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Jesús García-Mayor , Antonio Moreno-Llamas , Ernesto De la Cruz-Sánchez

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High educational attainment redresses the effect of occupational social class on health-related lifestyle: Findings from four Spanish national health surveys

Jesús García-Mayor[a]; Antonio Moreno-Llamas[a]; Ernesto De la Cruz-Sánchez[a,*]

[a]San Javier Campus, University of Murcia, Murcia, Spain.

* Corresponding author. Email: erneslacruz@um.es. Tel.: +34 868 884 589

Address: Campus de San Javier, Universidad de Murcia, C/ Santa Alicia s/n, 30720 Santiago de la Ribera - Murcia – España.

Compliance with Ethical Standards

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Abstract

Purpose: Social determinants as occupational social class or educational attainment might influence health outcomes. This phenomenon is known as the social gradient of health and is related to a skewed distribution of health behaviours that might explain differences in morbidity and mortality between social groups. But social class and educational attainment differ in their nature and might have distinct effects on health. Here we study the combined effect of educational attainment and occupational social class on health-related lifestyle.

Methods: We retrieved data from four large-scale, national representative Spanish surveys (n = 67,171). A latent class regression analysis was run to identify clusters of health-related lifestyle behaviours. Clusters were made according to sociodemographic factors, including a combined analysis of education and occupational social class.

Results: Higher educational attainment and occupational social class were associated with a healthier lifestyle for both sexes. The combined analysis of education and social class indicated that women with secondary education showed a high risk combination of unhealthy behaviours, as men with middle, primary or no education.

Conclusions: Regardless of social class, a higher educational attainment redresses the effect of occupational social class on health-related behaviours. Our results suggest that education likely plays a crucial role in population health outcomes through its effects on lifestyle.

Key words: Social determinants; Clustering; Health behaviours; Physical Activity, Diet; Smoking; Alcohol

List of abbreviations and acronyms

- Spanish National Health Surveys (SNHS)
- European Health Interview Survey (EHIS)
- Latent class analysis (LCA)
- Akaike information criterion (AIC)
- Bayesian information criterion (BIC)
- High education/High social class (H/I-II)
- High education/Middle social class (H/III)
- High education/Low social class (H/I-IV)
- Middle education/High social class (M/I-II)
- Middle education/High social class (M/III)
- Middle education/High social class (M/IV-V)
- Primary or no education/High social class (P/I-II)
- Primary or no education/High social class (P/I-II)
- Primary or no education/Low social class (P/IV-V)
- Odds Ratios (OR)
- 95% confidence intervals (95% CI)

Introduction

The social gradient of health is the phenomenon whereby social and economic factors, such as educational attainment, occupational social class, income, and material deprivation determine major health-related outcomes, as well as life expectancy and well-being [1-3]. These sets of heterogeneous characteristics that comprise this social gradient, the social determinants of health, are strongly related to lifestyle modulating behaviours, such as smoking, alcohol use, diet, and physical activity [4-8]. The combined effect of a poor lifestyle on total mortality has been associated with a 3.49-fold risk compared with those with a healthy lifestyle [9]; these factors contribute significantly to a great number of non-communicable diseases, such as cardiovascular diseases, diabetes, and some types of cancer, as well as all-cause mortality [10-13].

The influence of the social determinants of health on health-related behaviours has been widely documented [3]. The individual contribution to health outcomes and diseases varies according to each risk factor: smoking is accountable for 4.1% of the burden of disease, while inactivity, lack of fruit and vegetables or alcohol use account for 1.3%, 1.8%, and 4%, respectively [14]. However, the adverse health effect for a combination of these risk factors might be even higher, and accountability for the interaction of multiple behaviours is more important as it could determine many of major health problems that occur, such as on cancer or cardiovascular disease [9]. Nonetheless, a limited number of studies have explored the effect of social determinants on the interactions among health-related behaviours, their particular co-occurrence and clustering [15-19]. The major factors of the social gradient of health, the educational attainment and occupational social class, not only affect each aforementioned health-related behaviours but also predict their co-occurrence and clustering [20].

Both educational attainment and occupational social class, along with income, have been employed as indicators of socioeconomic status in the study of the social determinants of health. But despite their similarity, they differ in their nature and effects on health, and cannot be used interchangeably: they measure different phenomena, act through different mechanisms, and comprise specific health outcomes [21, 22]. Income reflects material resources for health [22], whereas the occupational social class (highly related with income) reflects not only affluence but one's position in the socioeconomic hierarchy. Both might vary throughout life, and are related to factors such as material resources, working environment, and leisure time availability [23]. Educational

attainment is a stable trait that might determine income and occupation, and – in certain circumstances – could enhance social mobility, providing personal empowerment for the whole population (i.e., in those countries with free and accessible public education systems at all levels). The more educated seem to be better informed, have improved critical thinking skills, and are more likely to trust science and medical counselling [24, 25]. The heterogeneity of the sources of the disparities that produces the social gradient of health must be taken into account; this approach could guide us to identify the factors on which we can best intervene to alleviate health inequalities [26].

The research on the co-occurrence or clustering of health-related behaviours according to the different dimensions of socioeconomic measures is scarce: many of the studies use a single indicator to assess socioeconomic status [27-29], whereas others described the relationship between one socioeconomic factor and particular health-related behaviour, after controlling for other dimensions [7, 30, 31]. There are some exceptions where the different dimensions of the social gradient of health are used in combination, but these are focused on health outcomes, such as morbidity or mortality [32-35]. To our knowledge, there is a lack of studies of the combining effect [35] of educational attainment and occupational social class within the association of different health-related behaviours that drive health outcomes. We hypothesize that both educational attainment and occupational social class will be predictors of health-related behaviours; however, we also hypothesize that educational attainment, which is a more stable trait than occupation, could independently affect health related lifestyle. Here we aim to analyse the independent and combined effects of educational attainment and occupational social class on the clustering of health-related lifestyle behaviours.

Methods

We retrieved data from four cross-sectional, periodical surveys: the Spanish National Health Surveys (SNHS) in 2006 (n = 29,478), 2011 (n = 21,007), and 2017 (n = 23,089), and the 2014 European Health Interview Survey (EHIS) for Spain (n = 22,842). In this study adults aged from 18 to 64 years were only included (working age population, n = 67,171). SNHS and EHIS collect data through a multi-stage cluster method with a proportional random selection of primary and secondary sampling units (region, population nuclei and census tract). The final sample is selected by quotas based on gender and age. Personal interviewing by trained interviewers was employed for data collection. The response rate was 96.0%, 89.6%, 74.6% and 74.0%,

respectively, in 2006, 2011, 2014 and 2017. More detailed information about methodology of these surveys has been described elsewhere [36].

Measures

We analysed five health-related lifestyle behaviours according to their importance on health outcomes [37, 38]: physical activity (reporting any leisure time physical activity or sport) [39, 40], daily fruit intake, daily vegetables intake, non-smoking, and non-alcohol use during the last two weeks. All health-related lifestyle behaviours were categorized as dichotomous variables (yes or no). This methodology is a reliable and valid approach in large scale health surveys [41-46].

Gender, age, educational attainment, occupational social class, place of residence – metropolitan areas (more than 500,000 inhabitants), middle-size urban areas (10,000 to 500,000 inhabitants) and rural areas (< 10,000 inhabitants) –, self-perceived health status [47], marital status and employment status were included. For the educational attainment, the last level of formal completed studies was used according to the International Standards Classification of Education [48]. The occupation of the main breadwinner of the family was employed to classify the occupational social class according to the proposal of the Working Group on Determinants of Health of the Spanish Society of Epidemiology [49]: High (I-II): executives of government and companies, senior civil servants, professionals, technicians, managers and owner-managers of commerce and personal services, other technicians (non-high technicians), artists and athletes; Middle (III): middle managers, administrative personnel, military protection and security services; and Low (IV-V): semi-skilled and manual workers in class IV-V industry, commerce and services, and unskilled workers. A combination of both education attainment and occupational social class was also employed, establishing a total of nine groups called: H/I-II, H/III, H/IV-V, M/I-II, M/III, M/IV-V, P/I-II, P/III, and P/IV-V.

Statistical Analysis

The cluster of health-related lifestyle behaviours was performed through a latent class analysis (LCA), using the statistical program Rstudio Version 3.6.1 (Rstudio, Inc., Boston, MA, USA). Latent class regression analysis was performed using the "poLCA" package (Version 1.4.1) [50]. Men and women were examined separately as risk factors' cluster could differ by gender [51]. LCA has advantages over other traditional

cluster techniques (i.e., hierarchical grouping or k-means) because it is based on probability modelling. In particular, the analysis is more flexible and the selection criteria are less arbitrary [52]. LCA models employ response patterns in observed categorical variables to classify individuals into latent classes, where the items have different probabilities of responses for each class/cluster. Thus, the class-specific response probability indicates the probability that a participant belonging to a certain cluster engages on certain behaviour. We considered a probability of 0.50 or less a low probability, 0.50-0.75 a moderate probability and 0.75 or more a high probability [53, 54].

To select the number of clusters that best fit the data, we first fitted a two-cluster model and then increase the number of classes by one, up to a five-cluster model. To identify the most suitable models, the models were compared using two criteria that are accepted for LCA methods: the Akaike information criterion (AIC) and the Bayesian information criterion (BIC). The best model was selected on the basis of these adjustment statistics or measures of classification (the smaller AIC and BIC value suggest better goodness of fit), although we prioritized the BIC because it offers greater precision [55]. In addition, we consider the relative size of classes in each model, selecting classes above 5% of the cohort [56].

Multinomial logistic regression models were employed to examine the association between class membership and socio-demographic factors, self-perceived health status and survey year, calculating odds ratios (OR) and 95% confidence intervals (95% CI). We performed a model adjusted for age, place of residence and survey year to evaluate association between class membership and the combined effects of educational attainment and occupational social class. SPSS version 24.0 (IBM Corp., Armonk, NY, USA) was employed for these analyses.

Results

A total of 66,577 people provided complete information for all the health-related lifestyle behaviours (99.1% of the whole sample). All those who had a missing value for any of health-related behaviour were excluded from the latent class regression analysis. Model-fit indices are represented in Table 1. The five-cluster model was discarded because both men and women from one of the classes had cohorts that were lower than 3% of the population. So, a four-cluster model presented the most suitable criterion for selection among men and women (according to BIC and AIC values, see table 1).

Characteristic of clusters

Latent class analysis showed that there are sex differences in health-related lifestyle: the combination of different behaviours in each cluster differs according to sex. Figure 1 represents the probabilities of health-related lifestyle for the most suitable model (four-cluster model) in both sexes: men were more represented than women in the "bad" and “regular-bad” clusters, while women were classified more frequently in the “regular-good” and "good" clusters (see figure 1).

Health-related lifestyle behaviours by sociodemographic factors

Supplementary table 1 represents the probability of each risk factor (i.e., smoking, alcohol use, physical inactivity, and fruit and vegetables intake) by social class and educational attainment, as well as their combination. We observed a better lifestyle in men and women of high occupational social class or high educational attainment; both showed a greater likelihood of regular physical activity, daily fruit and vegetable intake and non-smoking. However, people from higher social classes and higher educational attainment were more likely to report alcohol use. Additionally, the combination of education and occupation showed remarkable results: regardless of social class, men did not differ fruit and vegetable intake when are classified in the high educational attainment group, and the same trend was found in women for smoking behaviour.

Tables 2 and 3 show the descriptive analysis of sociodemographic factors, self-perceived health status and survey year by cluster among women and men, respectively. Being classified in the “good” cluster (a healthier lifestyle) was more common among married women and men aged from 50 to 64 years old with high education and high social class, early retired and living in metropolitan areas.

The multinomial logistic regression analysis indicated that education and occupational social class were related to a healthier lifestyle: the predominance of “bad” and “regular-bad” cluster was lower in those women and men with high education and high social class (Table 4). Married status was associated with a lower probability of being classified in the “bad” and “regular-bad” clusters, whereas unemployment status was related with a higher probability of being classified in the “bad” and “regular-bad” clusters for men, and in the “bad” cluster for women. The combined analysis of educational attainment and social class showed the association of a high educational attainment with a healthier lifestyle regardless of social class for women and men

(Figure 2). However, this finding was more evident in men: the probability of being classified in the "bad" cluster was higher among men with a middle or lower educational attainment of all social classes with respect the H/I-II group, while men with a high educational level showed the lower differences despite their occupational social class (OR = 1.20 (95% CI 0.99-1.46) for H/III; OR = 1.33 (95% CI 1.07-1.66) for H/IV-V). In women, there were no differences between those with high education, although there were also no differences between the H/I-II and P/III groups.

Discussion

We found that health-related lifestyle showed a clear social gradient: the clustering of a poorer lifestyle was more frequent in most disadvantaged socioeconomic groups. However, the combined effect of educational attainment and occupational social class indicates that education can overcome this social gradient by occupational social class: those highly educated had a healthy lifestyle regardless of their occupational status.

Many studies have shown how socioeconomic factors, such as educattional attainment, occupational social class and income, affect health-related lifestyle [15, 18, 29, 57]. We provide additional evidence of this phenomenon indicating a clear socioeconomic gradient in the clustering of health-related lifestyle behaviours, but additionally, we have also performed an analysis of the combined effect of the educational attainment and occupational social class on behavioural risk factors. Our study supports those that claim the role of education in health promotion [58, 59]: men with a high social class but low or middle educational attainment were more likely classified in the poorer lifestyle cluster.

Our results support previous studies on the association between class membership and other socio-demographic factors: men are classified more often than women in the higher risk combinations clusters [17] and single people from both sexes showed worse lifestyle [54]. Unlike other studies in which no differences were observed according to place of residence [54], we have found that people from middle-size urban areas (from 10,000 to 500,000 inhabitants) had a poorer lifestyle. Our results also showed how unemployed men and women had a higher probability of being classified in high risk factors clusters.

The results presented here should be interpreted in the context of several limitations. Data come from cross-sectional health surveys, so it is not possible to

determine a causal relationship nor to perform longitudinal data analysis. Self-report measurements imply limits and bias despite that these methods characterize most large-scale studies. We have also employed dichotomization in order to provide useful and actionable information on health-related lifestyle behaviours. We want to emphasize that results comparisons should be made with caution according to the methodology and cut-offs employed in this study. The alcohol use was based on regular intake and not on abusive use (recent studies have shown that any amount of alcohol is associated with all-cause mortality [60]). We must also consider that the measure used to evaluate occupation does not consider job insecurity and other labour conditions. Nevertheless, it is the most widely used measure of occupational social class in the literature, as well as is the current method proposed by the Spanish Society of Epidemiology. Also, although our models were adjusted to socio-demographic and health factors, we have to consider that factors such as country of origin could not be considered due to lack of information in the surveys. Moreover, we were unable to employ income as socioeconomic factor in this study, due to the number of missing values in the 2014 and 2017 surveys. Other factors could also limit our findings, i.e., certain health problems both could influence and are associated with health-related lifestyle, as well as education might be less stable in more recent birth cohorts.

Despite the aforementioned limits and to some extent, our results provide empirical evidence of a particular contradictory class location effect [61]: we show how the contradictory position between educational attainment and occupational social class might influence how people live. In our study, social class is assessed on the basis of the occupation of the main breadwinner of the household, but education is assessed on the basis of personal achievements; therefore, the occupational social class of many people interviewed might be based on parental or partner occupation [26]. Some authors have described that the influence of familial, occupational social class background could be less important than is often assumed [62], and education could drive (more so than occupation) those relational mechanisms that link psychosocial and proximal processes with our health-related lifestyle.

The human capital hypothesis describes how the set of personal skills and abilities that education provides extend beyond occupation and income, fostering health through the sense of personal control and coalesce healthy behaviours [63]. Moreover, there is evidence that an increase in material assets or income is not always associated with a better health status [64]; by contrast, education improves individual behaviours

and has a positive intergenerational effect on health-related lifestyle [63]. This study adds a new perspective in the current debate about the profitability of the educational system. Recent estimations of the annual reduction in the healthcare costs derived from a healthy lifestyle emphasize our findings: the non-material assets of education might have a profound effect in our health but also in the public health expenditure [65]. During recent years the need to maintain public investment in the existing public higher education system has been questioned given that Spain has a higher proportion of overqualified taskforce among all OECD countries (40.7%), and it takes between 6.5 and 9 years for young people to match their educational level with occupational requirements [66]. High educational attainment could redress the social gradient in health during these mismatched years, as well as protect people throughout job instability periods (which have become quite common during the last decade) and after retirement. Future research should assess the number and cluster of health risk factors from a wide range of socioeconomic backgrounds, evaluating the combined effect of education, occupation, and income throughout life.

Education might play a further and independent role in providing health equity through its effects on psychosocial factors, lifestyle, and behaviours regardless of material circumstances. Access to education creates social conditions for health, contributing to health equity and fairness even in a country with universal health care and a developed welfare system, such as Spain. More action is needed: the differential health outcomes, according to socioeconomic stratification, might be tackled through educational empowerment.

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Tables

Table 1. Model-fit indices for latent class analysis for behavioural risk factors (N = 66,577); NHSS and EHIS, 2006–2017, Spain

	Npar[a]	L^{2b}	df[c]	L^2 *p value*[d]	LL[e]	BIC[f]	AIC[g]	Relative Entropy	Minimum % of a cluster
Women									
Two-cluster	11	1171,28	20	< 0.001	-115800.1	231715.6	231622.2	0.463	35.7
Three-cluster	17	372,3356	14	< 0.001	-115404	230986.4	230842.1	0.558	17.7
Four-cluster	**23**	**138,1066**	**8**	**< 0.001**	**-115283.5**	**230808.2**	**230613.0**	**0.583**	**9.3**
Five-cluster	29	48,47156	2	< 0.001	-115238.3	230780.9	230534.7	0.554	2.9
Men									
Two-cluster	11	670,9965	20	< 0.001	-98412.13	196937.9	196846.3	0.440	43.5
Three-cluster	17	212,0361	14	< 0.001	-98173.57	196522.7	196381.1	0.623	23.5
Four-cluster	**23**	**66,11689**	**8**	**< 0.001**	**-98101.58**	**196440.8**	**196249.2**	**0.516**	**12.4**
Five-cluster	29	17,29211	2	< 0.001	-98076.84	196453.3	196211.7	0.600	2.3

Population aged from 18 to 64 years old; [a]Number of parameters in the model; [b]Model Fit Likelihood ratio chi-squared statistic; [c]Degrees of freedom in the model; [d]*p* value of L^2; [e]Log likelihood; [f]Bayesian Information criterion, based on the log likelihood; [g]Akaike's Information Criterion.

Table 2. Descriptive analysis (%) of sociodemographic factors self-perceived health status and survey year by clustering of health-related lifestyle among women (N = 35,941); NHSS and EHIS, 2006–2017, Spain

	Bad	Regular-Bad	Regular-Good	Good	
	N = 3,358	N = 9,483	N = 11,024	N = 12,076	*p* value
	9.3%	26.4%	30.7%	33.6%	
Age					
18 to 34	11.3	38.5	25.2	25.0	< 0.001
35 to 49	10.6	26.1	30.3	33.0	
50 to 64	6.5	17.8	35.1	40.7	
Education					
High education	10.0	20.1	25.3	44.6	< 0.001
Middle education	10.4	28.9	29.2	31.5	
Primary or no education	6.4	26.6	38.9	28.1	
Social class					
Social class I-II	10.6	19.4	25.2	44.8	< 0.001
Social class III	10.1	24.0	29.3	36.5	
Social class IV-V	8.7	29.5	33.2	28.6	
Social class/education					
H/I-II	10.1	17.6	23.8	48.5	< 0.001
H/III	10.4	21.7	25.8	42.1	
H/IV-V	9.3	25.1	29.1	36.4	
M/I-II	11.8	23.4	25.3	39.4	
M/III	11.2	25.7	28.7	34.5	
M/IV-V	9.9	30.9	30.2	29.0	
P/I-II	9.1	16.8	36.2	37.9	
P/III	6.2	21.1	36.9	35.8	
P/IV-V	6.4	28.0	39.5	26.1	
Marital status					
Single	12.5	34.0	23.3	30.2	< 0.001
Married	7.5	23.1	33.9	35.5	
Other	11.0	25.6	31.0	32.3	
Unemployed status					
Working	10.4	25.7	29.5	34.3	< 0.001
Unemployed	9.7	32.9	28.0	29.3	
Early retired	6.6	20.8	34.9	37.7	
Homemaker	6.6	23.5	35.6	34.3	
Other	9.4	36.5	28.6	25.5	
Place of residence					
Rural area	8.5	23.4	33.9	34.2	< 0.001
Metropolitan area	10.3	26.2	25.4	38.1	
Middle-size urban area	9.4	27.4	30.5	32.7	
Self-perceived health					
Poor	8.0	26.3	36.2	29.5	< 0.001
Good	9.9	26.4	28.4	35.3	
Survey year					
2006	10.6	22.5	33.2	33.7	< 0.001
2011	9.6	29.3	30.1	31.0	
2014	8.3	28.1	28.3	35.3	
2017	8.3	27.9	29.7	34.2	

Population aged 18 to 64 years old; *p* value is presented from Chi-square test.

Table 3. Descriptive analysis (%) of sociodemographic factors, self-perceived health status and survey year by clustering of health-related among men (N = 30,636); NHSS and EHIS. 2006–2017, Spain

	Bad	Regular-Bad	Regular-Good	Good	
	N = 8,847	N = 9,749	N = 3,796	N = 8,244	*p* value
	28.9%	31.8%	12.4%	26.9%	
Age					
18 to 34	34.0	37.2	10.3	18.5	< 0.001
35 to 49	30.2	31.3	12.4	26.0	
50 to 64	23.4	28.3	13.9	34.4	
Education					
High education	18.0	31.5	18.1	32.5	< 0.001
Middle education	31.1	31.7	11.7	25.6	
Primary or no education	32.3	32.4	9.5	25.8	
Social class					
High social class (I-II)	20.7	30.4	16.4	32.4	< 0.001
Middle social class (III)	26.1	32.0	14.5	27.5	
Low social class (IV-V)	32.6	32.0	10.3	25.0	
Social class/education					
H/I-II	16.7	30.4	18.7	34.2	< 0.001
H/III	18.6	33.1	18.5	29.8	
H/IV-V	22.0	33.5	14.9	29.5	
M/I-II	26.6	30.5	13.7	29.1	
M/III	27.8	32.0	13.6	26.6	
M/IV-V	33.1	31.6	10.6	24.7	
P/I-II	25.2	28.2	10.0	36.5	
P/III	28.2	30.5	12.9	28.4	
P/IV-V	33.2	32.7	9.1	25.0	
Marital status					
Single	34.5	33.7	10.8	21.0	< 0.001
Married	24.4	31.6	13.3	30.8	
Other	36.3	24.9	12.9	25.9	
Employment status					
Working	27.9	31.5	13.3	27.3	
Unemployed	38.1	30.9	8.6	22.4	
Early retired	25.3	30.2	13.8	30.7	
Homemaker	25.9	30.6	10.4	33.2	
Other	26.7	42.1	9.0	22.1	
Place of residence					
Rural area	30.1	29.9	12.1	27.8	< 0.001
Metropolitan area	26.6	30.9	12.7	29.8	
Middle-size urban area	28.8	32.7	12.4	26.1	
Self-perceived health					
Poor	31.3	32.1	8.9	27.8	< 0.001
Good	28.2	31.8	13.4	26.7	
Survey year					
2006	32.1	29.0	13.0	25.9	< 0.001
2011	28.0	30.6	11.3	30.1	
2014	28.0	32.2	12.1	27.6	
2017	26.9	35.8	13.0	24.2	

Population aged 18 to 64 years old; *p* value is presented from Chi-square test.

Table 4. Multivariate logistic regression models examining the class membership according to sociodemographic factor, self-perceived health status and survey year among women (N = 35,941) and men (N = 30,636); NHSS and EHIS, 2006–2017, Spain

	Women			Men		
	Bad	Regular-bad	Regular-good	Bad	Regular-bad	Regular-good
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95 CI)	OR (95 CI)	OR (95 CI)
Age[a]						
15-34 years	1	1	1	1	1	1
35-49 years	0.72 (0.65-0.79)	0.52 (0.48-0.55)	0.91 (0.85-0.98)	0.63 (0.58-0.68)	0.60 (0.55-0.65)	0.85 (0.77-0.95)
50-64 years	0.35 (0.32-0.39)	0.28 (0.26-0.31)	0.86 (0.80-0.92)	0.37 (0.34-0.40)	0.41 (0.38-0.44)	0.72 (0.65-0.80)
Educational attainment[b]						
High education	1	1	1	1	1	1
Middle education	1.55 (1.42-1.71)	2.17 (2.02-2.33)	1.65 (1.54-1.76)	2.78 (2.51-3.08)	1.68 (1.53-1.85)	0.70 (0.62-0.79)
Primary or no education	1.39 (1.23-1.58)	3.75 (3.42-4.10)	2.74 (2.53-2.98)	2.14 (1.96-2.33)	1.25 (1.15-1.35)	0.81 (0.74-0.89)
Social class[b]						
High social class	1	1	1	1	1	1
Middle social class	1.22 (1.09-1.36)	1.60 (1.47-1.75)	1.42 (1.32-1.54)	2.07 (1.91-2.25)	1.38 (1.28-1.49)	0.81 (0.74-0.89)
Low social class	1.36 (1.24-1.50)	2.48 (2.31-2.67)	2.05 (1.92-2.20)	1.51 (1.37-1.66)	1.27 (1.16-1.40)	1.05 (0.94-1.17)
Marital status[a]						
Single	1	1	1	1	1	1
Married	0.51 (0.47-0.56)	0.58 (0.54-0.61)	1.24 (1.16-1.32)	0.48 (0.45-0.52)	0.64 (0.60-0.68)	0.84 (0.77-0.92)
Other	0.83 (0.73-0.93)	0.70 (0.64-0.77)	1.24 (1.14-1.36)	0.85 (0.76-0.96)	0.60 (0.53-0.68)	0.96 (0.83-1.13)
Employment status[a]						
Working	1	1	1	1	1	1
Unemployed	1.09 (0.97-1.23)	1.50 (1.39-1.63)	1.11 (1.02-1.21)	1.67 (1.53-1.83)	1.20 (1.10-1.32)	0.79 (0.70-0.90)
Early retired	0.57 (0.50-0.66)	0.74 (0.67-0.81)	1.08 (0.99-1.17)	0.81 (0.73-0.89)	0.85 (0.78-0.94)	0.92 (0.82-1.04)
Homemaker	0.63 (0.56-0.72)	0.92 (0.85-1.00)	1.20 (1.12-1.30)	0.76 (0.62-0.95)	0.81 (0.65-0.99)	0.65 (0.48-0.87)
Other	1.22 (1.01-1.47)	1.91 (1.68-2.17)	1.30 (1.14-1.49)	1.19 (1.03-1.37)	1.66 (1.46-1.90)	0.84 (0.69-1.02)
Place of residence[a]						
Rural area	1	1	1	1	1	1
Metropolitan area	1.09 (0.95-1.25)	1.00 (0.91-1.11)	0.67 (0.61-0.74)	0.82 (0.74-0.92)	0.96 (0.87-1.07)	0.97 (0.85-1.12)
Middle-size urban area	1.16 (1.05-1.28)	1.22 (1.14-1.31)	0.94 (0.89-1.00)	1.02 (0.95-1.10)	1.17 (1.09-1.25)	1.09 (1.00-1.20)
Self-perceived health status[a]						
Poor	1	1	1	1	1	1
Good	1.04 (0.96-1.14)	0.84 (0.79-0.90)	0.67 (0.62-0.69)	0.94 (0.88-1.01)	1.03 (0.96-1.11)	1.56 (1.41-1.73)
Survey year[a]						
2006	1	1	1	1	1	1
2011	0.99 (0.89-1.09)	1.42 (1.32-1.53)	0.99 (0.92-1.06)	0.75 (0.69-0.82)	0.91 (0.83-0.99)	0.75 (0.68-0.84)
2014	0.75 (0.67-0.83)	1.19 (1.11-1.28)	0.82 (0.76-0.87)	0.82 (0.76-0.89)	1.04 (0.96-1.13)	0.88 (0.79-0.98)
2017	0.77 (0.70-0.86)	1.22 (1.14-1.32)	0.88 (0.82-0.95)	0.90 (0.82-0.98)	1.32 (1.21-1.43)	1.08 (0.97-1.20)

[a]Crude values. [a]Adjusted by age, place of residence and survey year. Reference group for comparison was "Good" for classes of health-related lifestyle and the category set as OR = 1 for the socio-demographic variables, self-perceived health and survey year.

Figures

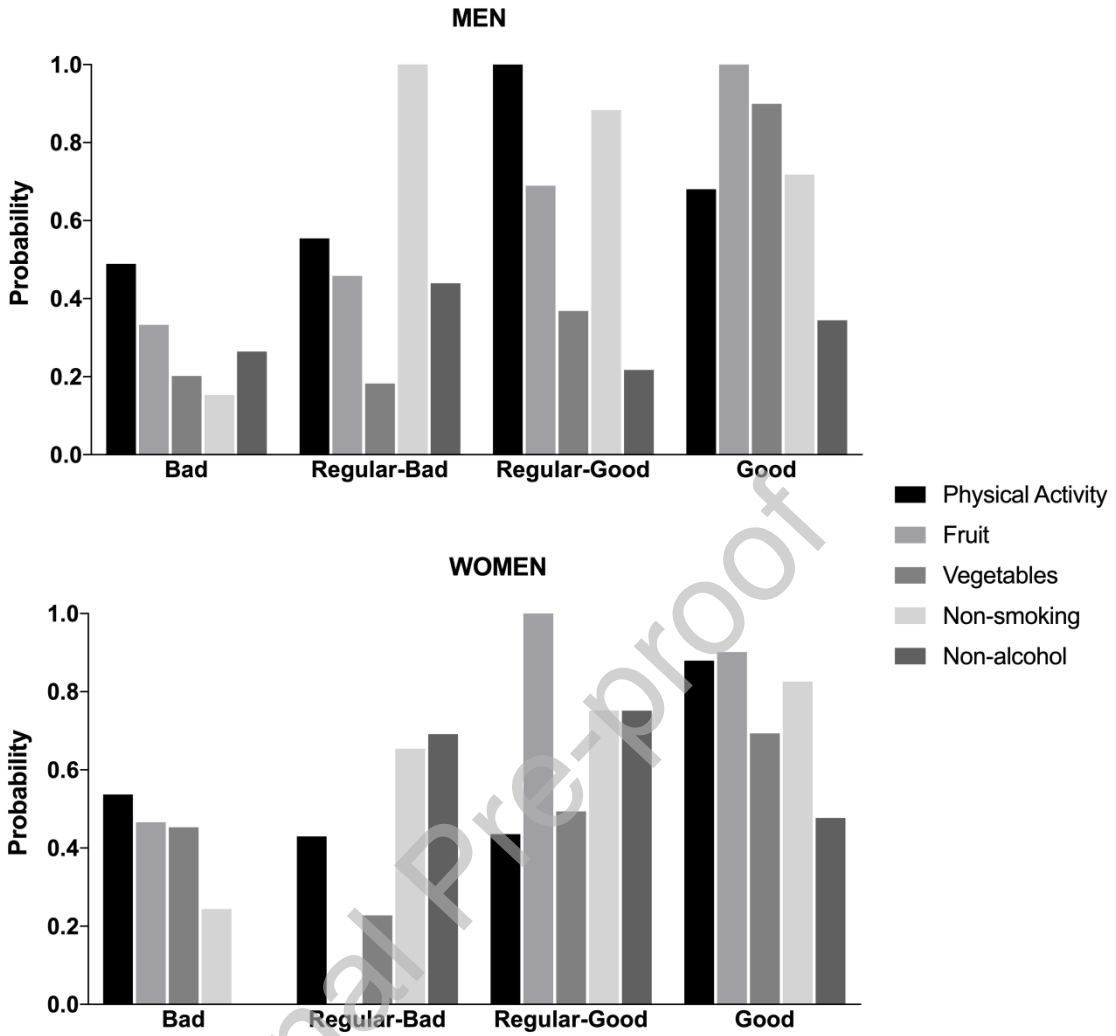

Figure 1. Probabilities of health-related lifestyle behaviours for the four-cluster model among women (N = 35,941) and men (*N* = 30,636); NHSS and EHIS, 2006–2017, Spain. Women: Bad represents the class indicating 4 healthy factors with a low (less than 50%) probability, while Regular-Bad, Regular-good and Good indicating 3, 2 and 1, respectively. Men: Bad represents the class indicating 5 healthy factors with a low (less than 50%) probability, while Regular-Bad, Regular-Good and Good indicating 4, 2 and 1, respectively.

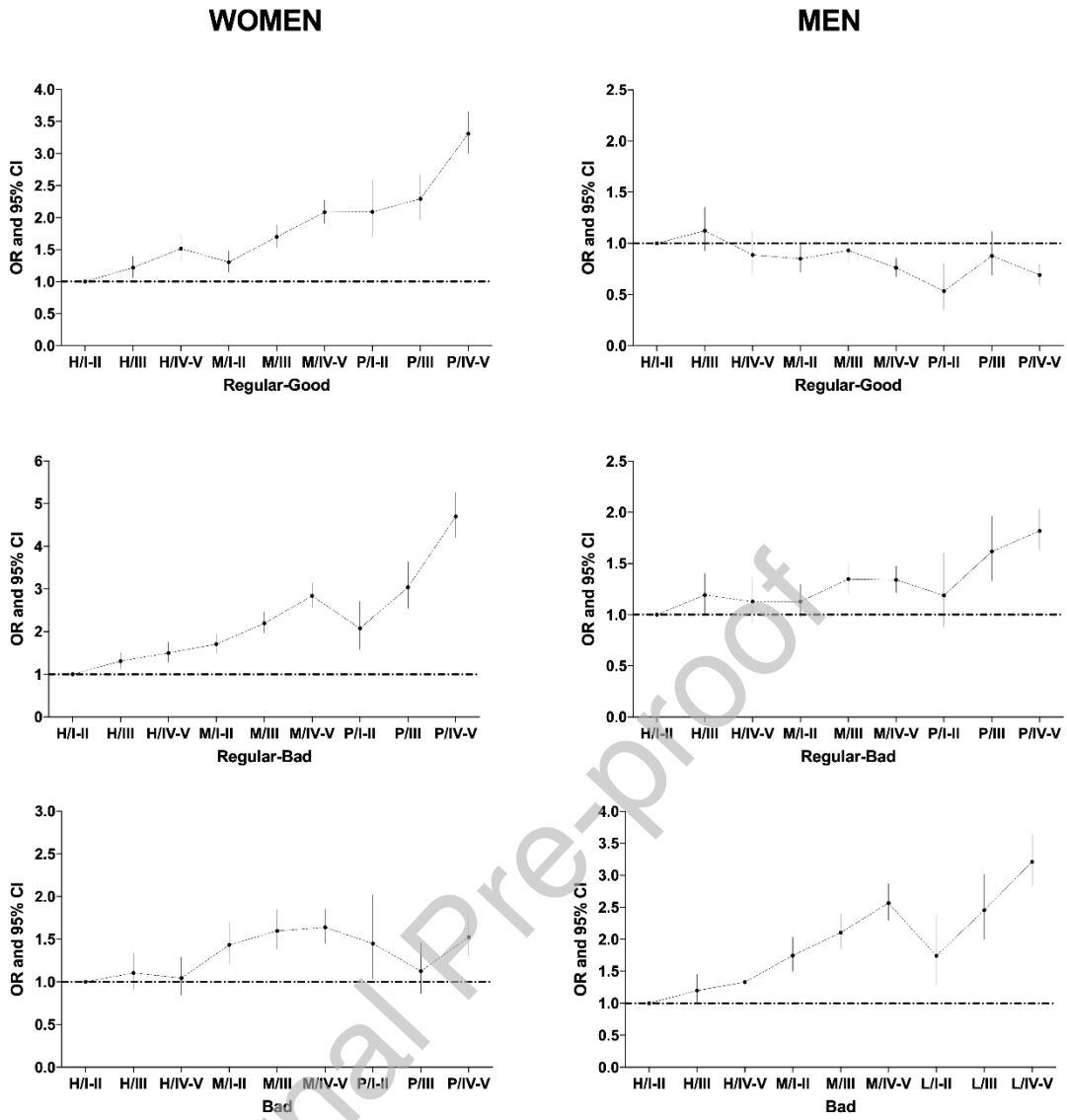

Figure 2. Multivariate logistic regression model examining the class membership among women and men, using a combination of educational attainment and occupational social class. Reference groups for comparison were Good and High Educational Level/I-II Social class, respectively. Analysis was adjusted by age, place of residence and survey year.