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ORIGINAL ARTICLE

Socioeconomic position, resilience, and health behaviour among elderly people

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Abstract
Objectives Healthy psychological functioning, the ability to respond rapidly to environmental changes, has been associated with better health outcomes. Less work has examined the association with health behaviour. This study explores whether resilience (a specific expression of healthy psychological functioning) is positively associated with health behaviour in an elderly population aged ≥65 years and whether this association differs in different socioeconomic groups.
Methods Resilience was measured in 3,942 elderly participating in a population-based cohort study (KORA-Age study) in Germany through a short version of the Resilience Scale developed by Wagnild and Young. Regression analyses were performed by socioeconomic position (low/high educational level or income) for two outcome variables, i.e. high consumption of fruit and vegetables and high/moderate physical activity.
Results Resilient people were more likely to consume ≥5 servings of fruit and vegetables a day and to perform high/moderate physical activity as compared to non-resilient people (ORs ranging from 1.5 to 2.2), irrespective of socioeconomic position.
Conclusions Resilience could provide an important starting point for health promotion strategies, addressing resources rather than deficits and risk factors.

Keywords Resilience · Aging · Lifestyle · Socioeconomic position

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Introduction

Healthy psychological functioning is conceptualized as the ability to respond rapidly to environmental changes and to cope with daily life situations (Rozanski and Kubzansky 2005). Several instantiations of healthy psychological functioning such as optimisms and the ability to regulate emotions have been associated with better health outcomes (Kubzansky and Thurston 2007; Smith 2006). Less work has addressed the relationship between healthy psychological functioning and health behaviours among older adults.

Health behaviours, such as physical exercise and nutrition are associated with cognitive, physical, and social functioning in old age (Franklin and Tate 2009). In a world where the proportion of elderly individuals is growing faster than any other age group (WHO 2010a) and where the number of people aged 60 and over is estimated to rise to 2 billion by 2050 (WHO 2010b), addressing health behaviours of elderly people is of public health relevance. To date, though, little research is available on conditions and opportunities that could foster health behaviours among older adults.

Resilience ("stress-resistance"), a specific expression of healthy psychological functioning (Rozanski and Kubzansky

2005), is generally understood as the ability to adapt successfully to stressful situations (Luthar et al. 2000; Schumacher et al. 2004). It has already been related to better health outcomes (Smith 2006) and to better health behaviours among adolescents (Mistry et al. 2009). To date there seems to be no study, though, investigating whether resilience is related to health behaviour among older adults.

Research on resilience started with studies investigating why some children developed normally, despite exposure to adversity (Masten 2001). Later on it expanded to explore psychosocial determinants of resilience in high-risk adults (Bonanno 2004). There are still some open questions about the concept of resilience, for example concerning the characterization as personal trait or as dynamic process (Luthar et al. 2000). An important difference between the two concepts is that when resilience is understood as personal trait it does not necessarily assume exposure to adversity (Luthar et al. 2000). In our study, resilience is conceptualized as protective personality factor, referring to the ability to adapt successfully to stressful experiences, and the measurement instrument that we use focuses on this aspect (Schumacher et al. 2004). It has been suggested to use the term 'resiliency' if the personal trait aspect is in the focus. We use the term 'resilience' throughout the paper, though, as it is well established and has been used by the authors who developed the measurement instrument presented below.

This study aims to investigate the association between resilience and health behaviours (such as physical activity and consumption of fruit and vegetables) in elderly individuals. Since empirical studies show that people with a lower socioeconomic position engage more in health risk behaviours than people with a higher socioeconomic position (Mielck 2000; Schneider 2007), we will also assess whether the association of resilience with health behaviours differs in different socioeconomic groups. A positive association would point to the potential role of resilience as a risk modifier among older adults, and to the importance of building specific health-promoting strategies that focus on resilience.

Methods

Data

Our analyses are based on data collected within the WHO MONICA study (multinational MONItoring trends and determinants in CArdiovascular disease) and the subsequent KORA study (Cooperative Health Research in the Region Augsburg) in the region of Augsburg in Southern Germany. Four independent cross-sectional population-based representative surveys were carried out between 1984/85 and 1999/2001, with a response rate varying between 79 and 67% (Loewell et al. 2005). The age range of the participants was 25–74 years at these baseline examinations. In 2008/09, a follow-up health questionnaire was sent to all participants of the previous four surveys. Further information concerning multimorbidity and mental health among those aged $\geq$65 was obtained through telephone interviews conducted in 2008/09 (KORA-Age cohort study). For the present analysis, we used data from the participants of this KORA-Age cohort, including information for this cohort from the 2008/09 follow-up health questionnaire. The number of participants was 4,565 for the questionnaire (response rate 76.2%) and 4,127 for the telephone interview (response rate 68.9%) (Lacruz et al. 2010).

Given that cognitive impairment might affect the understanding of some items related to resilience, we restricted our analyses to those participants who did not show cognitive impairment ($N = 3{,}347$). The cognitive status was assessed by the modified telephone interview for cognitive status adjusted for education years (TICS-m; cut-off $\leq$31), a procedure to test cognitive impairment based on the Mini Mental State Examination (Perneczky 2003; Cook et al. 2009). The median age of our sample was 72 years both for men and women.

Resilience

The resilience of the participants was measured through a short version of the resilience scale (RS) developed by Wagnild and Young (1993). The scale encompasses 11 items (RS-11) and was obtained by a factor analysis of a German sample of 2,031 persons aged 14–95 years (Schumacher et al. 2004). It has proved to be a reliable and valid instrument (Roehring et al. 2006). The authors of the RS-11 conceptualized resilience as protective personality factor, referring to the ability to adapt successfully to stressful situations (Schumacher et al. 2004).

The data relating to the RS-11 were collected by telephone interview in the KORA-Age study. The items are: (1) when I make plans I follow through with them. (2) I usually manage one way or another. (3) Keeping interested in things is important to me. (4) I am friends with myself. (5) I feel that I can handle many things at a time. (6) I am determined. (7) I keep interested in things. (8) I can usually find something to laugh about. (9) I can usually look at a situation in a number of ways. (10) Sometimes I make myself do things whether I want to or not. (11) I have enough energy to do what I have to do.

The range of answers varied from 'strongly disagree' (=1) to 'strongly agree' (=7). A resilience score was calculated by summing up the values from 1 to 7 across all 11

questions. Participants with more than two missing items were excluded ($N = 32$). The resilience score was then divided into thirds, and we considered those individuals in the upper third as resilient and those in the middle and lower thirds as non-resilient (Hardy et al. 2004). The thirds were derived from the data.

Socioeconomic variables

We used two socioeconomic indicators (i.e. educational level and income) and conducted the statistical analyses separately for those with low versus high educational level on one hand, and for those with low versus high income on the other (Geyer et al. 2006).

Educational level refers to the highest level of education reached by the participant. It is divided into two groups: 'low' (up to lower secondary school) and 'high' (upper secondary school/qualification for university/completion of undergraduate studies). The educational level was obtained at baseline. The total income of all household members was measured in nine categories, ranging from ≤500 to ≥3,500 Euro. We differentiated two income groups: 'low' (income ≤ the median per capita income of our sample. i.e. 1,125 EUR) and 'high' (>median). This categorisation yields a relatively high percentage (64%) of people with an income ≤ the median, as 14% ($N = 447$) had an income exactly equal to the median per capita income of our sample. The information on income was obtained in the KORA-Age study.

Health behaviour

Information on nutrition was gathered in the telephone interview. Participants were asked about the portions of fruit and vegetables normally consumed per day. Five different answers could be given: 5 or more, 4, 3, 2 and <2. Following international recommendations, '5 or more' was defined as 'healthy lifestyle' (US Department of Health and Human Services 2010; Centers for Disease Control and Prevention 2005). The information on physical activity was collected in the telephone interview as well. In two separate questions, participants were asked how often they exercised per week in winter and in summer. The possible answers were: (1) >2 h, (2) 1–2 h, (3) <1 h, (4) none. We summed the numbers 1–4 encoding each answer for the winter and summer season, and considered 'physically active' to be those whose total score was <5. In an additional question, the participants were asked if they usually walk at least 30 min–1 h a day. Those who answered positively, or who had a total score of <5 (see above) were finally assigned as 'physically active' (British Heart Foundation 2010).

Additional variables

To control for potential confounding, we included information on health status, presence of disease, living status, age, and sex.

Information on health status was obtained in the questionnaire through the EQ-5D, a standardised instrument to measure health outcomes (EuroQol Group 2010). The five questions of the EQ-5D relate to: mobility (problems in walking about), self-care (problems in performing daily life activities), usual activities (problems in performing activities such as work, study, family or leisure activities), pain/discomfort (having pain or discomfort), and anxiety/depression (being anxious or depressed). We considered 'healthy' those participants who did not report any problem in any of the above areas and 'not healthy' those who responded positively to at least one question. In the follow-up health questionnaire, the participants were also asked about three diseases, i.e. diabetes mellitus, myocardial infarction, and stroke. In the analyses, 'no disease' was defined as having none of these conditions. The question concerning 'living status' was collected through the telephone interview. Participants were asked whether they lived alone, and, if the answer was 'no', whether they lived with a partner, a family member and/or other persons. To avoid misclassifications, we classified 'living alone' as those who expressly declared to be living alone and did not mention any person they were living with.

Statistical analysis

Descriptive statistics was performed to show the basic distribution of the variables in our sample.

The Chi-squared significance test was used to assess the association of high resilience with demographic, socioeconomic, clinical, and lifestyle factors. Crude and adjusted odds ratios (OR) for age, sex, educational level, income, living status, health status, and presence of disease with 95% confidence intervals (CI) were calculated for the outcome variables 'fruit and vegetable consumption' and 'physical activity' using logistic regression analyses. Multivariate analyses were conducted by socioeconomic position. Multicollinearity was assessed by estimating the Kendall's coefficient of rank correlation for ordinal variables and Cramer's V for nominal variables.

The statistical analysis was conducted with the software package SAS® version 9.1 (SAS Institute Inc., Cary, NC, USA).

Results

The majority of our sample (61.8%) was less than 75 years old (Table 1). There were more women than men (52.5 vs.

Table 1 Basic distribution of the variables in participants of the KORA-Age study without cognitive impairment (Germany 2008–2009)

Variable	*N*	%
Age (years)		
<75	2,068	61.8
≥75	1,279	38.2
Sex		
Male	1,589	47.5
Female	1,758	52.5
Resilience		
Mid and low third	2,238	67.2
Upper third	1,092	32.8
Educational level		
High	1,061	31.7
Low	2,285	68.3
Household income		
High (>median)	1,131	36.0
Low (≤median)	2,009	64.0
Fruit and vegetables consumption		
High	290	8.7
Low	3,055	91.3
Physical activity		
High/moderate	2,910	86.9
Low	437	13.1
Living status		
Not living alone	2,398	71.6
Living alone	949	28.4
Health status (assessed by EQ-5D)		
Healthy	1,027	31.0
Not healthy	2,296	69.0
Disease[a]		
Without disease	2,494	74.6
With disease	849	25.4

[a] Diabetes mellitus/myocardial infarction/stroke

Table 2 Frequency of high resilience in different subgroups of the KORA-Age study (Germany 2008–2009)

Variable	High resilience[a]		*p* value[b]
	N	%	
Age (years)			
<75	738	35.8	<0.0001
≥75	354	27.9	
Sex			
Male	501	31.6	0.1729
Female	536	33.9	
Educational level			
High	393	37.0	0.0004
Low	699	30.8	
Household income			
High	418	37.1	<0.0001
Low	603	30.2	
Fruit and vegetables consumption			
High	133	46.0	<0.0001
Low	959	31.6	
Physical activity			
High/moderate	1,011	34.9	<0.0001
Low	81	18.8	
Living status			
Not living alone	766	32.1	0.1455
Living alone	326	34.7	
Health status			
Healthy	451	44.0	<0.0001
Not healthy	633	27.7	
Disease			
Without disease	867	34.9	<0.0001
With disease	225	26.7	

[a] Upper third

[b] Chi-square test

47.5%, respectively). Nearly two-thirds had a low educational level (68%), a relatively high proportion that reflects, however, that of the representative statistic of the German population based on the microcensus (German Federal Statistical Office 2010). While the majority (86.9%) claimed to perform high/moderate physical activity, only 8.7% declared to eat the recommended 5 or more servings of fruit and vegetables per day (Centers for Disease Control and Prevention 2005).

Table 2 shows the prevalence estimates of 'high resilience' for the subgroups defined by the demographic, socioeconomic, clinical, and lifestyle variables. Resilience was slightly more prevalent among women as compared to men, but the difference was not statistically significant ($p = 0.1729$) and among high as compared to low educational and income levels ($p = 0.0004$ and <0.0001, respectively). In the younger age group (<75 years), the prevalence was also significantly higher than in the older group (35.8 vs. 27.9%). Concerning the lifestyle variables, fruit and vegetable consumption and physical activity showed a strong association with high resilience ($p < 0.0001$). Despite some evidence showing that older adults who live alone have lower psychological well-being than older adults who live with somebody (Cheng et al. 2008), living status was not associated with resilience in our analysis. Further analyses (data not shown in table) also showed that living status was not associated with consumption of fruit and vegetables, but significantly associated with physical activity ($p = 0.0097$). This is why we only included this variable in the regression model with the outcome variable 'physical activity'. Finally, the prevalence of resilience was significantly higher among

those who were relatively healthy as compared to those who were not ($p < 0.0001$).

Prevalence estimates of the two lifestyle variables among resilient and non-resilient participants by socioeconomic position are given in Figs. 1 and 2, respectively. They show that prevalence estimates for "consumption of fruit and vegetables (≥5/day)" and for "physical activity (high/moderate)" were higher among resilient than among non-resilient people in all socioeconomic groups.

The results of multivariate analysis also show that resilience was related to health behaviours in all socioeconomic groups. Table 3 shows crude and adjusted ORs (with the corresponding 95% CI) for the outcome variable 'high fruit and vegetable consumption'. The results of the logistic regression show that high resilience was associated with healthy nutrition both in the group with low educational level (crude OR 1.9; CI 1.4–2.6), and in the group with high educational level (crude OR 1.7; CI 1.2–2.5) and that these ORs remained rather stable even after controlling for age, sex, household income, health status, and disease (OR 1.7; CI 1.2–2.4 and OR 1.6; CI 1.0–2.3, respectively). The likelihood of consuming 5 or more portions of fruit and vegetables a day was also much higher in the group of resilient with low or high income as compared to the group of non-resilient belonging to the same income groups. OR adjusted for age, sex, educational level, health status, and disease was 1.5 (CI 1.1–2.2) for the low income group and 1.7 (CI 1.2–2.5) for the high income group.

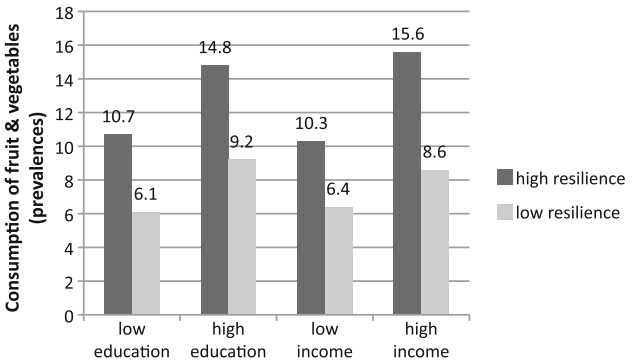

Fig. 1 Prevalences of consumption of fruit and vegetables (≥5/day) by socioeconomic position among resilient and non-resilient people. Resilience was measured with a short version (11 items) of the Resilience scale developed by Wagnild and Young (1993). The data were collected within the research cooperation KORA-Age (Langzeitdeterminanten und Konsequenzen der Multi-morbidität) in the region of Augsburg in Southern Germany between 2008/09

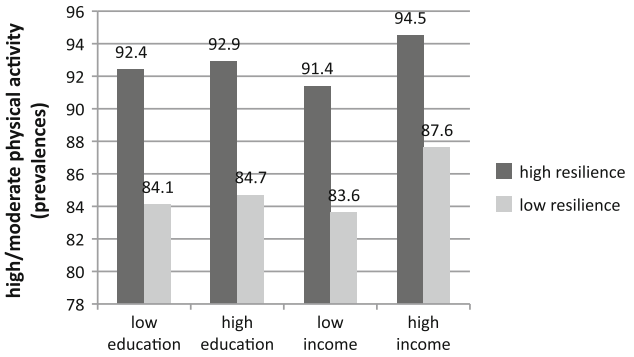

Fig. 2 Prevalences of high/moderate physical activity by socioeconomic position among resilient and non-resilient people. Resilience was measured with a short version (11 items) of the Resilience scale developed by Wagnild and Young (1993). The data were collected within the research cooperation KORA-Age (Langzeitdeterminanten und Konsequenzen der Multi-morbidität) in the region of Augsburg in Southern Germany between 2008/09

The results shown in Table 4—i.e. crude and adjusted OR with 95% CI for the outcome variable 'high/moderate physical activity'—also indicate that resilience was associated with healthy lifestyle. Resilient persons with low educational level or low income were more likely to exercise than non-resilient persons belonging to the same socioeconomic position (OR 2.3; CI 1.7–3.1 and OR 2.1; CI 1.5–2.9, respectively), even after controlling for all other variables of the dataset (OR 1.9; CI 1.3–2.6 and OR 1.8; CI 1.3–2.5, respectively). Similarly, resilient with high educational level or high income were more likely to exercise as compared to non-resilient belonging to the same socioeconomic position (adjusted OR 2.0; CI 1.3–3.3 and adjusted OR 2.2; CI 1.4–3.7, respectively).

Discussion

Our results indicate that resilience is important for health-related behaviours among older adults independently of socioeconomic position. We are not aware of a similar study looking at the association between resilience and modifiable lifestyle factors in elderly individuals belonging to different socioeconomic groups.

Our analyses show that those who are resilient (as compared to those who are not) are more likely to eat ≥5 servings of fruit and vegetables a day, and to perform high/moderate physical activity. As nutrition and physical activity are well known lifestyle factors important for aging successfully (Franklin and Tate 2009), our findings support the assumption that healthy psychological functioning has a beneficial effect on health behaviour. These findings are of particular importance for those people belonging to a lower socioeconomic position, as low educational level and low income are often associated with increased health risk behaviour (Mielck 2000; Schneider 2007).

The finding that high resilience is positively associated with higher fruit/vegetable consumption and higher physical activity supports the demand for implementing health-promoting interventions focusing on resilience. A resilience-based approach has already proved successful among

Table 3 Consumption of fruit and vegetables by socioeconomic position (KORA-Age study, Germany 2008–2009)

Variable	Consumption of fruit and vegetables: high			
	Subsample with low educational level		Subsample with high educational level	
	Crude OR (95% CI)	Mutually adjusted OR (95% CI)	Crude OR (95% CI)	Mutually adjusted OR (95% CI)
Resilience				
Low/medium	1.0	1.0	1.0	1.0
High	1.9 (1.4–2.6)	1.7 (1.2–2.4)	1.7 (1.2–2.5)	1.6 (1.0–2.3)
Age (years)				
≥75	1.0	1.0	1.0	1.0
<75	1.5 (1.1–2.0)	1.3 (0.9–1.9)	1.5 (1.0–2.3)	1.4 (0.9–2.1)
Sex				
Male	1.0	1.0	1.0	1.0
Female	1.3 (1.0–1.7)	1.5 (1.1–2.1)	1.1 (0.8–1.6)	1.2 (0.8–1.9)
Household income				
Low	1.00	1.0	1.0	1.0
High	1.3 (1.0–1.8)	1.4 (1.0–1.9)	1.4 (0.9–2.0)	1.3 (0.9–2.0)
Health status				
Not healthy	1.0	1.0	1.0	1.0
Healthy	1.3 (0.9–1.7)	1.1 (0.8–1.6)	1.5 (1.1–2.2)	1.6 (1.0–2.4)
Disease				
With disease	1.0	1.0	1.0	1.0
Without disease	1.4 (1.0–1.9)	1.1 (0.7–1.6)	1.2 (0.8–1.8)	0.8 (0.5–1.3)
	Subsample with low income level		Subsample with high income level	
	Crude OR (95% CI)	Mutually adjusted OR (95% CI)	Crude OR (95% CI)	Mutually adjusted OR (95% CI)
Resilience				
Low/medium	1.0	1.0	1.0	1.0
High	1.7 (1.2–2.4)	1.5 (1.1–2.2)	2.0 (1.3–2.8)	1.7 (1.2–2.5)
Age (years)				
≥75	1.0	1.0	1.0	1.0
<75	1.4 (1.0–2.0)	1.1 (0.7–1.6)	1.6 (1.1–2.4)	1.6 (1.0–2.4)
Sex				
Male	1.0	1.0	1.0	1.0
Female	1.2 (0.9–1.7)	1.5 (1.1–2.0)	1.2 (0.8–1.6)	1.5 (1.0–2.3)
Educational level				
Low	1.00	1.0	1.0	1.0
High	1.5 (1.1–2.0)	1.4 (1.0–2.0)	1.5 (1.1–2.2)	1.3 (0.9–2.0)
Health status				
Not healthy	1.0	1.0	1.0	1.0
Healthy	1.3 (0.9–1.7)	1.1 (0.8–1.6)	1.6 (1.1–2.3)	1.4 (1.0–2.1)
Disease				
With disease	1.0	1.0	1.0	1.0
Without disease	1.4 (0.9–2.0)	1.1 (0.7–1.7)	1.2 (0.8–1.8)	0.8 (0.5–1.3)

African–American adults with type 2 diabetes. Following coaching programs including resilience education, a statistically significant improvement in HbA1c was found in the group receiving resilience training (Steinhardt et al. 2009). It would be worth exploring whether resilience training could also be a possible direction for health promoting strategies aimed to improve health behaviour among older adults, independently of health status and socioeconomic position.

Table 4 Physical activity by socioeconomic position (KORA-Age study, Germany 2008–2009)

Variable	Physical activity: moderate/high			
	Subsample with low educational level		Subsample with high educational level	
	Crude OR (95% CI)	Mutually adjusted OR (95% CI)	Crude OR (95% CI)	Mutually adjusted OR (95% CI)
Resilience				
Low/medium	1.0	1.0	1.0	1.0
High	2.3 (1.7–3.1)	1.9 (1.3–2.6)	2.3 (1.5–3.6)	2.0 (1.3–3.3)
Age (years)				
≥75	1.0	1.0	1.0	1.0
<75	2.3 (1.9–2.7)	1.5 (1.1–1.9)	2.3 (1.9–2.7)	2.4 (1.6–3.7)
Sex				
Male	1.0	1.0	1.0	1.0
Female	0.8 (0.6–0.9)	0.8 (0.6–1.1)	0.9 (0.6–1.2)	0.8 (0.5–1.3)
Household income				
Low	1.0	1.0	1.0	1.0
High	1.3 (1.0–1.7)	2.0 (1.4–2.9)	1.2 (0.8–1.7)	1.2 (0.8–1.9)
Living status				
Living alone	1.0	1.0	1.0	1.0
Not living alone	1.4 (1.1–1.7)	1.3 (0.9–1.9)	1.1 (0.8–1.6)	1.0 (0.6–1.7)
Health status				
Not healthy	1.0	1.0	1.0	1.0
Healthy	3.2 (2.3–4.3)	2.5 (1.7–3.6)	2.2 (1.4–3.3)	1.3 (0.8–2.0)
Disease				
With disease	1.0	1.0	1.0	1.0
Without disease	1.8 (1.4–2.2)	1.5 (1.2–2.0)	1.9 (1.3–2.7)	1.8 (1.2–2.7)
	Subsample with low income level		Subsample with high income level	
	Crude OR (95% CI)	Mutually adjusted OR (95% CI)	Crude OR (95% CI)	Mutually adjusted OR (95% CI)
Resilience				
Low/medium	1.0	1.0	1.0	1.0
High	2.1 (1.5–2.9)	1.8 (1.3–2.5)	2.4 (1.5–3.9)	2.2 (1.4–3.7)
Age (years)				
≥75	1.0	1.0	1.0	1.0
<75	2.1 (1.7–2.7)	1.7 (1.3–2.2)	2.3 (1.6–3.3)	1.7 (1.1–2.5)
Sex				
Male	1.0	1.0	1.0	1.0
Female	1.2 (0.9–1.7)	0.8 (0.6–1.0)	1.2 (0.8–1.6)	0.9 (0.6–1.4)
Educational level				
Low	1.0	1.0	1.0	1.0
High	1.2 (0.9–1.6)	1.0 (0.8–1.4)	1.1 (0.8–1.5)	0.7 (0.5–1.1)
Living status				
Living alone	1.0	1.0	1.0	1.0
Not living alone	1.8 (1.3–2.4)	1.4 (0.9–2.0)	1.5 (1.0–2.1)	1.0 (0.6–1.6)
Health status				
Not healthy	1.0	1.0	1.0	1.0
Healthy	2.6 (1.9–3.6)	2.2 (1.5–3.1)	2.8 (1.8–4.4)	1.7 (1.1–2.8)
Disease				
With disease	1.0	1.0		1.0
Without disease	1.7 (1.4–2.2)	1.6 (1.2–2.1)	1.9 (1.3–2.7)	1.8 (1.2–2.8)

Resilience-based programs to promote health behaviours should be started at an early age. Promoting changes in lifestyle at an older age is difficult because of long-settled habits, and because many health benefits will become apparent only in the long run. It is arguable, for example, whether an 80-year-old person should be involved in a public health program focusing on healthy nutrition. Quality of life for very old persons probably often just means continuing to eat what they have enjoyed eating in their entire life. This is different for young–old people (mid-50s to mid-70s), who could effectively enjoy, for example, the benefits of a healthy nutrition. The need to start already at an early age is supported by a study conducted among adolescents, which showed a positive association between resilience and healthy behaviour, including fruit/vegetable consumption and physical activity (Mistry et al. 2009).

Our findings are limited by the fact that causality cannot be proven in such a cross-sectional study. It could be possible that high fruit/vegetables consumption and high physical activity supports the development of resilience. It seems to be more plausible, though, to assume that resilience supports healthy behaviour. In future studies it would be important to disentangle the causal relations between resilience and healthy behaviour in more detail and to investigate whether the results reported here could be confirmed using other instruments to measure resilience, including those focusing on resilience as dynamic process, since a limitation of our study is that the measurement instrument we used focuses on resilience as personality factor. This conceptualization is criticized as it might imply that resilience is a static trait, which only some people possess (Luthar et al. 2000). Furthermore, if personality characteristics are understood as stable and fixed, it becomes difficult to plan public health interventions directed at something immutable (Luthar et al. 2000). An eclectic approach that looks not only at resilient individuals, but also at resilient families, resilient communities, and cultural contexts (Ungar 2008), and at how social and economic policies shape resilience (Seccombe 2002; Shaikh and Kauppi 2010) might offer the basis for possible public health interventions, irrespective of the characterisation of resilience as process or trait. This would suggest that interventions should be not only directed to the individual, but also to structural deficiencies, which prevent people from surmounting their problems (Shaikh and Kauppi 2010). One of the major limits of this approach lies, however, in the difficulties of adapting public structures to public health needs of the population (Richard et al. 2008; van Dijk 2008). Other limitations of the study relate to the data collection. All data were self-reported, and given the old age of the participants some questions might have been misunderstood or reported inaccurately.

Future studies should investigate whether programs aimed to improve resilience, especially in low status groups, could really improve their health behaviour. It would be important to assess the effectiveness and the costs of these programs in a standardised way, to build an empirical database for their improvement.

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