



Self-rated health among older adults in two fast ageing European countries: evidence from Italy and Serbia

Samoprocena zdravlja starih u dve evropske zemlje brzog starenja: dokazi iz Italije i Srbije

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Abstract

Background/Aim. Self-rated health (SRH) is a widely adopted tool to compare health across countries. Relationships of socio-demographics with SRH in later life have been extensively cross-nationally observed. However, cross-comparisons of the effects of health behaviors (i.e., eating habits, smoking, and alcohol consumption) and health status (i.e., chronic diseases) on SRH are less frequent. Our aim was to examine SRH differences between older adults in Italy and Serbia and to observe the role of predictors of SRH particularly referring to health behaviors in both countries. **Methods.** Two samples of 4,406 Italians and 3,539 Serbs aged 65 and older were extracted from national health surveys conducted in 2013. For this secondary analysis, SRH, socio-demographics, health status variables, and health behavior factors were selected. In the multivariate logistic regression models, SRH was the dependent variable while the selected independent predictors were socio-demographics, characteristics related to health status and to health behavior. **Results.** Both Italians (30.3%) and

Serbs (22.3%) reported lower values of good- or very good-SRH than the European average (36.9%). The logistic regressions showed that Serbs reported poor-SRH significantly more often than Italians. Moreover, gender, education level, chronic diseases, and daily life limitations resulted as significant predictors of SRH in both national samples. In addition, vegetables intake was positively associated to SRH among Italians, while among Serbs an adequate fruits intake was positively associated to SRH. **Conclusion.** Health behavior and health status factors are associated with better SRH in the population aged 65 and older. The effects differ between countries. It is essential that decision-makers of the implementation of international preventive strategies take into account the specific characteristics of countries in the organization of interventions for the aged population.

Key words:

aged; aged, 80 and over; health; self-assessment; surveys and questionnaires; italy; serbia; risk factors.

Apstrakt

Uvod/Cilj. Samoprocena zdravlja (*Self-rated health* – SPH) je široko prihvaćen postupak za potrebe komparacije zdravstvenog stanja različitih zemalja. Povezanost socijalno-demografskih osobina sa SPH starijih osoba uočena je u nacionalnim istraživanjima. Međutim, ova istraživanja retko obuhvataju poređenja povezanosti zdravstvenog ponašanja (tj. navika u ishrani, pušenju i konzumiranju alkohola) sa zdravstvenim stanjem (tj. prisustvom hronične bolesti). Cilj je bio da se ispita razlika u SPH starih osoba u Italiji i Srbiji, kao i da se odredi uloga prediktora SPH, posebno zdravstvenog pona-

šanja u obe zemlje. **Metode.** U okviru nacionalnih istraživanja zdravlja u Italiji i Srbiji, sprovedenih na reprezentativnim uzorcima domaćinstava u 2013. godini, posmatrane su osobe starije od 65 godina: 4 406 Italijana i 3 539 Srba. U modelima multivarijantnih logističkih regresionih analiza SRH je predstavljala zavisnu varijablu, a nezavisne prediktore činile su socijalno-demografske osobine ispitanika, obeležja u vezi sa zdravstvenim stanjem i ona koja predstavljaju faktore zdravstvenog ponašanja. **Rezultati.** U obe zemlje manji broj ispitanika starijih od 65 godina procenio je svoje zdravlje kao dobro i veoma dobro (Italijani: 30,3% i Srbi 22,3%) u odnosu na evropski prosek (36,9%). U logističkim regresiji-

jama uočeo je da je samoprocenjeno zdravlje češće lošije u Srbiji nego u Italiji. Ipak u oba nacionalna uzorka značajni prediktori samoprocenjenog zdravlja bili su isti: pol, obrazovanje, hronične bolesti i ograničenje dnevnih aktivnosti. Posmatrajući zdravstveno ponašanje, u Italiji je unos povrća bio značajno povezan sa osećanjem boljeg zdravlja, dok je u Srbiji istu povezanost imao unos voća u svakodnevnoj ishrani. **Zaključak.** Istraživanje pokazuje da postoje faktori zdravstvenog ponašanja koji su udruženi sa boljom SPH u populaciji starijoj od 65

godina, ali i da se oni razlikuju među zemljama. Neophodno je da donosioci odluka o implementaciji međunarodnih preventivnih strategija uvažavaju posebne specifičnosti zemalja pri organizaciji intervencija za populaciju starijih.

Ključne reči: stare osobe; stare osobe, 80 i više godina; zdravlje; samoprocena; ankete i upitnici; italija; srbija; faktori rizika.

Introduction

The factors associated with older people's self-rated health (SRH) have been studied extensively. Health-related factors, such as chronic diseases and daily life limitations were identified among the principal determinants of SRH for this age group¹. In addition, health behavior factors were also reported to affect older people's SRH². Rarely these factors were analyzed together in a multi-national study. The present study aimed at comparing elderly population in Italy and Serbia, two Southern European countries that are currently facing specific challenges in the public health domains concerning older people.

Italy is a country that for a long time has enjoyed high fertility and birth rates. However, since the 1970s, these figures started to decline rapidly, leading to a dramatic population aging that reached the level of one in five citizens over 65 years old³. Currently, Italy ranks second in the world regarding population aged 65 and older (22%), right behind Japan⁴. This picture could even get worse since Italy is about to experience one of the largest worldwide growths in over 65 years old population⁵. In fact, a cohort born between 1945 and 1964, so-called "baby boomers", is progressively aging and this trend will continue up to the 2030s, leading to a top-heavy age structure⁶. An older population carries major challenges to health and social care since the number of "super-utilizers" grows inevitably. They are a particular part of the elderly population composed of patients with multiple ambulatory care-sensitive chronic conditions consuming a rich portion of the medical resources⁷. The optimization of the resource allocation needs to be guided by strong indicators and SRH has been found to be the most efficient measure of the general state of health⁸.

Serbia is expected to face an increase in the portion of people aged 65 and above, ranging from 17% to 33% by 2061⁹. This demographic picture is also affected by migration problems: in 2009, 44% of young Serbs (age between 18 and 24) indicated an intention to migrate. This could lead in turn to top-heavy age structure in the country¹⁰. The risk of a mass migration is real since 80% of migration seekers declared to have connections abroad, such as relatives or friends who could ease the transition dynamics¹⁰. This running aging process is most visible in the city of Belgrade: the capital has seen a constant rise in the proportion of 65+ age groups, paralleled with a decrease of youngsters¹¹. Moreover, a major risk factor for the elderly population of Serbia is poverty: a recent survey on the living standard of the population showed that the poverty rate among older adults

(aged 65 and above) is significantly higher than the overall population and, also, the poverty risk among the older people is higher than the Serbian average¹².

Overall, comparison of different countries in Southern Europe is recommended in order to evidence comparability of results to support intervention aimed at improving health among portions of the population at risk such as the elderly¹³. Accordingly, the present study was designed to investigate and compare levels of SRH in the 65+ population of Italy and Serbia and to compare associations with socio-demographics, health status, and health behaviors characteristics.

Methods

Study population and data

We used cross-sectional population-based data from two national health surveys in Italy and Serbia. Both countries dispose of nationally representative data that include measures of SRH and health-related habits as a result of the alignment to international standards in health surveys. More specifically, for this secondary analysis we used data from the 2013 Italian National Health Survey, section Multi-scope Survey on the Family Aspects of Daily Life¹⁴ and from the 2013 National Health Survey for the population of Serbia¹⁵. The current national data were harmonized with those of the European Health Interview Survey wave 2, with the aim of reaching comparability with results of other European Union countries¹⁶. Both surveys targeted members of private households and adopted paper and pencil technique to submit questionnaires. For Italy, in order to obtain a nationally representative sample, households were selected through a complex stratified multistage design, while a stratified two-stage cluster probability sampling was adopted in Serbia. The inhabitants of the Autonomous Province of Kosovo and Metohija were not included in the Serbian survey. A total of 30,914 respondents (20,275 Italians and 16,623 Serbs) completed the examination, with a response rate of 78.9% and 88.9% in Italy and Serbia respectively. According to the definition of older adults given by the World Health Organization (WHO)¹⁷ we restricted this study to adult respondents aged 65 years and older. This left a total of 4,406 Italians (1,854 males and 2,552 females) and 3,539 Serbs (1,527 males and 2,012 females).

Study variables

As dependent variable, SRH was measured using a single-item question, namely "How is your health in general?",

with five possible answers: very good, good, fair, poor, and very poor. The first two answers were then grouped as “good” and the last two were grouped as “poor”, like in other studies^{18, 19}.

The independent variables were selected after reviewing the research literature on factors influencing SRH. The selected items were divided into three groups: socio-demographics, health status, and health behaviors.

Socio-demographics included: age, gender, education level, geographical distribution, and living alone. Age was categorized as follows: 65–74, 75–84, and 85+. Gender was classified as males and females. Education level was reclassified according to the International Standard Classification of Education (ISCED)²⁰: low (ISCED 0–2), medium (ISCED 3–4), and high (ISCED 5–8). The geographical distribution was summarized in North, Center, and South because of the similar demographic macro-regions. For Italy, North West and North East were grouped in North, Center was left as such, and South incorporated Islands too. For Serbia, Vojvodina and Belgrade represent the North, Šumadija and West fall into Center, while South integrates also East. Living alone was calculated with the following item: “Total number of persons in a household”. The dichotomization was then carried out separating the people living alone from the people not living alone.

Health status was summarized into two variables: the Age-adjusted Charlson Comorbidity Index (AaCCI)²¹ for the chronic diseases and daily life limitations. Longstanding diseases or health problems were extracted from a long list of conditions occurred in the past year. The following were available in both surveys and, consequently, included: diabetes (scoring 1), hypertension (1), infarction (1), angina pectoris (1), chronic obstructive pulmonary disease (1), asthma (1), allergies (1), neoplasm (2), liver calculus (2), cirrhosis (1), osteoarthritis (1), and mental diseases (1). The age adjustment was then implemented by weighting 0 the 65–74 group, 1 the 75–84 group, and 2 the 85+ group. By summing up the eventual presence of chronic diseases and the age weight, an overall score was obtained and therefore classified as 1, 2, 3, 4, and 5+. General activity limitations were investigated through one question, namely “For at least the past 6 months, to what extent have you been limited because of a health problem in activities people usually do?” Three options were given: severely limited, limited but not severely, and not limited at all.

Items regarding health behaviors included: intake of fruits, intake of vegetables, binge drinking, smoking, and body mass index (BMI). BMI was measured using the formula: weight divided by height squared (kg/m^2), and then categorized into three groups, according to the WHO classification²²: under/normal weight ($< 25 \text{ kg}/\text{m}^2$), overweight (25 to 29.99 kg/m^2), and obese ($\geq 30 \text{ kg}/\text{m}^2$). The frequencies of vegetables and fruits intake were measured through two similar questions: “How often do you eat vegetables or salad (excluding juice and potatoes)?”, and “How often do you eat fruits (excluding juice)?” Answers were then rearranged into two levels, following the WHO report recommending a minimum of 400 g of fruits and vegetables per day for the prevention of several diseases²³: inadequate (“never”, “less than once a week”, “1 to 3 times a week”, and “4 to 6 times a

week”), and adequate (“once or more a day”). Binge drinking, or risky single occasion drinking, was estimated using the following single-item: “During the past 12 months, how often have you had six or more drinks on one occasion?” The answers were dichotomized into non-binge drinkers (“never” and “not during the past 12 months”), and binge drinkers (“less than once monthly”, “once a week”, and “every day”). Smoking habit was measured with a question: “Do you smoke at all nowadays?” The three possible responses were dichotomized into non-smokers (“no”) and smokers (“yes, daily” and “yes, occasionally”).

Statistical analysis

Data were analyzed using SPSS version 21.0 software (SPSS Inc., Chicago, IL, USA). Analyses consisted of descriptive statistics and univariate and multivariate multinomial logistic regression methods.

Table 1 reports frequencies for independent and dependent variables and results of χ^2 tests assessing significant differences between Italy and Serbia. Table 2 reports the results of univariate and multivariate (adjusted for age and gender and all study variables) logistic multinomial regression analysis testing for SRH differences across Italy and Serbia. Tables 3 and 4 report the results of univariate and multivariate multinomial logistic regression analyses using good-SRH vs. poor-SRH and good-SRH vs. fair-SRH as dependent variables in the Italian and Serbian sample respectively. The use of multivariate modeling enabled us to distinguish among different determinants: socio-demographics, health status, and health behaviors. Odds ratios (ORs) in univariate analysis were calculated and then the adjustment for age and gender was introduced in the second model. Only the variables that were significant in the model adjusted for age and gender were entered into the final multivariate multinomial logistic regression model to identify the predictors of SRH using good SRH as the reference category. AaCCI and daily life limitations were excluded from these last analyses because of multicollinearity problems. At last, the descriptions of the predictor coefficients was based on the previous models, while their comparison was established on the new multinomial model with SRH as dependent variable and country* predictor as independent variable. Specifically, we analyzed the interaction term between two countries (Italy/Serbia) and each predictor wherever it was generated in the previous models for either Italy or Serbia. In all the analyses, a *p*-value of < 0.05 was considered statistically significant.

Results

As it can be seen from Table 1, the two countries significantly differed on all analyzed variables, except for gender. SRH as a discriminant was always significant for the Serbian sample and the entire sample while for the Italian sample it was not significant for binge drinking and fruit consumption. Overall, Serbs were younger, higher educated, and consumed more vegetables, while Italians reported better health, less chronic diseases, less general activity limitations, lower BMI, declared to eat fruits more frequently and to drink and smoke less than Serbs (Table 1).

Table 1

Self-rated health, socio-demographics, health status, and health behavior characteristics of Italians, Serbs, and in both countries

Variables	Italy (n = 4,406) n (%)	Serbia (n = 3,539) n (%)	Both countries (n = 7,945) n (%)	<i>p</i> *
Self-rated health				
Very good	112 (2.5)	102 (2.9)	214 (2.7)	< 0.001
Good	1221 (27.7)	687 (19.4)	1908 (24.0)	
Fair	2202 (50.0)	1334 (37.7)	3536 (44.5)	
Poor	719 (16.3)	1076 (30.4)	1795 (22.6)	
Very poor	152 (3.4)	340 (9.6)	492 (6.2)	
Socio-demographics				
Age (years)				< 0.001
65–74	2181 (49.5)	1954 (55.2)	4135 (52.0)	
75–84	1642 (37.3)	1385 (39.1)	3027 (38.1)	
85+	583 (13.2)	200 (5.6)	783 (9.9)	
Gender				0.331
male	1854 (42.1)	1527 (43.1)	3381 (42.6)	
female	2552 (57.9)	2012 (56.9)	4564 (57.4)	
Education level				< 0.001
high	199 (4.5)	529 (14.9)	728 (9.2)	
middle	619 (14.0)	934 (26.4)	1553 (19.5)	
low	3588 (81.4)	2076 (58.6)	5664 (71.3)	
Geographical distribution				< 0.001
north	1895 (43.0)	1608 (45.4)	3503 (44.1)	
center	810 (18.4)	1012 (28.6)	1822 (22.9)	
south	1701 (38.6)	919 (26.0)	2620 (33.0)	
Living alone				< 0.001
yes	3053 (69.3)	2771 (78.3)	5824 (73.3)	
no	1353 (30.7)	768 (21.7)	2121 (26.7)	
Health status				
AaCCI				< 0.001
0	713 (16.2)	368 (10.4)	1081 (13.6)	
1	1053 (23.9)	719 (20.3)	1772 (22.3)	
2	977 (22.2)	836 (23.6)	1813 (22.8)	
3	661 (15.0)	690 (19.5)	1351 (17.0)	
4	448 (10.2)	439 (12.4)	887 (11.2)	
5+	554 (12.6)	487 (13.8)	1041 (13.1)	
Daily life limitations				< 0.001
not limited	1866 (45.5)	1192 (33.7)	3058 (40.0)	
limited	1524 (37.1)	1453 (41.1)	2977 (39.0)	
seriously limited	715 (17.4)	887 (25.1)	1602 (21.0)	
Health behavior				
BMI (kg/m ²)				< 0.001
less than 25	1752 (39.8)	1002 (30.5)	2754 (35.8)	
25–29	1980 (44.9)	1330 (40.5)	3310 (43.1)	
30+	674 (15.3)	950 (28.9)	1624 (21.1)	
Fruits				< 0.001
adequate	3698 (85.5)	1751 (49.5)	5449 (69.3)	
inadequate	627 (14.5)	1788 (50.5)	2415 (30.7)	
Vegetables				< 0.001
adequate	2155 (49.7)	2002 (56.6)	4157 (52.8)	
inadequate	2180 (50.3)	1537 (43.4)	3717 (47.2)	
Binge drinking				< 0.001
no	4144 (97.7)	887 (74.5)	5031 (92.6)	
yes	98 (2.3)	304 (25.5)	402 (7.4)	
Smoking				< 0.001
no	4045 (91.8)	3155 (89.1)	7200 (90.6)	
yes	361 (8.2)	384 (10.9)	745 (9.4)	

AACCI – Age-adjusted Charlson Comorbidity Index; BMI – body mass index;

*Differences between Italy and Serbia according to χ^2 test.

Levels of SRH as potential discriminators between the two countries of interest are reported in Table 2.

Levels of poor-SRH compared to levels of good-SRH were significantly higher in the Serbian sample than in the Italian sample. This hold true in the univariate model (OR 2.75), as well as in multivariate models after adjusting for age and gender (OR 3.19), and all variables from Table 1 (OR 2.25). Levels of fair-SRH compared to good-SRH did not differ between national samples (Table 2).

Table 2
Differences of self-rated health levels between Italy and Serbia – results of univariate and multivariate logistic regression models

Self-rated health	Serbia (0) vs. Italy (1)		
	OR	95% CI	<i>p</i>
Univariate			
Poor	2.75	2.43–3.10	< 0.001
Fair	1.02	0.92–1.14	0.682
Good (ref cat)	1.00		
Adjusted on age and gender			
Poor	3.19	2.81–3.63	< 0.001
Fair	1.10	0.98–1.23	0.117
Good (ref cat)	1.00		
Adjusted on all variables			
Poor	2.25	1.53–3.31	< 0.001
Fair	0.98	0.79–1.21	0.815
Good (ref cat)	1.00		

Ref cat = reference category; OR – odds ratio; CI – confidence interval.

The results of the multinomial logistic regression analyses for Italy are presented in Tables 3a and 3b. Predictors of SRH in the groups of Italians respondents that reported significantly better health than their respective referent categories in both good-SRH vs. Poor-SRH and fair-SRH vs. Poor-SRH were: 65–74 and 75–84 years of age, males, high education, living in north and center, not living alone, AaCCI scores lower than 5, no daily life limitations, non-serious daily life limitations, BMI lower than 25, and adequate vegetables consumption. Binge drinking and smoking were not significant in the adjusted models, therefore, they were not included the final model (Tables 3a, 3b).

The results of the multinomial logistic regression analyses for Serbia are presented in Tables 4a and 4b. Similar results were recorded among Serbs: being a male, better educated, not living in the South, not living alone, scoring less than 5 at the AaCCI and not being seriously limited were factors leading to better health than their respective referent categories in both the analyses. The only age category that significantly correlated with SRH in all analyses was the 75–84 group, for what concerning specifically the good-SRH vs. poor-SRH model [OR, 1.44; 95% confidence interval (CI), 1.17–1.77]. BMI resulted to be a significant predictor only in the good-SRH vs. poor-SRH model: only the group reporting a value lower than 25 kg/m² was significantly different in the multivariate analysis (OR, 1.49; 95% CI, 1.15–1.93)

from the obese group. A healthy diet was always a discriminant in the univariate and in the adjusted models, but only an adequate intake of fruits positively influenced health when taking into account all the other variables in the good-SRH vs. poor-SRH analysis (OR, 1.34; 95% CI, 1.06–1.29). Binge drinking and smoking did not enter the multivariate models (Tables 4a, 4b).

Discussion

One of the goals of the present study was to investigate and compare levels of SRH in the 65+ population of Italy and Serbia. Serbia reported poor-SRH significantly more often than Italians (40.0% vs. 19.8% respectively). The effect of nationality on SRH hold true also after controlling for gender and age and for all the variables in the final model. Our results confirmed the evidence that Eastern Europeans report worse self-perceived health than Westerners²⁴. Serbia is still facing the consequences of the war period during the 1990s and health implications are enormous especially for older generation²⁵. Based on the present data and analyses, a possible explanation could be found in the high prevalence of chronic diseases and daily life limitations among Serbian elderly, since these two variables resulted as the most determinant in explaining SRH in both national samples while their prevalence was higher among the Serbian population (21.4% vs. 34.4% with no chronic diseases and 33.8% vs. 45.5% with no daily limitations in favor of Italy). The effect of health status on SRH was also proved in other researches¹.

Comparing the poor-SRH results for the population of interest with those of other European countries²⁶, we see that Italy would rank 15th and Serbia 26th out of 31. On the other hand, for the good-SRH results, Italy would occupy the 21st spot and Serbia the 23rd. The better results achieved by Italy could be explained by longevity in the country: thanks mainly to the Mediterranean diet and the role played by olive oil²⁷, Italy ranks second in overall life expectancy, only behind Japan, with 83 years, while Serbia is 67th, with 75 years⁴.

Another goal of the present research was to investigate the association between socio-demographics, health status, and health behavior factors with SRH. Within the socio-demographics, the only factor to remain significant in all the models across the two countries was education. This factor was found to be crucial also in another recent study on older adults in Europe²⁸. Education after World War II was considered an exclusive for richer part of the population so that among today's older generation a higher educational level implies a privileged family background²⁹. In our sample, education mirrors financial resources that in turn are associated with subjective health in before and after retirement population¹².

Although older Italians declared to eat more fruits than vegetables, it is the latter that had a positive influence on health when all the variables were taken into account. Something similar could be seen in the Serbian sample where participant declared to eat more vegetables than fruits, but it was only the latter to be significant in the good-SRH vs. poor-SRH multivariate model.

Table 3a
Predictors of self-rated health for Italians in multinomial logistic regression models (Socio-demographics)

Variables	Good (1) vs. poor (0) self-rated health [OR (95% CI); p]		Good (1) vs. fair (0) self-rated health [OR (95% CI); p]	
	Univariate	Adjusted on age and gender	Univariate	Adjusted on age and gender
Age* (years)				
65-74	7.22(5.41-9.65); 0.000	6.78(5.07-9.07); 0.000	2.80(2.17-3.61); 0.000	2.68(2.07-3.45); 0.000
75-84	3.59(2.95-4.36); 0.000	3.51(2.88-4.27); 0.000	1.65(1.42-1.91); 0.000	1.62(1.40-1.89); 0.000
85+ (ref cat)	1.00		1.00	
Gender*				
male	1.83(1.53-2.18); 0.000	1.63(1.36-1.96); 0.000	1.47(1.28-1.69); 0.000	1.40(1.22-1.61); 0.000
female (ref cat)	1.00		1.00	
Education level				
high	3.69(2.25-6.03); 0.000	2.90(1.75-4.81); 0.000	1.96(1.45-2.66); 0.000	1.75(1.29-2.38); 0.000
middle	1.11(0.64-1.93); 0.705	1.16(0.66-2.05); 0.756	1.05(0.75-1.47); 0.780	1.07(0.76-1.50); 0.696
low (ref cat)	1.00		1.00	
Geographical distribution*				
north	3.07(2.52-3.73); 0.000	3.01(2.46-3.69); 0.000	2.07(1.77-2.42); 0.001	2.05(1.75-2.40); 0.000
center	1.46(1.14-1.87); 0.003	1.44(1.11-1.85); 0.005	1.36(1.13-1.64); 0.001	1.35(1.12-1.63); 0.002
south (ref cat)	1.00		1.00	
Living alone*				
no	3.30(2.72-4.01); 0.000	3.27(2.65-4.03); 0.000	2.38(2.02-2.81); 0.000	2.36(1.99-2.79); 0.000
yes (ref cat)	1.00		1.00	

*Variables weighting more for Italy than for Serbia; ref cat – reference category; OR – odds ratio; CI – confidence interval.

Table 3b

Variables	Good (1) vs. poor (0) self-rated health [OR (95% CI); p]		Good (1) vs. fair (0) self-rated health [OR (95% CI); p]	
	Univariate	Adjusted on age and gender	Univariate	Adjusted on age and gender
Health status				
AaCCI [†]				
0	276.19(151.27-504.24); 0.000	384.89(201.09-736.67); 0.000	15.56(9.77-24.79); 0.000	20.41(12.32-33.84); 0.000
1	77.66(44.98-134.07); 0.000	99.73(55.67-178.64); 0.000	10.47(7.23-15.18); 0.000	13.25(8.83-19.88); 0.000
2	24.45(15.07-39.65); 0.000	29.34(17.52-49.15); 0.000	5.53(4.27-7.15); 0.000	6.84(5.10-9.17); 0.000
3	9.25(5.80-14.75); 0.000	10.57(6.47-17.27); 0.000	3.36(2.72-4.15); 0.000	4.04(3.17-5.14); 0.000
4	2.96(1.82-4.83); 0.000	3.11(1.90-5.11); 0.000	1.97(1.62-2.40); 0.000	2.17(1.76-2.67); 0.000
5+ (ref cat)	1.00		1.00	
Daily life limitations [†]				
not limited	848.57(459.96-1565.512); 0.000	723.32(389.48-1343.31); 0.000	15.70(9.05-27.25); 0.000	13.46(7.72-23.47); 0.000
limited	26.69(18.75-38.00); 0.000	23.90(16.74-34.12); 0.000	5.45(4.59-6.46); 0.000	5.06(4.25-6.02); 0.000
BMI*				
less than 25.00	1.66(1.29-2.15); 0.000	2.13(1.63-2.79); 0.000	1.42(1.15-1.76); 0.001	1.61(1.30-2.01); 0.000
25.00-29.99	1.01(0.84-1.22); 0.910	1.16(0.95-1.41); 0.135	1.11(0.96-1.29); 0.162	1.21(1.04-1.40); 0.014
30.00 and more (ref cat)	1.00		1.00	1.09(0.93-1.28); 0.285
Fruits*				
adequate	1.30(1.02-1.65); 0.033	1.32(1.03-1.69); 0.030	1.04(0.85-1.27); 0.704	1.05(0.86-1.29); 0.624
inadequate (ref cat)	1.00		1.00	
Vegetables*				
adequate	1.52(1.28-1.80); 0.000	1.56(1.31-1.87); 0.000	1.26(1.10-1.45); 0.001	1.29(1.12-1.49); 0.000
inadequate (ref cat)	1.00		1.00	1.24(1.07-1.43); 0.004
Drinking*				
no	0.51(0.26-1.01); 0.053	0.87(0.43-1.78); 0.709	0.99(0.64-1.54); 0.977	1.34(0.86-2.10); 0.200
yes (ref cat)	1.00		1.00	
Smoking*				
no	0.55(0.40-0.76); 0.000	0.88(0.62-1.24); 0.457	0.69(0.55-0.88); 0.002	0.86(0.67-1.09); 0.200
yes (ref cat)	1.00		1.00	

*Variables weighting more for Italy than for Serbia; † Variables not included in the final model because of multicollinearity; AaCCI – Age-adjusted Charlson Comorbidity Index; BMI – body mass index; ref cat – reference category; OR – odds ratio; CI – confidence interval.

Table 4a
Predictors of self-rated health for Serbs in multinomial logistic regression models (Socio-demographics)

Variables	Good (1) vs. poor (0) self-rated health [OR (95% CI); p]		Good (1) vs. fair (0) self-rated health [OR (95% CI); p]	
	Univariate	Adjusted on age and gender	Univariate	Adjusted on age and gender
Age (years)				
65-74	1.75(1.19-2.57); 0.005	1.57(1.06-2.32); 0.023	0.94(0.62-1.42); 0.759	0.88(0.58-1.33); 0.540
75-84	1.68(1.39-2.02); 0.000	1.67(1.38-2.01); 0.000	1.13(0.93-1.36); 0.218	1.12(0.93-1.35); 0.233
85+ (ref cat)	1.00		1.00	
Gender				
male	2.53(2.12-3.03); 0.000	2.51(2.10-3.00); 0.000	1.74(1.46-2.08); 0.000	1.75(1.46-2.09); 0.000
female (ref cat)	1.00		1.00	
Education level				
high	5.01(3.87-6.48); 0.000	3.94(3.02-5.14); 0.000	2.06(1.64-2.61); 0.000	1.79(1.41-2.28); 0.000
middle	1.88(1.42-2.49); 0.000	1.80(1.35-2.39); 0.000	1.51(1.18-1.94); 0.001	1.44(1.12-1.86); 0.004
low (ref cat)	1.00		1.00	
Geographical distribution				
north	1.89(1.52-2.36); 0.000	1.97(1.58-2.47); 0.000	1.61(1.29-2.02); 0.000	1.66(1.32-2.07); 0.000
center	1.80(1.46-2.22); 0.000	1.88(1.51-2.33); 0.000	1.47(1.19-1.82); 0.000	1.51(1.22-1.87); 0.000
south (ref cat)	1.00		1.00	
Living alone				
no	2.33(1.84-2.94); 0.000	2.23(1.75-2.83); 0.000	1.61(1.27-2.05); 0.000	1.49(1.17-1.91); 0.001
yes (ref cat)	1.00		1.00	

OR – odds ratio; CI – confidence interval.

Table 4b

Variables	Good (1) vs. poor (0) self-rated health [OR (95% CI); p]		Good (1) vs. fair (0) self-rated health [OR (95% CI); p]	
	Univariate	Adjusted on age and gender	Univariate	Adjusted on all variables
				Adjusted on all variables gender
Health status				
AaCCI*†				
0	140.78(75.29-263.24); 0.000	210.79(109.33-406.40); 0.000	12.62(7.04-22.63); 0.000	18.90(10.24-34.89); 0.000
1	42.21(25.86-68.91); 0.000	63.18(37.40-106.73); 0.000	5.71(3.73-8.74); 0.000	8.48(5.35-13.45); 0.000
2	18.50(12.20-28.05); 0.000	26.19(16.72-41.04); 0.000	4.13(3.00-5.68); 0.000	5.85(4.10-8.37); 0.000
3	9.77(6.53-14.61); 0.000	12.63(8.25-19.33); 0.000	4.06(3.05-5.42); 0.000	5.29(3.85-7.27); 0.000
4	3.02(2.00-4.56); 0.000	3.28(2.16-4.99); 0.000	2.24(1.70-2.95); 0.000	2.48(1.86-3.31); 0.000
5+ (ref cat)	1.00		1.00	
Daily life limitations*†				
not limited	146.15(95.36-224.01); 0.000	153.12(99.14-236.50); 0.000	3.84(2.50-5.90); 0.000	4.04(2.62-6.22); 0.000
limited	16.23(12.42-21.21); 0.000	15.41(11.75-20.22); 0.000	3.94(3.23-4.80); 0.000	3.87(3.16-4.74); 0.000
seriously limited (ref cat)	1.00		1.00	
Health behavior				
BMI (kg/m ²)				
less than 25.00	1.57(1.24-1.99); 0.000	1.50(1.17-1.92); 0.001	1.22(0.96-1.55); 0.097	1.14(0.89-1.45); 0.303
25.00-29.99	0.98(0.79-1.22); 0.872	1.00(0.81-1.25); 0.969	1.04(0.85-1.29); 0.694	1.03(0.83-1.27); 0.779
30.00 and more (ref cat)	1.00		1.00	
Fruits				
adequate	1.70(1.42-2.02); 0.000	1.64(1.37-1.96); 0.000	1.28(1.07-1.53); 0.006	1.28(1.07-1.53); 0.007
inadequate (ref cat)	1.00		1.00	1.09(0.87-1.36); 0.442
Vegetables				
adequate	1.41(1.18-1.69); 0.000	1.38(1.15-1.65); 0.001	1.27(1.06-1.52); 0.009	1.27(1.06-1.52); 0.010
inadequate (ref cat)	1.00		1.00	1.19(0.95-1.49); 0.121
Drinking				
no	0.59(0.41-0.85); 0.004	0.70(0.49-1.02); 0.062	1.06(0.79-1.43); 0.686	1.13(0.83-1.53); 0.436
yes (ref cat)	1.00		1.00	
Smoking				
no	0.67(0.51-0.87); 0.003	0.83(0.63-1.10); 0.187	0.77(0.59-1.00); 0.50	0.82(0.62-1.08); 0.151
yes (ref cat)	1.00		1.00	

*Variables weighting more for Italy than for Serbia; † Variables not included in the final model because of multicollinearity; AaCCI – Age-adjusted Charlson Comorbidity Index; BMI – body mass index; ref cat – reference category; OR – odds ratio; CI – confidence interval.

Similar positive results were found in a research that measured the associations between fruits and vegetables intake and SRH among older adults³⁰. Those findings together with our results show that even a relatively cheap food, such as seasonal fruit and vegetable, may play a substantial role in improving health in both Italy and Serbia.

BMI resulted to be significantly correlated to SRH: in the Italian sample, both under/normal weight and overweight respondents rated their health better than the obese ones, while among Serbs under/normal weight individuals did not significantly differ from the reference category. The significant interaction between BMI and SRH at later stages of life is already known in literature: a cross-sectional research in India reports that subjects with good/fair SRH tended not to have problematic BMI, while in the poor-SRH category 55% of males and 47% of females were below 19 units of BMI³¹. Regarding the average levels of BMI, it is noteworthy to underline that, being a normal BMI between 18.5 kg/m² and 24.9 kg/m², both countries have to be recognized as overweight on average since Italy scored 25.1 kg/m² (25.7 kg/m² for males and 24.4 kg/m² for females) and Serbia 25.9 kg/m² (26.3 and 25.4 kg/m², respectively)²¹.

Both binge drinking and smoking did not represent a major threat to SRH for the current population of interest: none of them was significant in the adjusted models so that they were not included in the multivariate analysis. However, the descriptive analysis showed a quite different reality between the two countries: Serbs declared to smoke and drink more than what Italians did. As shown in a longitudinal Serbian study, heavy drinkers, who were usually smokers too, exhibited significantly higher relative risks for all-cause mortality and myocardial infarction³². Accordingly, even though after the age of 65, levels of SRH also depend on other variables, these factors may still be taken into account in future studies based on Serbian samples.

Several limitations to the present study should be noted. First, given the cross-sectional nature of the data analyzed here, it is not possible to establish causal relationships between levels of SRH and studied factors. Second, chronic di-

seases and daily life limitations were measured through self-reported items, so that information bias could not be prevented. Finally, some of the variables that have been found significant predictors of SRH among older adults in previous studies, such as levels of physical activity or access to health care³³, could not be included in the current study since they were omitted or differently measured in the two national databases analyzed here.

Conclusion

In sum, the present study confirmed that socio-demographics, health status, and health behavior factors are major factors affecting SRH in late life, as previously reported by other authors. Implications for the health and social care of non-institutionalized seniors in Italy and Serbia can be also drawn thanks to the representative samples included here. In both countries, the strategies of prevention should focus mainly on relieving the burden of chronic diseases and daily life limitations, which appeared to be the main determinants of poor SRH. Improving self-perception of health status among elderly could also drive the promotion of well-being. Our findings could be also informative for other countries in the Southern European region. In the future, it would be valuable to carry out similar studies including more countries from this geographical area.

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Conflicts of interest

None declared.

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