

BMJ Open Impact of resilience on health in older adults: a cross-sectional analysis from the International Mobility in Aging Study (IMIAS)

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ABSTRACT

Objectives Self-rated health (SRH) is a predictor of objective health measures, including mortality and morbidity. The link between resilience and SRH among the elderly is unclear. We aim to examine whether resilience aligns with SRH and, secondarily, whether resilience can override the negative health consequences of adverse childhood experiences (ACE).

Design and setting We use 2012, 2014 and 2016 data from the International Mobility in Aging Study, a longitudinal cohort study that collects survey and biophysical data from Albania, Brazil, Colombia and Canada. The main independent variables were resilience and ACE (social and economic).

Participants Community-dwelling 65–74 year olds (in 2012) were recruited through primary care registers. The sample size of the study was 1506.

Primary outcome The outcome measure was SRH.

Results We found that sex, site, economic ACE, current income sufficiency, current depressive symptoms, current physical function and current resilience were associated with current SRH. In regression analyses, we showed that the association between ACE and SRH disappeared once factors such as sex, site, income, depression, physical health and resilience were considered.

Conclusions The association between resilience and health poses a compelling argument for building resilience throughout life.

INTRODUCTION

Traditional medical perceptions of ageing often revolve around increments in illness and decline of function. Recent research reframes the paradigm more positively with a focus on successful ageing and on resilience as a predictor of this.¹ What is this elixir of well-being summed up by the term resilience? Multiple definitions exist. The one we will use characterises resilience as the process of positively adapting to adversity, trauma, threats or significant stress.² Resilience is, at times, described as a personality trait, however, usually is considered to be a group

Strengths and limitations of this study

- One of the first studies to combine the constructs of resilience and early adversity in examining health among older adults.
- Sample size was large (>1500 participants) and allowed for examination of differences between women and men.
- Participants were from four countries with different social capital and economic norms but with 'within site' homogeneity.
- Design precludes determining causality, that is, whether better self-rated health is caused by greater resilience.

of dynamic personal characteristics that can be augmented well into later life.³

Resilience research had its birth in developmental child psychology but grew to include adults on recognition that brain plasticity and, therefore, resilience building can extend throughout life.⁴ A search for the characteristics that underpin resilience in older populations uncovered emotional, social and physical traits not unlike those shaping resilience among children. A 2016 review identified optimism, adaptive coping styles, community involvement, social support and connectedness, independence with activities of daily living, high mobility, physical well-being and self-rated successful ageing as central.⁵ Some researchers have begun to circle back to early life experiences in looking for predictors of resilience across the life course. Adverse social but not economic childhood experiences (ACE) seem, perhaps counterintuitively, to predict greater resilience later in life,^{6,7} particularly for women. Collectively, these studies suggest that location, likely a proxy for cultural differences, affects resilience as well.

Intuitively and empirically, adverse childhood experiences (ACE), such as abuse or family dysfunction, seem to and do foreshadow long-term negative health outcomes such as obesity, depression, disability, chronic disease, shortened lifespan and poorer self-rated health (SRH).⁸ This is an incremental relationship, with each additional ACE predicting poorer adult health. However, the relationship is not inevitable.⁹ As mentioned above, some children and adults seem to flourish despite early adversity. This variation in responses to stressful situations prompted a refinement of initial ACE studies and a search for factors that modify the harms of ACE and, in turn, suggested the value of linking resilience and ACE research. There is likely a complex interaction between vulnerability, protective personal assets and supportive social resources, that, at times, mitigates the harms of early adversity.^{10 11} While this does not justify inaction to prevent ACE, concomitant promotion of protective factors that build individual resilience is a means of diminishing the harm of less malleable social vulnerability. Examples of beneficial individual characteristics include intelligence, self-control, self-efficacy and optimism, all nurtured by social support and having a sense of community with access to sociocultural resources.^{10 11}

While there is much research on resilience as an outcome, fewer studies look at resilience as a predictor of health outcomes, with fewer still examining older populations. One would expect higher resilience to be associated with better health at all stages of life, and indeed resilience aligns with subjective successful ageing, greater happiness, greater satisfaction with life, less depression and longevity.¹²⁻¹⁴ What has not been studied is the link between resilience and SRH. SRH has repeatedly been shown to be a valid marker of objective health and to predict mortality, morbidity,¹⁵ healthcare expenditure, physical activity and cognitive capacity.¹⁶⁻¹⁸ Identifying a relationship between resilience and SRH would effectively also establish its connection with mortality, morbidity and other objective measures of health.

Examining whether the relationship is different for older people who experienced ACE would bring together ACE, resilience and health across the lifespan. Previous studies of resilience and SRH excluded the elderly,¹⁹ or were limited to those with a highly specific condition such as postpolio syndrome,¹⁴ HIV²⁰ or parents of children with autism.²¹ Nevertheless, across studies, resilience is associated with higher self-perceived health. Still unanswered is whether this association will hold true for a larger, more general older population and further whether the association between lower SRH and lower socioeconomic status among older adults (SES)²² will be modified in the presence of resilience.

The aim of the present study is to explore the association between resilience and SRH among an international cohort of older adults. A secondary objective is to examine whether long-term negative health impacts of ACE are modified by resilience. We hypothesise that resilience will align with SRH and may decrease the long-term health harms of ACE.

METHODS

Study design and population

Data used were from the International Mobility in Aging Study (IMIAS), a longitudinal cohort that collected survey information and biophysical measures from community-dwelling 65–74 year olds starting in 2012. The study was conducted at five sites: Tirana (Albania), Natal (Brazil), Manizales (Colombia), Kingston (Ontario, Canada) and Saint-Hyacinthe (Quebec, Canada). These sites were chosen because available demographic data indicated relative within-site homogeneity (ethnic background, income, social norms) but across site heterogeneity that would allow for comparisons of the impact of social circumstances on health. Participants were recruited via local primary healthcare centres. In Albania, Brazil and Colombia, we were given access to centre registers and were able to invite participants directly resulting in a 90%–100% participation rate. Ethics guidelines stipulated that Canadian participants only receive an indirect letter of information from their primary care physician. They were asked to contact the study coordinator by phone if they wished more information. Of the 30% who called, over 90% gave verbal or written consent and enrolled. A baseline sample of 1995 participants with equal numbers of women and men was recruited in 2012 and reinterviewed in 2014 and 2016. From 2012 to 2016, death, frailty, cognitive impairment and moving away lead to an attrition of approximately 25%. All participants were interviewed using the same questionnaire in local language. Ethics approval was granted. Data from the 2016 collection were used for all variables except for ACE (gathered only in 2012) and resilience (2014 only).

Main predictor

Resilience

We used the Wagnild Resilience Scale (RS-14), validated among young and older adults across settings/languages.²³⁻²⁵ It has 14 statements, each followed by a seven-point scale ranging from strongly disagree to strongly agree. Examples of the statements include 'I have self-discipline', 'I can usually find something to laugh about' and 'My life has meaning'.

Scores were dichotomised at the 50th percentile with a cut-off score of 82/98. Participants below this score were categorised as having low resilience and those above as having high resilience.

Other explanatory variables

Childhood adversity

Participants were asked about social and economic adversity in the first 15 years of life, two variables identified by previous factor analysis of findings.²⁶ The specific questions are in the online supplementary data. The number of social and economic adversities (each from 0 to 3) generated an ACE score with the 'no adversity' group as the reference category.

Current socioeconomic status

This was measured by income sufficiency to account for the range in absolute household income across sites. Participants were asked 'To what extent does your income allow you to meet your needs?' (1=very well, to 4=not at all). Responses were recoded into very well, suitably and not very well.

Current depression

Depression was measured via the Center for Epidemiologic Studies Depression (CESD) scale, a validated 20-item test for depressive symptoms in older adults. Total CESD scores were used, ranging from 0 to 60 (greater score meaning greater depression). The traditional cut-off score of 16 was used, above which was considered depressed.²⁷

Current physical functioning

The validated short performance physical battery (SPPB) score was used, composed of three timed measures of balance, gait speed and lower limb force.²⁸ Each component is scored from 0 to 4 (0=inability to perform test) for a potential total score of 12. The cut-off point of 8, below which was considered low physical functioning, was derived from a large representative group of older adults.^{28–30}

Outcome variable

Self-rated health

We asked 'How would you rate your health: very good, good, fair, poor, or very poor?'. Responses were dichotomised, with the first three categories being collapsed as 'good' and the latter two as 'poor'.

Statistical analyses

SPSS (V.24) was used for analyses. Descriptive statistics stratified by sites and sex are reported.

Correlations between each independent variable and SRH were then established via χ^2 testing (for categorical variables) and Student's t-testing (for numeric variables). Economic and social childhood adversity were collapsed into none, or one or more. Resilience was scored as low or high (>50th percentile). SPPB scores were 'high' (eight or higher) or low. CESD scores of 16 or more were 'depressed' versus not depressed (score <16). Income was either sufficient or insufficient (income meets needs not very well or not at all). Finally, SRH was high (very good/good/fair) or low (poor/very poor). Disaggregating data by site would have produced very small numbers of participants for some measures; however, to capture site's inherent meaning of context and culture, we included it as a categorical variable. Sex was participant-defined as female or male. Mean values

Table 1 Frequency measures for covariates according to IMIAS sites at baseline (n=1506), 2012

Variables	Kingston n (%)	St. Hyacinthe n (%)	Tirana n (%)	Manizales n (%)	Natal n (%)
Men					
Age, years; mean (SD)	72.7 (2.6)	72.5 (2.9)	73.4 (3.2)	73.3 (3.0)	72.9 (2.9)
Income sufficiency					
Suitably	34 (13.6)	55 (22.0)	53 (21.2)	53 (21.2)	53 (22.0)
Not/Not very well	1 (0.4)	1 (0.4)	93 (35.5)	106 (40.5)	61 (23.3)
Presence of depressive symptoms	6 (9.7)	4 (6.5)	25 (40.3)	18 (29.0)	9 (14.5)
SPPB less than 8	11 (12.0)	9 (9.8)	24 (26.1)	25 (27.2)	23 (25.0)
ACE economic	43 (12.5)	48 (14.0)	100 (29.2)	72 (21.0)	80 (23.3)
ACE social	29 (19.1)	19 (12.5)	32 (21.1)	40 (26.3)	32 (21.1)
Low resilience*	12 (9.9)	20 (16.5)	55 (45.5)	17 (14.0)	17 (14.0)
Women					
Age, years; mean (SD)	73.3 (2.6)	72.5 (2.5)	72.7 (3.2)	73.4 (2.9)	72.9 (2.7)
Income sufficiency					
Suitably	49 (17.1)	62 (21.7)	55 (19.2)	62 (21.7)	58 (20.3)
Not/Not very well	7 (2.4)	9 (3.1)	107 (36.5)	111 (37.9)	59 (20.1)
Presence of depressive symptoms	17 (11.5)	18 (12.2)	55 (37.2)	33 (23.3)	25 (16.9)
SPPB less than 8	22 (13.4)	16 (9.8)	56 (34.1)	40 (24.4)	30 (18.3)
ACE economic	54 (16.3)	47 (14.2)	88 (26.6)	62 (18.7)	80 (24.2)
ACE social	43 (22.2)	43 (22.2)	25 (12.9)	44 (22.7)	39 (20.1)
Low resilience*	11 (7.2)	20 (13.2)	83 (54.6)	11 (7.2)	27 (17.8)

*Data from 2014 wave collection.

ACE, adverse childhood experiences; IMIAS, International Mobility in Aging Study; SPPB, short performance physical battery.

were used for age. P values <0.05 were considered statistically significant.

Next, we performed logistic regressions of resilience, sex, age, study site, income sufficiency, CESD and SPPB (less than eight points) with the dependent variable, SRH. For multivariate analyses, sex and site were categorical, and the remainder were continuous variables. Sex interactions were tested and found to be insignificant, so sex was included as a covariate. In addition, age was included as a covariate. The models with the included variables were as follows:

Model 1. Sex, Site, Income, Depression, SPPB less than eight points.

Model 2. Model 1+ACE Economic+ACE Social.

Model 3. Model 2+Resilience.

Patient and public involvement

Patients and the public were not explicitly involved with the study design or recruitment process. However, at each site, researchers worked with community partners to publicise and recruit participants. At all sites, participants have been invited to presentations describing findings and health-sustaining interventions arising from these.

RESULTS

Baseline characteristics are reported in table 1. Mean resilience scores were relatively high but varied across sites (Manizales=87, St. Hyacinthe=84, Kingston=82, Natal=78, Tirana=73). Of the 1506 participants physically and mentally capable of participating in the IMIAS study in 2016, 939 rated their health as high. Lower SRH was more prevalent among women ($p<0.001$), those living outside of Canada ($p<0.01$), participants who had experienced more economic adversity in childhood ($p<0.01$), had less current income sufficiency ($p<0.01$), more depressive symptoms ($p<0.01$), poorer physical function ($p<0.01$) or lower resilience (table 2). However, early social adversity did not foreshadow lower SRH ($p=0.20$).

We next did multivariate analyses of the relationships of all variables whose bivariate correlations with SRH were statistically significant (table 3). Social adversity was 'forced' into the model because it was a variable of particular interest despite its insignificance, statistically in bivariate analyses. When considered together, sex, site, income, depression and SPPB (ie, physical health) all remained significant correlates of SRH (model 1). Although income sufficiency was of no benefit, income insufficiency was associated with poorer health. Adding measures of early economic and social adversity (model 2) did not shift these relationships substantially and ACEs, themselves, were not associated with SRH. Finally, we included resilience in the analysis (model 3), finding it to be significantly aligned with SRH. This addition did decrease the significance of some of the other measures somewhat although not in a statistically significant manner. Site remained a strong predictor of health.

Table 2 General characteristics by self-rated health status (n=1503)

	Self-rated health		P values
	Very good/ Good (n=939)	Fair/Poor/ Very poor (n=564)	
Age, mean (SD)	72.91 (2.84)	73.19 (3.04)	0.07
Sex, n (%)			
Male	479 (67.2)	234 (32.8)	<0.01
Female	460 (58.2)	330 (41.8)	
Research site, n (%)			
Kingston	261 (88.5)	34 (11.5)	<0.01
St. Hyacinthe	252 (84.8)	45 (15.2)	
Tirana	113 (35.0)	210 (65.0)	
Manizales	228 (67.3)	111 (32.7)	
Natal	85 (34.1)	164 (65.9)	
Income sufficiency, n(%)*			
Very well	358 (86.5)	56 (13.5)	<0.01
Suitable	352 (65.8)	183 (34.2)	
Not very well	229 (41.4)	324 (58.6)	
Depressive symptoms, n(%)*			
No	879 (68.0)	413 (32.0)	<0.01
Yes	60 (28.6)	150 (71.4)	
SPPB, n(%)*			
Eight or higher	861 (69.0)	387 (31.0)	<0.01
Lower than eight	78 (30.7)	176 (69.3)	
Resilience, n(%)			
High	847 (68.8)	385 (31.2)	<0.01
Low	92 (33.9)	179 (66.1)	
Economic adversities, n(%)†			
No	574 (69.2)	255 (30.8)	<0.01
Yes	364 (54.2)	308 (45.8)	
Social adversities, n(%)†			
No	733 (63.4)	424 (36.6)	0.20
Yes	205 (59.6)	139 (40.4)	

Results from χ^2 test or Student's t-test.

*One missing value.

†Two missing values.

SPPB, short performance physical battery.

Disaggregating men and women did not change results with respect to resilience and SRH (not reported).

DISCUSSION

In general, existing studies have separately linked childhood adversity (social more so than economic) with resilience or with SRH. We have put all three together to determine whether resilience and health are aligned and how resilience along with other entwined life course social, economic and biological realities alters pathways to SRH. Our key finding is that while resilience is a predictor of older adults' health, social and economic ACE are

Table 3 Logistic regression models for the association between sociodemographic status, depression, physical performance, adverse childhood experiences variables, resilience and self-rated health status

Variables	Model 1	Model 2	Model 3
Sex*	1.44 (1.11 to 1.87)†	1.47 (1.13 to 1.91)†	1.50 (1.15 to 1.95)†
Research site‡			
St. Hyacinthe	1.46 (0.88 to 2.42)	1.50 (0.90 to 2.49)	1.44 (0.86 to 2.41)
Tirana	7.60 (4.54 to 12.82)†	7.78 (4.59 to 13.19)†	6.65 (3.89 to 11.38)†
Manizales	1.77 (1.04 to 3.01)†	1.84 (1.08 to 3.15) †	1.91 (1.11 to 3.27)†
Natal	10.11 (5.98 to 17.08)†	10.19 (5.98 to 17.36)†	9.96 (5.83 to 17.03)†
Income sufficiency§			
Suitably	1.39 (0.92 to 2.12)	1.33 (0.87 to 2.04)	1.27 (0.83 to 1.95)
Not/Not very well	2.90 (1.82 to 4.62)†	2.79 (1.75 to 4.46)†	2.78 (1.73 to 4.45)†
Depressive symptoms	3.32 (2.26 to 4.89)†	3.30 (2.24 to 4.86)†	2.82 (1.89 to 4.20)†
SPPB less than 8	3.59 (2.52 to 5.10)†	3.26 (2.28 to 4.66)†	3.18 (2.22 to 4.55)†
ACE economic		1.13 (0.86 to 1.48)	1.15 (0.88 to 1.51)
ACE social		1.04 (0.76 to 1.42)	1.06 (0.78 to 1.44)
Low resilience			1.99 (1.39 to 2.86)†

International Mobility in Aging Study: OR (95% CI) .

*Male as reference.

†P value <0.05.

‡Kingston as reference.

§Very well as reference.

ACE, adverse childhood experiences; IMIAS, ; SPPB, short performance physical battery.

not. Resilience also diminishes, but does not eliminate the effect of current income sufficiency, depression and objective physical performance on SRH. In answer to our research question, the significance of long-term health harms, such as early economic adversity when examined alone, is eliminated by current circumstances, including, but not limited to, resilience.

While early circumstances cannot be altered in old age, resilience is dynamic and can be fostered throughout life by individual and community level interventions.⁸ This poses a compelling argument for measuring resilience when studying SRH, but, more important, for identifying and strengthening the personal assets and environmental resources that foster resilience and, therefore, seem to preserve SRH.

Those with less sufficient income, more depression or lower physical function tended to have lower resilience scores. The direction of this association is unknown but may well be circular or bidirectional. Reversing declines in mood and physical function is challenging, as is raising the income of older adults with limited material resources. However, success in building resilience is not dependent on SES or functional capacity and can decrease their inherent health harms to produce greater SRH and well-being.⁸

To the best of our knowledge, the fact that resilience may play a role in building the social and biological strengths that improve SRH among older adults and minimising the harms of early economic hardship is a novel finding. Measures of current SES aligned with

those of resilience; however, early economic adversity did not. Further, it would appear that resilient participants were healthier regardless of past economic ACE. Because ours is the first study to link ACE, current biosocial well-being, resilience and health of older adults, there are no comparative findings to discuss.

Location, a probable proxy for sociocultural realities, made a statistically significant difference on the relationship between adversity, resilience and SRH. Participants from Brazil, Colombia and Albania collectively had a larger proportion of participants in the low resilience and low SRH categories than did the Canadian group. Recognising that SES is an important determinant of health, the differences in socioeconomic circumstances among these groups may contribute to their respective resilience and SRH levels in ways we have not identified. Participants in North American sites reported less childhood economic adversity and greater current income sufficiency. However, to truly dissect geographic and sociocultural patterns would call for a deeper exploration of each country's norms than this study permits.

Perhaps most striking was the connection between where participants lived and their SRH. It is difficult to fully define the social forces that foster social capital or those that undermine individual assets like income, mental health or resilience. Social capital refers to the interplay of cooperative and trusting relationships between people that facilitates collaborative action to meet shared needs.³¹ Like resilience, social capital has been shown by others to predict health and, specifically SRH^{32 33} and SRH in

the elderly.³⁴ For example, measures of social capital that have been linked to better SRH include higher individual levels of trust, less social isolation and more participation in voluntary associations.^{32 33} Both population level social capital and individual resilience seem to capture a group of factors that influence health and may well overlap or be interdependent. Perhaps the two are inextricably linked in a pathway from social capital to individual resilience to health. Research to further explore the direction of these relationships is merited, particularly to determine the extent to which resilience enables individuals to gain from social environments compared with the impact of greater social capital on resilience.

In summary, resilience seems to augment SRH and may also shape and be shaped by other medical and social realities that are central to older adults' views of their health. Together, these override any measurable harm of early childhood adversity. The strong impact of place on SRH raises the question of links between social capital and resilience, a question that should be addressed in future research.

LIMITATIONS

The descriptive nature of our study precludes any statements about causality. The issue of being underpowered or overpowered arises with quantitative research. Larger sample sizes would have produced more statistically, although not necessarily practically significant associations. The use of different tools to measure resilience in different studies makes comparisons with other research challenging.

We recognise the possibility of reverse causality. Our research demonstrates an association between resilience and SRH but cannot identify the direction of that association because observational data are used. We hypothesise that resilience fosters SRH which, in turn, fosters greater resilience but cannot prove this with the current study.

We are cautious about generalising findings. Although the demographic characteristics of the initial cohort were similar to those of their age group in each setting, there are limitations. Across the whole group, and particularly in the non-Canadian settings, it would be the healthiest and most resilient adults who were still alive and met initial enrolment criteria. In addition, there was an inevitable loss to follow-up of the IMIAS cohort between 2012 and 2016 of about 24%. Of this 24%, approximately 8% had died, 11% were too frail to participate and 7% had moved or could not be contacted. Those who remained in the study would, by definition, have been healthier. We think this would not have biased the relationships being studied but cannot prove this.

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from IMIAS, statistical analyses and manuscript writing. ROG contributed to study conception and manuscript writing. JFdSB also contributed to study conception and data analysis.

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REFERENCES

1. Stewart JM, Auais M, Bélanger E, *et al*. Comparison of self-rated and objective successful ageing in an international cohort. *Ageing Soc* 2018;1:1–18.
2. American Psychological Association, 2015. The road to resilience. <http://www.apa.org/helpcenter/road-resilience.aspx>
3. Masten AS. Resilience in developing systems: progress and promise as the fourth wave rises. *Dev Psychopathol* 2007;19:921–30.
4. Luthar SS. Annotation: methodological and conceptual issues in research on childhood resilience. *J Child Psychol Psychiatry* 1993;34:441–53.
5. MacLeod S, Musich S, Hawkins K, *et al*. The impact of resilience among older adults. *Geriatr Nurs* 2016;37:266–72.
6. Phillips SP, Auais M, Belanger E, *et al*. Life-course social and economic circumstances, gender, and resilience in older adults: The longitudinal International Mobility in Aging Study (IMIAS). *SSM Popul Health* 2016;2:708–17.
7. Harris MA, Brett CE, Starr JM, *et al*. Early-life predictors of resilience and related outcomes up to 66 years later in the 6-day sample of the 1947 Scottish mental survey. *Soc Psychiatry Psychiatr Epidemiol* 2016;51:659–68.
8. Felitti VJ, Anda RF. The relationship of adverse childhood experiences to adult medical disease, psychiatric disorders and sexual behaviour: implications for healthcare. In: Lanius R, Vermetten E, Pain C, eds. *The hidden epidemic: the impact of early life trauma on health and disease*. New York, NY: Cambridge University Press, 2010:77–88.
9. Masten AS, Best KM, Garmezy N. Resilience and development: contributions from the study of children who overcome adversity. *Dev Psychopathol* 1990;2:425–44.
10. Lutha SS, Cicchetti D. The construct of resilience: implications for interventions and social policies. *Dev Psychopathol* 2000;12:857–85.
11. Noltemeyer AL, Bush KR. Adversity and resilience: a synthesis of international research. *Sch Psychol Int* 2013;34:474–87.
12. Jeste DV, Savla GN, Thompson WK, *et al*. Association between older age and more successful aging: critical role of resilience and depression. *Am J Psychiatry* 2013;170:188–96.
13. Shen K, Zeng Y. The association between resilience and survival among Chinese elderly. *Demogr Res* 2010;23:105–16.
14. Pierini D, Stuifbergen AK. Psychological resilience and depressive symptoms in older adults diagnosed with post-polio syndrome. *Rehabil Nurs* 2010;35:167–75.
15. Idler EL, Benyamini Y. Self-rated health and mortality: a review of twenty-seven community studies. *J Health Soc Behav* 1997;38:21–37.
16. Leinonen R, Heikkinen E, Jylhä M. Predictors of decline in self-assessments of health among older people—a 5-year longitudinal study. *Soc Sci Med* 2001;52:1329–41.

17. Pérez-Zepeda MU, Belanger E, Zunzunegui MV, *et al.* Assessing the validity of self-rated health with the short physical performance battery: a cross-sectional analysis of the international mobility in aging study. *PLoS One* 2016;11:e0153855.
18. Schüz B, Wurm S, Schöllgen I, *et al.* What do people include when they self-rate their health? Differential associations according to health status in community-dwelling older adults. *Qual Life Res* 2011;20:1573–80.
19. Ezeamama AE, Elkins J, Simpson C, *et al.* Indicators of resilience and healthcare outcomes: findings from the 2010 health and retirement survey. *Qual Life Res* 2016;25:1007–15.
20. Dageid W, Grønlie AA. The associations between resilience, social capital and self-rated health among HIV-positive South Africans. *J Health Psychol* 2015;20:1463–73.
21. Ruiz-Robledillo N, De Andrés-García S, Pérez-Blasco J, *et al.* Highly resilient coping entails better perceived health, high social support and low morning cortisol levels in parents of children with autism spectrum disorder. *Res Dev Disabil* 2014;35:686–95.
22. Ferrer RL, Palmer R. Variations in health status within and between socioeconomic strata. *J Epidemiol Community Health* 2004;58:381–7.
23. Wagnild GM, Young HM. Development and psychometric evaluation of the resilience scale. *J Nurs Meas* 1993;1:165–78.
24. Damásio BF, Borsa JC, da Silva JP. 14-item resilience scale (RS-14): psychometric properties of the Brazilian version. *J Nurs Meas* 2011;19:131–45.
25. Aiena BJ, Baczwaski BJ, Schulenberg SE, *et al.* Measuring resilience with the RS-14: a tale of two samples. *J Pers Assess* 2015;97:291–300.
26. Sousa AC, Guerra RO, Thanh Tu M, *et al.* Lifecourse adversity and physical performance across countries among men and women aged 65–74. *PLoS One* 2014;9:e102299.
27. Radloff L. The CES-D scale: a self-report depression scale for research in the general population. *Appl Psychol Meas* 1997;1:385–401.
28. Guralnik JM, Simonsick EM, Ferrucci L, *et al.* A short physical performance battery assessing lower extremity function: association with self-reported disability and prediction of mortality and nursing home admission. *J Gerontol* 1994;49:M85–94.
29. da Câmara SM, Alvarado BE, Guralnik JM, *et al.* Using the short physical performance battery to screen for frailty in young-old adults with distinct socioeconomic conditions. *Geriatr Gerontol Int* 2013;13:421–8.
30. Freire AN, Guerra RO, Alvarado B, *et al.* Validity and reliability of the short physical performance battery in two diverse older adult populations in Quebec and Brazil. *J Aging Health* 2012;24:863–78.
31. Coleman JS. Social capital in the creation of human capital. *Am J Sociol* 1988;94:S95–S120.
32. d'Hombres B, Rocco L, Suhrcke M, *et al.* Does social capital determine health? Evidence from eight transition countries. *Health Econ* 2010;19:56–74.
33. Veenstra G, Luginaah I, Wakefield S, *et al.* Who you know, where you live: social capital, neighbourhood and health. *Soc Sci Med* 2005;60:2799–818.
34. Arezzo MF, Giudici C. The effect of social capital on health among European older adults: an instrumental variable approach. *Soc Indic Res* 2017;134:153–66.