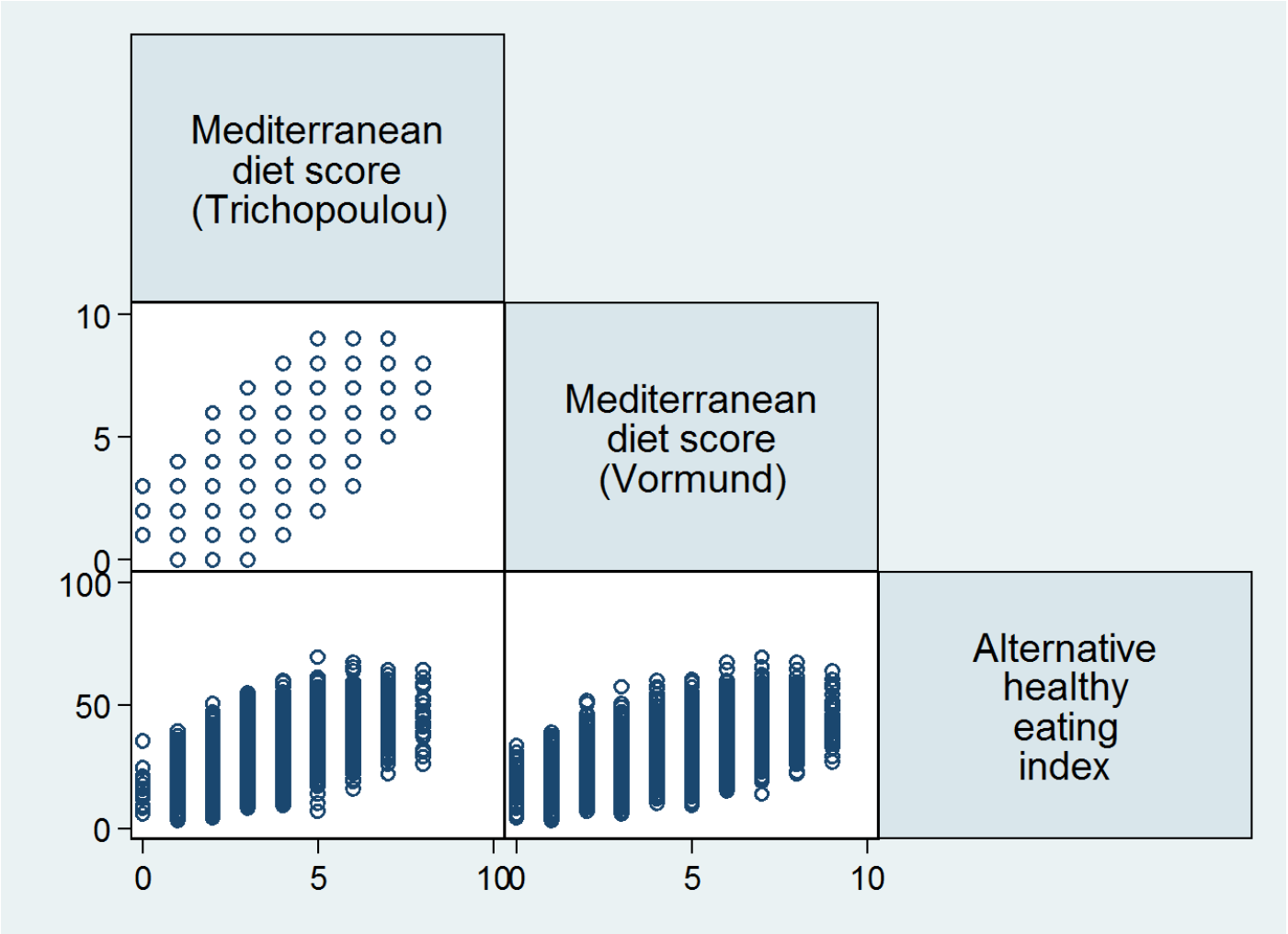
Figure 1: selection procedure of the participants.

FFQ, food frequency questionnaire; BMI, body mass index.



Supplementary material

Supplementary figure 1: association between the three dietary scores, CoLaus study, 2009-2012



Supplementary table 1: characteristics of included and excluded participants

	Included	**Excluded**	**p-value**
Sample size	4,439	625	
Women (%)	2383 (53.7)	324 (51.8)	0.39
Age (years)	57.5 ± 10.3	59.6 ± 11.6	<0.001
Age groups (%)			
40-49	1278 (28.8)	153 (26.3)	0.17
50-59	1355 (30.5)	187 (32.1)	
60-69	1204 (27.1)	147 (25.3)	
70-79	602 (13.6)	95 (16.3)	
Marital status (%)			
Living alone	1860 (41.9)	342 (54.7)	<0.001
Living in a couple	2579 (58.1)	283 (45.3)	
Country of birth (%)			
Switzerland	2877 (64.8)	307 (49.1)	<0.001
France	296 (6.7)	22 (3.5)	
Italy	221 (5.0)	57 (9.1)	
Portugal	206 (4.6)	47 (7.5)	
Spain	140 (3.2)	38 (6.1)	
Other	699 (15.8)	154 (24.6)	
Receiving social help (%)	505 (11.4)	102 (16.3)	<0.001
Smoking status (%)			
Never	1815 (40.9)	220 (38.7)	0.001
Former	1693 (38.1)	190 (33.5)	
Current	931 (21.0)	158 (27.8)	
Educational level (%)			
University	973 (21.9)	106 (17.0)	<0.001
High school/college	1174 (26.5)	132 (21.1)	
Apprenticeship	1599 (36.0)	197 (31.5)	
Basic	693 (15.6)	190 (30.4)	
On a diet (%)	1405 (31.7)	169 (27.0)	0.02
Sedentary (%)	2302 (57.4)	103 (59.5)	0.58
BMI (kg/m^2)	26.13 ± 4.56	26.88 ± 4.01	0.006
BMI categories (%)			
Normal	1970 (44.4)	275 (44.0)	0.79
Overweight	1722 (38.8)	238 (38.1)	
Obese	747 (16.8)	112 (17.9)	

Results are expressed as mean ± standard deviation or as number of participants and (%). The number of excluded participants varies because of missing data. BMI, body mass index. Between-gender comparisons using chi-square or student's t-test.

Supplementary table 2: multivariable analysis of the individual and behavioural determinants of healthy diet scores, stratified by gender, Lausanne, Switzerland, 2009-2012

	Mediterranean score 1		Mediterranean score 2		Alternative healthy eating index	
	Men	**Women**	**Men**	**Women**	**Men**	**Women**
Sample size	1,849	2,159	1,849	2,159	1,849	2,159
Age group						
40-49	3.9 ± 0.1	3.8 ± 0.1	4.6 ± 0.1	4.5 ± 0.1	30.1 ± 0.4	32.1 ± 0.4
50-59	4.0 ± 0.1	3.8 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	30.8 ± 0.4	33.1 ± 0.4
60-69	4.2 ± 0.1	4.0 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	31.4 ± 0.5	33.7 ± 0.4
70-79	4.3 ± 0.1	4.0 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	31.4 ± 0.6	33.5 ± 0.6
p-value §	<0.001	0.001	0.53	0.16	0.02	0.006
Marital status						
Alone	3.9 ± 0.1	3.7 ± 0.1	4.4 ± 0.1	4.3 ± 0.1	30.3 ± 0.4	32.5 ± 0.3
In a couple	4.1 ± 0.1	4.1 ± 0.1	4.8 ± 0.1	5.0 ± 0.1	31.0 ± 0.3	33.6 ± 0.3
p-value	0.007	<0.001	<0.001	<0.001	0.13	0.01
Nationality						
Swiss	3.9 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.6 ± 0.1	29.9 ± 0.3	32.5 ± 0.3
French	4.0 ± 0.1	3.8 ± 0.1	4.9 ± 0.2	4.6 ± 0.2	29.9 ± 0.9	32.3 ± 0.8
Italian	4.6 ± 0.1	4.3 ± 0.2	5.0 ± 0.2	4.9 ± 0.2	33.5 ± 0.9	35.1 ± 1.1
Portuguese	4.9 ± 0.2	4.6 ± 0.2	5.6 ± 0.2	5.6 ± 0.2	35.0 ± 1.1	37.8 ± 1.1
Spanish	4.6 ± 0.2	4.4 ± 0.2	5.3 ± 0.2	5.1 ± 0.2	32.9 ± 1.2	34.6 ± 1.3
Other	4.1 ± 0.1	3.9 ± 0.1	4.5 ± 0.1	4.7 ± 0.1	32.2 ± 0.6	33.7 ± 0.5
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Social help						
No	4.1 ± 0.1	3.9 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	30.8 ± 0.2	33.1 ± 0.2

Yes	4.0 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.7 ± 0.1	30.6 ± 0.7	33.0 ± 0.7
p-value	0.52	0.39	0.16	0.49	0.75	0.96
Education						
University	4.3 ± 0.1	4.2 ± 0.1	5.0 ± 0.1	5.0 ± 0.1	32.3 ± 0.4	35.0 ± 0.5
High school	4.1 ± 0.1	4.0 ± 0.1	4.7 ± 0.1	4.9 ± 0.1	31.2 ± 0.4	34.0 ± 0.4
Apprenticeship	3.9 ± 0.1	3.8 ± 0.1	4.4 ± 0.1	4.5 ± 0.1	29.7 ± 0.4	32.2 ± 0.4
Primary	3.9 ± 0.1	3.7 ± 0.1	4.5 ± 0.1	4.3 ± 0.1	29.7 ± 0.7	31.3 ± 0.6
p-value §	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Smoking status						
Never	4.0 ± 0.1	3.9 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	31.2 ± 0.4	33.2 ± 0.3
Former	4.2 ± 0.1	4.0 ± 0.1	4.8 ± 0.1	4.7 ± 0.1	31.3 ± 0.3	33.9 ± 0.4
Current	3.9 ± 0.1	3.7 ± 0.1	4.4 ± 0.1	4.3 ± 0.1	29.2 ± 0.5	31.4 ± 0.5
p-value §	0.85	0.17	0.004	<0.001	0.005	0.05
On a diet						
No	4.0 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.5 ± 0.1	29.9 ± 0.3	32.1 ± 0.3
Yes	4.3 ± 0.1	4.1 ± 0.1	4.9 ± 0.1	4.9 ± 0.1	33.0 ± 0.4	35.0 ± 0.4
p-value	0.02	<0.001	<0.001	<0.001	<0.001	<0.001
Sedentary						
No	4.2 ± 0.1	4.0 ± 0.1	4.8 ± 0.1	4.8 ± 0.1	32.0 ± 0.3	34.2 ± 0.4
Yes	3.9 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.6 ± 0.1	29.6 ± 0.3	32.4 ± 0.3
p-value	<0.001	0.003	0.002	0.007	<0.001	<0.001
BMI categories						
Normal	4.2 ± 0.1	4.0 ± 0.1	4.7 ± 0.1	4.8 ± 0.1	32.1 ± 0.4	33.8 ± 0.3
Overweight	4.0 ± 0.1	3.9 ± 0.1	4.7 ± 0.1	4.6 ± 0.1	30.5 ± 0.3	32.8 ± 0.4
Obese	3.9 ± 0.1	3.7 ± 0.1	4.4 ± 0.1	4.2 ± 0.1	29.0 ± 0.5	31.0 ± 0.6

p-value §	0.007	0.001	0.02	<0.001	<0.001	<0.001

Results are expressed as adjusted mean ± standard error. Associations were assessed using analysis of variance. Multivariable analysis adjusted for gender, age, marital status, nationality, receiving social help, educational level, smoking status, being on a diet or sedentary, and BMI categories. § p-value for trend.

Supplementary table 3: multivariable analysis of personal and behavioural determinants of healthy diet scores, overall and stratified by gender, including participants without data for sedentarity, Lausanne, Switzerland, 2009-2012.

	Mediterranean score 1			Mediterranean score 2			Alternative healthy eating index		
	All	**Men**	**Women**	**All**	**Men**	**Women**	**All**	**Men**	**Women**
Sample size	4,439	2,056	2,383	4,439	2,056	2,383	4,439	2,056	2,383
Gender									
Woman	3.9 ± 0.1	-	-	4.7 ± 0.1	-	-	32.9 ± 0.2	-	-
Man	4.0 ± 0.1	-	-	4.6 ± 0.1	-	-	30.6 ± 0.2	-	-
p-value	0.07	-	-	0.06	-	-	<0.001	-	-
Age group									
40-49	3.8 ± 0.1	3.9 ± 0.1	3.8 ± 0.1	4.6 ± 0.1	4.6 ± 0.1	4.5 ± 0.1	31.2 ± 0.3	30.2 ± 0.4	32.0 ± 0.4
50-59	3.9 ± 0.1	4.0 ± 0.1	3.8 ± 0.1	4.6 ± 0.1	4.6 ± 0.1	4.7 ± 0.1	31.9 ± 0.3	30.5 ± 0.4	33.1 ± 0.4
60-69	4.0 ± 0.1	4.1 ± 0.1	4.0 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	32.3 ± 0.3	31.1 ± 0.4	33.3 ± 0.4
70-79	4.1 ± 0.1	4.2 ± 0.1	4.0 ± 0.1	4.6 ± 0.1	4.5 ± 0.1	4.6 ± 0.1	32.0 ± 0.4	30.7 ± 0.6	33.2 ± 0.6
p-value §	<0.001	0.003	0.02	0.99	0.73	0.54	0.007	0.13	0.02
Marital status									
Living alone	3.8 ± 0.1	3.9 ± 0.1	3.7 ± 0.1	4.3 ± 0.1	4.3 ± 0.1	4.3 ± 0.1	31.2 ± 0.2	29.9 ± 0.4	32.3 ± 0.3
Living in a couple	4.1 ± 0.1	4.1 ± 0.1	4.0 ± 0.1	4.8 ± 0.1	4.7 ± 0.1	5.0 ± 0.1	32.3 ± 0.2	30.9 ± 0.3	33.5 ± 0.3
p-value	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001	0.02	0.006
Nationality									
Swiss	3.8 ± 0.1	3.9 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.5 ± 0.1	4.5 ± 0.1	31.1 ± 0.2	29.7 ± 0.3	32.3 ± 0.3
French	3.9 ± 0.1	4.0 ± 0.1	3.8 ± 0.1	4.7 ± 0.1	4.8 ± 0.2	4.6 ± 0.1	31.2 ± 0.6	29.8 ± 0.8	32.3 ± 0.8
Italian	4.4 ± 0.1	4.5 ± 0.1	4.2 ± 0.2	4.9 ± 0.1	4.8 ± 0.2	5.0 ± 0.2	33.6 ± 0.7	32.5 ± 0.9	34.3 ± 1.1
Portuguese	4.8 ± 0.1	4.8 ± 0.2	4.6 ± 0.2	5.6 ± 0.1	5.6 ± 0.2	5.5 ± 0.2	36.4 ± 0.7	34.9 ± 1.1	37.6 ± 1.1
Spanish	4.5 ± 0.1	4.5 ± 0.2	4.4 ± 0.2	5.3 ± 0.2	5.2 ± 0.2	5.2 ± 0.2	33.9 ± 0.8	32.4 ± 1.2	35.1 ± 1.2

Other	4.0 ± 0.1	4.1 ± 0.1	3.9 ± 0.1	4.6 ± 0.1	4.5 ± 0.1	4.6 ± 0.1	32.9 ± 0.4	32.2 ± 0.6	33.6 ± 0.5
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Social help									
No	4.0 ± 0.1	4.0 ± 0.1	3.9 ± 0.1	4.6 ± 0.1	4.6 ± 0.1	4.6 ± 0.1	31.8 ± 0.2	30.7 ± 0.2	32.9 ± 0.2
Yes	3.9 ± 0.1	3.9 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.4 ± 0.1	4.7 ± 0.1	31.7 ± 0.4	30.1 ± 0.6	33.0 ± 0.6
p-value	0.33	0.33	0.70	0.35	0.08	0.56	0.68	0.39	0.84
Education									
University	4.2 ± 0.1	4.3 ± 0.1	4.2 ± 0.1	5.0 ± 0.1	5.0 ± 0.1	5.0 ± 0.1	33.7 ± 0.3	32.3 ± 0.4	34.9 ± 0.5
High school	4.0 ± 0.1	4.0 ± 0.1	4.0 ± 0.1	4.8 ± 0.1	4.6 ± 0.1	4.9 ± 0.1	32.6 ± 0.3	31.0 ± 0.4	34.0 ± 0.4
Apprenticeship	3.8 ± 0.1	3.9 ± 0.1	3.8 ± 0.1	4.4 ± 0.1	4.4 ± 0.1	4.4 ± 0.1	30.9 ± 0.2	29.5 ± 0.4	32.0 ± 0.3
Primary	3.7 ± 0.1	3.8 ± 0.1	3.6 ± 0.1	4.3 ± 0.1	4.5 ± 0.1	4.2 ± 0.1	30.0 ± 0.4	29.4 ± 0.7	30.8 ± 0.5
p-value §	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001
Smoking status									
Never	3.9 ± 0.1	4.0 ± 0.1	3.9 ± 0.1	4.7 ± 0.1	4.6 ± 0.1	4.7 ± 0.1	32.1 ± 0.2	31.0 ± 0.4	33.0 ± 0.3
Former	4.1 ± 0.1	4.1 ± 0.1	4.0 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	32.5 ± 0.2	31.1 ± 0.3	33.8 ± 0.3
Current	3.8 ± 0.1	3.9 ± 0.1	3.7 ± 0.1	4.3 ± 0.1	4.4 ± 0.1	4.3 ± 0.1	30.1 ± 0.3	28.9 ± 0.5	31.1 ± 0.5
p-value §	0.14	0.73	0.07	<0.001	0.04	<0.001	<0.001	0.002	0.02
On a diet									
No	3.8 ± 0.1	3.9 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.5 ± 0.1	4.5 ± 0.1	30.9 ± 0.2	29.6 ± 0.3	32.0 ± 0.3
Yes	4.2 ± 0.1	4.3 ± 0.1	4.1 ± 0.1	4.9 ± 0.1	4.9 ± 0.1	4.9 ± 0.1	33.8 ± 0.3	32.9 ± 0.4	34.7 ± 0.4
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
BMI categories									
Normal	4.1 ± 0.1	4.1 ± 0.1	4.0 ± 0.1	4.7 ± 0	4.7 ± 0.1	4.8 ± 0.1	33.0 ± 0.2	32.0 ± 0.4	33.8 ± 0.3
Overweight	3.9 ± 0.1	4.0 ± 0.1	3.8 ± 0.1	4.6 ± 0	4.7 ± 0.1	4.6 ± 0.1	31.6 ± 0.2	30.5 ± 0.3	32.5 ± 0.4
Obese	3.7 ± 0.1	3.8 ± 0.1	3.6 ± 0.1	4.2 ± 0.1	4.3 ± 0.1	4.2 ± 0.1	29.4 ± 0.4	28.3 ± 0.5	30.4 ± 0.5

p-value §	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	<0.001	<0.001

Results are expressed as multivariable adjusted mean ± standard error. Associations were assessed using analysis of variance. Multivariable analysis adjusted for gender, age, marital status, nationality, receiving social help, educational level, smoking status, being on a diet, and BMI categories. § p-value for trend.

Supplementary table 4: multivariable analysis of personal and behavioural determinants of healthy diet scores, overall and stratified by gender, using two categories of body mass index, Lausanne, Switzerland, 2009-2012.

	Mediterranean score 1			Mediterranean score 2			Alternative healthy eating index		
	All	**Men**	**Women**	**All**	**Men**	**Women**	**All**	**Men**	**Women**
Sample size	4,008	1,849	2,159	4,008	1,849	2,159	4,008	1,849	2,159
Gender									
Woman	3.9 ± 0.1	-	-	4.7 ± 0.1	-	-	33.2 ± 0.2	-	-
Man	4.0 ± 0.1	-	-	4.6 ± 0.1	-	-	30.7 ± 0.2	-	-
p-value	0.14	-	-	0.04	-	-	<0.001	-	-
Age group									
40-49	3.8 ± 0.1	3.9 ± 0.1	3.8 ± 0.1	4.6 ± 0.1	4.6 ± 0.1	4.5 ± 0.1	31.2 ± 0.3	30.2 ± 0.4	32.1 ± 0.4
50-59	3.9 ± 0.1	4.0 ± 0.1	3.8 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	32.1 ± 0.3	30.8 ± 0.4	33.2 ± 0.4
60-69	4.1 ± 0.1	4.1 ± 0.1	4.0 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	32.6 ± 0.3	31.4 ± 0.5	33.7 ± 0.4
70-79	4.1 ± 0.1	4.3 ± 0.1	4.0 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	32.5 ± 0.4	31.4 ± 0.6	33.5 ± 0.6
p-value §	<0.001	0.002	0.007	0.24	0.60	0.16	0.01	0.07	0.04
Marital status									
Living alone	3.8 ± 0.1	3.9 ± 0.1	3.7 ± 0.1	4.3 ± 0.1	4.4 ± 0.1	4.3 ± 0.1	31.5 ± 0.2	30.3 ± 0.4	32.5 ± 0.3
Living in a couple	4.1 ± 0.1	4.1 ± 0.1	4.1 ± 0.1	4.9 ± 0.1	4.8 ± 0.1	5.0 ± 0.1	32.4 ± 0.2	31.0 ± 0.3	33.6 ± 0.3
p-value	<0.001	0.006	<0.001	<0.001	<0.001	<0.001	0.002	0.12	0.008
Nationality									
Swiss	3.9 ± 0.1	3.9 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.5 ± 0.1	4.6 ± 0.1	31.3 ± 0.2	29.9 ± 0.3	32.5 ± 0.3
French	3.9 ± 0.1	4.0 ± 0.1	3.8 ± 0.1	4.7 ± 0.1	4.9 ± 0.2	4.6 ± 0.2	31.3 ± 0.6	30.0 ± 0.9	32.3 ± 0.8
Italian	4.4 ± 0.1	4.6 ± 0.1	4.2 ± 0.2	5.0 ± 0.1	5.0 ± 0.2	4.9 ± 0.2	34.5 ± 0.7	33.6 ± 0.9	35.1 ± 1.1
Portuguese	4.8 ± 0.1	4.9 ± 0.2	4.7 ± 0.2	5.6 ± 0.2	5.6 ± 0.2	5.6 ± 0.2	36.6 ± 0.8	35.0 ± 1.1	37.8 ± 1.1
Spanish	4.5 ± 0.1	4.6 ± 0.2	4.4 ± 0.2	5.2 ± 0.2	5.3 ± 0.2	5.1 ± 0.2	34.0 ± 0.9	32.9 ± 1.2	34.6 ± 1.3

Other	4.0 ± 0.1	4.1 ± 0.1	3.9 ± 0.1	4.6 ± 0.1	4.5 ± 0.1	4.7 ± 0.1	32.9 ± 0.4	32.1 ± 0.6	33.7 ± 0.5
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Social help									
No	4.0 ± 0.1	4.1 ± 0.1	3.9 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	32.0 ± 0.2	30.8 ± 0.2	33.1 ± 0.2
Yes	3.9 ± 0.1	4.0 ± 0.1	3.8 ± 0.1	4.6 ± 0.1	4.4 ± 0.1	4.7 ± 0.1	31.8 ± 0.5	30.5 ± 0.7	33.0 ± 0.7
p-value	0.21	0.45	0.38	0.40	0.12	0.53	0.67	0.63	0.93
Education									
University	4.2 ± 0.1	4.3 ± 0.1	4.2 ± 0.1	5.0 ± 0.1	5.0 ± 0.1	5.0 ± 0.1	33.8 ± 0.3	32.3 ± 0.4	35.0 ± 0.5
High school	4.1 ± 0.1	4.1 ± 0.1	4.1 ± 0.1	4.8 ± 0.1	4.7 ± 0.1	4.9 ± 0.1	32.7 ± 0.3	31.2 ± 0.4	34.1 ± 0.4
Apprenticeship	3.8 ± 0.1	3.9 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.4 ± 0.1	4.5 ± 0.1	31.1 ± 0.3	29.7 ± 0.4	32.2 ± 0.4
Primary	3.7 ± 0.1	3.9 ± 0.1	3.7 ± 0.1	4.4 ± 0.1	4.5 ± 0.1	4.3 ± 0.1	30.4 ± 0.4	29.7 ± 0.7	31.2 ± 0.6
p-value §	<0.001	0.003	<0.001	<0.001	0.003	<0.001	<0.001	<0.001	<0.001
Smoking status									
Never	3.9 ± 0.1	4.0 ± 0.1	3.9 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	32.2 ± 0.2	31.2 ± 0.4	33.1 ± 0.3
Former	4.1 ± 0.1	4.2 ± 0.1	4.0 ± 0.1	4.7 ± 0.1	4.8 ± 0.1	4.7 ± 0.1	32.7 ± 0.2	31.3 ± 0.3	33.9 ± 0.4
Current	3.8 ± 0.1	3.9 ± 0.1	3.7 ± 0.1	4.4 ± 0.1	4.5 ± 0.1	4.3 ± 0.1	30.4 ± 0.3	29.2 ± 0.5	31.4 ± 0.5
p-value §	0.07	0.52	0.05	<0.001	0.09	<0.001	<0.001	0.001	0.004
On a diet									
No	3.9 ± 0.1	4.0 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.6 ± 0.1	4.5 ± 0.1	31.1 ± 0.2	29.9 ± 0.3	32.1 ± 0.3
Yes	4.2 ± 0.1	4.3 ± 0.1	4.1 ± 0.1	4.9 ± 0.1	4.9 ± 0.1	4.9 ± 0.1	34.0 ± 0.3	33.0 ± 0.4	34.9 ± 0.4
p-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Sedentary									
No	4.1 ± 0.1	4.2 ± 0.1	4.0 ± 0.1	4.8 ± 0.1	4.8 ± 0.1	4.8 ± 0.1	33.3 ± 0.2	32.1 ± 0.3	34.2 ± 0.4
Yes	3.9 ± 0.1	3.9 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.5 ± 0.1	4.6 ± 0.1	31.1 ± 0.2	29.6 ± 0.3	32.4 ± 0.3
p-value	<0.001	<0.001	0.002	<0.001	<0.001	0.005	<0.001	<0.001	<0.001

BMI categories									
<25 kg/m^2	4.1 ± 0.1	4.2 ± 0.1	4.0 ± 0.1	4.8 ± 0.1	4.7 ± 0.1	4.8 ± 0.1	33.0 ± 0.2	32.0 ± 0.4	33.8 ± 0.3
≥25 kg/m^2	3.9 ± 0.1	4.0 ± 0.1	3.8 ± 0.1	4.6 ± 0.1	4.6 ± 0.1	4.5 ± 0.1	31.2 ± 0.2	30.1 ± 0.3	32.2 ± 0.3
p-value	<0.001	0.02	0.003	0.003	0.36	<0.001	<0.001	<0.001	<0.001

Results are expressed as multivariable adjusted mean ± standard error. Associations were assessed using analysis of variance. Multivariable analysis adjusted for gender, age, marital status, nationality, receiving social help, educational level, smoking status, sedentarity, and BMI categories. § p-value for trend.

Supplementary table 5: multivariable analysis of personal and behavioural determinants of healthy diet scores, overall and stratified by gender, excluding participants on a diet and using two categories of body mass index, Lausanne, Switzerland, 2009-2012.

	Mediterranean score 1			Mediterranean score 2			Alternative healthy eating index		
	All	**Men**	**Women**	**All**	**Men**	**Women**	**All**	**Men**	**Women**
Sample size	2,758	1,325	1,433	2,758	1,325	1,433	2,758	1,325	1,433
Gender									
Woman	3.9 ± 0.1	-	-	4.6 ± 0.1	-	-	32.3 ± 0.3	-	-
Man	3.9 ± 0.1	-	-	4.5 ± 0.1	-	-	29.8 ± 0.3	-	-
p-value	0.44	-	-	0.09	-	-	<0.001	-	-
Age group									
40-49	3.8 ± 0.1	3.8 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.5 ± 0.1	4.5 ± 0.1	30.4 ± 0.3	29.2 ± 0.4	31.4 ± 0.5
50-59	3.8 ± 0.1	3.8 ± 0.1	3.8 ± 0.1	4.6 ± 0.1	4.5 ± 0.1	4.6 ± 0.1	31.3 ± 0.3	29.6 ± 0.5	32.9 ± 0.5
60-69	4.0 ± 0.1	4.2 ± 0.1	3.9 ± 0.1	4.6 ± 0.1	4.7 ± 0.1	4.6 ± 0.1	31.9 ± 0.4	31.1 ± 0.6	32.7 ± 0.5
70-79	4.1 ± 0.1	4.3 ± 0.1	3.9 ± 0.1	4.5 ± 0.1	4.6 ± 0.2	4.4 ± 0.2	31.2 ± 0.6	30.8 ± 0.8	31.5 ± 0.8
p-value §	<0.001	<0.001	0.27	0.98	0.40	0.74	0.12	0.02	0.98
Marital status									
Living alone	3.7 ± 0.1	3.8 ± 0.1	3.7 ± 0.1	4.2 ± 0.1	4.3 ± 0.1	4.2 ± 0.1	30.6 ± 0.3	29.4 ± 0.5	31.9 ± 0.4
Living in a couple	4.0 ± 0.1	4.0 ± 0.1	4.0 ± 0.1	4.8 ± 0.1	4.7 ± 0.1	4.9 ± 0.1	31.5 ± 0.2	30.2 ± 0.3	32.6 ± 0.4
p-value	<0.001	0.03	<0.001	<0.001	0.001	<0.001	0.03	0.16	0.17
Nationality									
Swiss	3.8 ± 0.1	3.8 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.4 ± 0.1	4.5 ± 0.1	30.4 ± 0.2	29.1 ± 0.3	31.7 ± 0.3
French	3.9 ± 0.1	4.1 ± 0.2	3.7 ± 0.1	4.9 ± 0.1	5.1 ± 0.2	4.7 ± 0.2	30.6 ± 0.7	29.5 ± 1.1	31.7 ± 1.0
Italian	4.2 ± 0.1	4.3 ± 0.2	4.0 ± 0.2	4.9 ± 0.2	4.9 ± 0.2	4.7 ± 0.3	33.6 ± 0.9	33.0 ± 1.1	33.4 ± 1.4
Portuguese	4.6 ± 0.1	4.6 ± 0.2	4.5 ± 0.2	5.3 ± 0.2	5.3 ± 0.3	5.3 ± 0.3	35.0 ± 0.9	33.6 ± 1.3	36.1 ± 1.4
Spanish	4.3 ± 0.2	4.4 ± 0.2	4.3 ± 0.2	5.2 ± 0.2	5.2 ± 0.3	5.1 ± 0.3	34.0 ± 1.1	32.9 ± 1.5	34.9 ± 1.6

Other	3.9 ± 0.1	3.9 ± 0.1	3.8 ± 0.1	4.4 ± 0.1	4.3 ± 0.1	4.4 ± 0.1	32.0 ± 0.5	31.2 ± 0.7	32.8 ± 0.7
p-value	<0.001	0.001	0.006	<0.001	<0.001	0.03	<0.001	<0.001	0.02
Social help									
No	3.9 ± 0.1	4.0 ± 0.1	3.8 ± 0.1	4.5 ± 0.1	4.6 ± 0.1	4.5 ± 0.1	31.1 ± 0.2	29.9 ± 0.3	32.2 ± 0.3
Yes	3.8 ± 0.1	3.8 ± 0.1	3.7 ± 0.1	4.5 ± 0.1	4.4 ± 0.2	4.7 ± 0.2	31.1 ± 0.6	29.8 ± 0.8	32.4 ± 0.8
p-value	0.13	0.23	0.38	0.91	0.28	0.26	0.99	0.86	0.87
Education									
University	4.2 ± 0.1	4.2 ± 0.1	4.1 ± 0.1	4.9 ± 0.1	4.9 ± 0.1	4.9 ± 0.1	32.8 ± 0.4	31.4 ± 0.5	34.1 ± 0.6
High school	3.9 ± 0.1	3.9 ± 0.1	4.0 ± 0.1	4.6 ± 0.1	4.4 ± 0.1	4.8 ± 0.1	31.7 ± 0.4	29.9 ± 0.5	33.3 ± 0.5
Apprenticeship	3.7 ± 0.1	3.8 ± 0.1	3.6 ± 0.1	4.3 ± 0.1	4.3 ± 0.1	4.3 ± 0.1	30.1 ± 0.3	29.1 ± 0.4	31.0 ± 0.4
Primary	3.7 ± 0.1	3.8 ± 0.1	3.6 ± 0.1	4.3 ± 0.1	4.4 ± 0.2	4.3 ± 0.1	29.7 ± 0.5	28.6 ± 0.9	30.8 ± 0.7
p-value §	<0.001	0.01	<0.001	<0.001	0.01	<0.001	<0.001	0.005	<0.001
Smoking status									
Never	3.9 ± 0.1	3.9 ± 0.1	3.9 ± 0.1	4.6 ± 0.1	4.6 ± 0.1	4.7 ± 0.1	31.7 ± 0.3	30.4 ± 0.4	32.9 ± 0.4
Former	4.0 ± 0.1	4.1 ± 0.1	3.9 ± 0.1	4.6 ± 0.1	4.7 ± 0.1	4.6 ± 0.1	31.6 ± 0.3	30.5 ± 0.4	32.6 ± 0.4
Current	3.7 ± 0.1	3.8 ± 0.1	3.6 ± 0.1	4.3 ± 0.1	4.4 ± 0.1	4.2 ± 0.1	29.4 ± 0.4	28.3 ± 0.5	30.2 ± 0.6
p-value §	0.03	0.37	0.01	0.003	0.15	0.002	<0.001	0.002	<0.001
Sedentary									
No	4.0 ± 0.1	4.1 ± 0.1	4.0 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	4.7 ± 0.1	32.2 ± 0.3	31.2 ± 0.4	33.0 ± 0.4
Yes	3.8 ± 0.1	3.8 ± 0.1	3.7 ± 0.1	4.4 ± 0.1	4.4 ± 0.1	4.5 ± 0.1	30.2 ± 0.2	28.6 ± 0.4	31.7 ± 0.3
p-value	<0.001	<0.001	0.006	<0.001	0.003	0.04	<0.001	<0.001	0.01
BMI categories									
<25 kg/m^2	4.0 ± 0.1	4.0 ± 0.1	3.9 ± 0.1	4.6 ± 0.1	4.6 ± 0.1	4.7 ± 0.1	31.9 ± 0.3	31.0 ± 0.4	32.7 ± 0.3
≥25 kg/m^2	3.8 ± 0.1	3.9 ± 0.1	3.7 ± 0.1	4.4 ± 0.1	4.5 ± 0.1	4.4 ± 0.1	30.4 ± 0.3	29.3 ± 0.3	31.5 ± 0.4
p-value	0.001	0.07	0.01	0.01	0.57	0.004	<0.001	0.002	0.02

Results are expressed as multivariable adjusted mean ± standard error. Associations were assessed using analysis of variance. Multivariable analysis adjusted for gender, age, marital status, nationality, receiving social help, educational level, smoking status, sedentarity, and BMI categories. § p-value for trend.