Life skills, wealth, health, and wellbeing in later life

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Edited by Eileen M. Crimmins, University of Southern California, Los Angeles, CA, and approved March 9, 2017 (received for review September 26, 2016)

Life skills play a key role in promoting educational and occupational success in early life, but their relevance at older ages is uncertain. Here we measured five life skills—conscientiousness, emotional stability, determination, control, and optimism—in 8,119 men and women aged 52 and older (mean 66.7 y). We show that the number of skills is associated with wealth, income, subjective wellbeing, less depression, low social isolation and loneliness, more close relationships, better self-rated health, fewer chronic diseases and impaired activities of daily living, faster walking speed, and favorable objective biomarkers (concentration of high-density lipoprotein cholesterol, vitamin D and C-reactive protein, and less central obesity). Life skills also predicted sustained psychological wellbeing, less loneliness, and a lower incidence of new chronic disease and physical impairment over a 4-y period. These analyses took account of age, sex, parental socioeconomic background, education, and cognitive function. No single life skill was responsible for the associations we observed, nor were they driven by factors such as socioeconomic status or health. Despite the vicissitudes of later life, life skills impact a range of outcomes, and the maintenance of these attributes may benefit the older population.

life skills | aging | resources | personality | health

Life skills refer to a set of personal characteristics and capabilities that are thought to increase chances of success and wellbeing in life. They include persistence and determination ("grit"), conscientiousness, self-control, social skills, self-confidence, optimism, and emotional stability (1–3). They are often described as "noncognitive" to distinguish them from cognitive abilities and intellectual capacity. The term "skill" is used instead of trait in part to highlight the notion that these characteristics are malleable rather than fixed characteristics, although many life skills are partly heritable (4, 5). Various life skills have individually been found in childhood and adolescence to predict greater academic success, future employment, prosocial behavior, and health (2, 6, 7). Fostering of life skills in early life is of major interest to policy-makers in education, crime prevention, public order, employment, and health (8).

Studies of middle-aged and older people have documented associations between individual characteristics such as conscientiousness, optimism, and emotional stability and a range of social and health outcomes (9–14). However, there have been few investigations of combinations of attributes (15, 16), and little is known about the importance of the accumulation of life skills for economic, social, health, and biological outcomes in later life. We therefore investigated whether the number of skills manifest at older ages is related to a broad range of outcomes after taking childhood circumstances, education, and cognitive ability into account.

Results

We assessed five core life skills in 2010 in a sample of 8,119 men and women aged 52 to over 90 y old (mean 66.7 y) from the English Longitudinal Study of Aging (17), a nationally representative population cohort. The five skills were conscientiousness, emotional stability, determination, optimism, and sense of control, and an index of the number of life skills was derived based on the highest response category for each facet (Table 1). With this classification, 29.4% of respondents had low life skills (not scoring high on any characteristic), 30.8% had one, 20.6% two, 11.9% three, and 7.4% four or five skills. Binary logistic regression and ordinary least squares (OLS) regression were used to investigate the relationship between the number of life skills and economic, psychosocial, health, physical capability, and biological outcomes. All analyses took into account age, gender, family socioeconomic background, educational attainment, and current cognitive function, so as to establish that associations between life skills and outcomes were not due to early socioeconomic endowments or cognitive ability. We observed moderate associations between the number of life skills and all covariates except gender (*SI Appendix*, Table S1); when we regressed each life skill on the covariates, r^2 ranged from 0.009 to 0.056, with an r^2 of 0.025 for the accumulated measure of life skills. The intercorrelations between the five skills were also low to moderate, as shown in *SI Appendix*, Table S2, where mean scores for each skill at every level of the cumulative index are also detailed.

The associations of life skills with economic and psychosocial factors are summarized in Fig. 1 (*SI Appendix*, Table S3). The proportion of participants in the highest quintile of wealth was positively associated with the number of life skills, ranging from 18.7% for the low to 26.4% in the four- or five-skill category. The odds ratio (OR) adjusted for covariates rose from 1.22 (95% confidence intervals, CI, 1.04–1.43, $P = 0.015$) for participants with one skill to 1.62 (95% CI 1.29–2.04) for those with four or five skills, in comparison with those having low life skills. We found a similar gradient across life skill categories for net family income, with significantly increased odds of being in the top income quintile for those with two (OR = 1.23), three (OR = 1.27), and four or five (OR 1.48) skills. Parental occupation, educational attainment, and cognitive scores were also independently associated with wealth and income in these analyses (*SI Appendix*, Table S3).

Significance

Life skills such as persistence, conscientiousness, and control are important in early life. Our findings suggest that they are relevant in later life as well. Higher scores on five life skills (conscientiousness, emotional stability, determination, control, and optimism) were associated both cross-sectionally and longitudinally with economic success, social and subjective wellbeing, and better health in older adults. No single attribute was especially important; rather, effects depended on the accumulation of life skills. Our results suggest that fostering and maintaining these skills in adult life may be relevant to health and wellbeing at older ages.

Author contributions: A.S. and J.W. designed research; A.S. and J.W. performed research; A.S. analyzed data; and A.S. wrote the paper.

The authors declare no conflict of interest.

This article is a PNAS Direct Submission.

Freely available online through the PNAS open access option.

Data deposition: The data reported in this paper have been deposited with the UK Data Service, https://www.ukdataservice.ac.uk/ (accession no. GN33368).

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This article contains supporting information online at www.pnas.org/lookup/suppl/doi:10.1073/pnas.1616011114/-/DCSupplemental.

Table 1. Definitions of life skills

Factor	Measure	Proportion of respondents defined as possessing the skill, %
Conscientiousness	Highest quartile (allowing for ties) on the four-item conscientiousness scale	23.3
Emotional stability	Lowest quartile (allowing for ties) on the six-item neuroticism scale	29.5
Persistence	Maximum ratings to the question about feeling determined	20.5
Optimism	Maximum scores on two optimism items: "I feel that life is full of opportunities" and "I feel that the future looks good for me."	24.7
Control	Maximum scores on the statement about having control in most situations	40.7

Subjective wellbeing was assessed in terms of enjoyment of life by using a measure previously shown to predict reduced mortality and functional impairment (18, 19). Mean scores adjusted for covariates were higher among respondents with more life skills, with a significant gradient across skills categories ($P < 0.001$, Fig. 1). Conversely, the proportion of participants reporting significant depressive symptoms declined from 22.8% among those with low life skills to 3.1% in those with four or five skills. This difference corresponded to a substantial 93% reduction in multivariate adjusted odds of depressive symptoms in the four or five compared with the low category (*SI Appendix*, Table S3).

Life skills were associated with a range of social outcomes, with less social isolation, more close relationships, lower loneliness, and more volunteering among participants with a larger number of skills (Fig. 1 and *SI Appendix*, Table S4). In all cases, we observed a linear gradient across skill categories ($P < 0.001$). For example, the proportion of respondents in the highest loneliness tertile was 49.6% of those with low skills, declining to 10.5% in those with four or five skills. Regular volunteering rose from 28.7 to 40.0% with increasing numbers of life skills.

The relevance of life skills is evident in the health domain as well (Fig. 2 and *SI Appendix*, Table S5). Self-rated health is a widely used indicator of general health that predicts future mortality (20). The proportion of respondents who rated their own health as fair or poor (compared with excellent, very good, or good) was 36.7% among those with low life skills, falling to 6% in participants with four or five skills. The presence of one of more serious chronic diseases (e.g., coronary heart disease, cancer, diabetes; see *SI Appendix* for more details) also showed a linear gradient with increasing life skills, so the adjusted odds of chronic disease were 0.53 (95% CI 0.44–0.65) in those with the most life skills. Life skills were inversely associated with the prevalence of impaired activities of daily living (ADL). By contrast, gait or walking speed, an objective measure that predicts future mortality in older population samples (21), was significantly faster among individuals with more skills.

Objective biomarkers including blood analytes were recorded in the majority of respondents during a home visit by a study nurse in 2012. Four indicators are shown in Fig. 2, and all demonstrate favorable associations with life skills (*SI Appendix*, Table S6). Thus, the proportion of respondents with low levels of high-density lipoprotein (HDL) "good" cholesterol decreased from 12.7 to 8.8% across life skill categories. Number of life skills was positively associated with vitamin D concentration, whereas levels of the inflammatory marker C-reactive protein were lower among participants with more skills. Central obesity, an indicator of fat distribution that is particularly relevant to metabolic and cardiovascular diseases, was greatest in people with few life skills. Compared with individuals with low skills according to our categorization, the odds for central obesity adjusted for covariates were 0.71 (95% CI 0.59–0.84) in those with three and 0.78 (95% CI 0.64–0.97) in respondents with four or five skills.

Firm conclusions about the temporal sequence of associations between life skills cannot be drawn from these cross-sectional analyses. We therefore carried out longitudinal analyses over a 4-y period (2010–2014) to discover whether life skills at baseline predicted changes over time in economic, wellbeing, social, and health outcomes (*SI Appendix*, Tables S7 and S8). These analyses were weighted to take account of nonresponse in 2014. Number of life skills did not predict changes in wealth or income over this period. However, a greater number of life skills predicted higher enjoyment of life and less depression at 4-y follow-up even after controlling statistically for baseline enjoyment and depression, respectively (Fig. 3). In the social domain, life skills predicted the number of close relationships and loneliness ratings in 2014, controlling for 2010 levels.

Life skills at baseline were inversely associated with fair or poor self-rated health on follow-up, controlling statistically for baseline self-rated health (*SI Appendix*, Table S8). Life skills also predicted the onset of serious illness over the 4-y period; 51.7% of participants with low life skills developed one or more chronic disease, falling to 40.4% of the four- or five-skill group, with a significant gradient across intermediate categories (Fig. 3). Arthritis was the most common new disease in this older population; however, the gradient was preserved when arthritis was excluded from the analysis. Number of life skills predicted the emergence of impaired ADLs over the 4-y period in participants who had no problems with ADLs at baseline; 16% of individuals in the low skill category developed incident ADL impairment compared with 9.2% in the 4 or 5 category. Finally, we also analyzed gait speed in 2014 in respondents aged 60 and older. Gait speed fell markedly on average in this population, but remained significantly faster in those with more life skills, even after baseline differences had been taken into account. It should be noted that in all of the analyses detailed in *SI Appendix*, Tables S3–S8, the unadjusted associations between life skills and outcomes were greater than in the fully adjusted models.

These findings are based on the accumulation of five life skills, but it is plausible that one particular attribute dominates the associations with other outcomes. We therefore conducted a series of analyses in which we successively removed one of the attributes from the life skill index. The results (*SI Appendix*, Table S9) indicate that the significant linear gradients across outcomes with the various reduced life skill indices remained strong. There is little evidence that any one of the five skills is substantially more important than the others.

We considered three further alternative explanations of results. The first is that these associations between life skills and outcomes are driven by variations in socioeconomic resources. Because we found that a greater number of life skills is correlated with greater wealth, it is plausible that wealth is responsible for the other associations. Consequently, we repeated all analyses adjusting statistically for wealth at baseline. The findings (*SI Appendix*, Table S10) show little evidence for such an effect, in that both cross-sectional and longitudinal gradients across life skill categories were maintained when wealth was taken into account. A second possibility is that health is the key determinant of these findings, with the better health of those with more life skills accounting for other associations. When we repeated the analyses adjusting statistically for self-rated health, some of the associations between life skills and health-related outcomes were reduced, presumably because these measures are

directly correlated, but gradients across most outcomes remained robust (*SI Appendix*, Table S10). Finally, instead of defining the presence of life skills by categorizing each component, we computed average normalized scores across the entire distribution of each life skill. When we analyzed aggregate life skills as a continuous variable, the pattern of results was the same as that found in the main analyses, as shown in *SI Appendix*, Table S10.

Discussion

It is well recognized that some highly intelligent people or those who come from privileged backgrounds may not succeed because they lack character strengths, whereas less well-endowed individuals who are reliable and self-disciplined do attain their goals (22). So-called noncognitive life skills are crucial in early life, but our findings indicate that they continue to be relevant at older ages. Although causal conclusions cannot be drawn from observational results, we took cognitive function, education, and family background into account, ruling them out as being responsible for associations with life skills. Furthermore, our finding that the number of life skills is related to favorable patterns across a variety of domains including economic success, mental wellbeing, social function, health, physical capacity, and biomarkers argues against confounding by unmeasured factors. The longitudinal analyses add further support to the relevance of life skills, although we cannot control for any trends that took place before the baseline.

The concept of life skill embraces several aspects of personal capability, and not all were assessed here. We did not have measures of social skills, empathy, or self-efficacy that are commonly regarded as relevant skills (1, 7, 22). The study builds not only on the childhood life skill literature, but on evidence from psychology

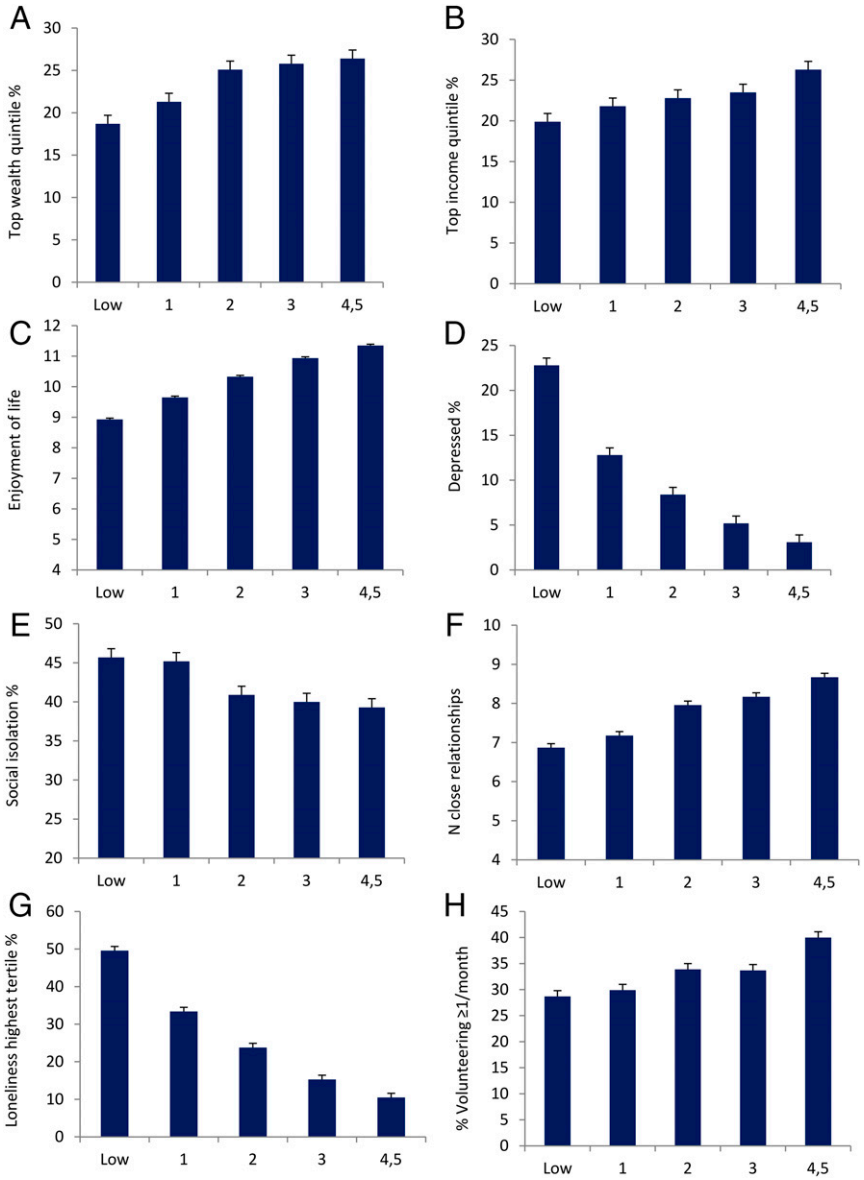

Fig. 1. Cross-sectional associations between life skills and economic, psychological, and social outcomes. The horizontal axis in each graph represents the number of life skills ranging from low to 4 or 5 (4,5). (*A*) Proportion of respondents in the top quintile for total nonpension wealth. (*B*) Proportion of respondents in the top quintile for total weekly net income. (*C*) Mean enjoyment of life ratings. (*D*) Proportion of individuals with depressive symptom scores ≥4. (*E*) Proportion of respondents with social isolation scores ≥1. (*F*) Mean number of close relationships. (*G*) Proportion of respondents with loneliness scores in the highest tertile. (*H*) Proportion of respondents who volunteered at least once per month. All analyses were adjusted for age, gender, parental occupation, educational attainment, and cognitive function. Error bars are SEM.

on traits and capabilities that are related to many different adult outcomes including health, marital stability, labor market outcomes, credit ratings, and health-related biology (11, 23–25). Combined associations between optimism, self-esteem, and social support and self-rated and objective health indicators have been reported (16, 26), whereas optimism, personal control, and self-esteem have been associated with reduced systemic inflammation in lower socioeconomic status men but not women (15). Research among older men and women on combinations of the skills measured here is limited at present. Many other factors are of course relevant to later life experience, including early life adversity, external circumstances in adult life, healthy lifestyles, genetic risk, and uncontrollable losses and events. Cognitive capabilities are also crucial for health and wellbeing (27), and for success in many domains of life (28), and interactions between life skills and cognition may be important. This investigation was focused on documenting associations between life skills and outcomes, and the processes underlying these relationships require further study. Apart from the biomarkers, other variables were based on self-report, so they may be susceptible to reporting bias. Nevertheless, this work opens up possibilities for exploring ways in which a range of life skills might be enhanced in people at older ages, for the possible improvement of health, wellbeing, and social function in the later stages of life.

Materials and Methods

Data were analyzed from the English Longitudinal Study of Aging (ELSA), a longitudinal panel study of men and women aged 50 and older living in England that started in 2002 (17). Fuller details are provided in *SI Appendix, SI Materials and Methods*. The questionnaires and general methods of data collection are detailed at www.elsa-project.ac.uk. The primary data for these analyses were collected on wave 5 of ELSA in 2010, because that was the occasion on which the measures of life skills were administered. Biomarkers were assessed in wave 6 (2012), whereas longitudinal analyses of changes in psychosocial and health outcomes over a 4-y period involved comparison of wave 5 (2010) with data collected in wave 7 (2014). ELSA was approved by London Multicentre Research Ethics Committee (MREC/01/2/91), and informed consent was obtained from all participants.

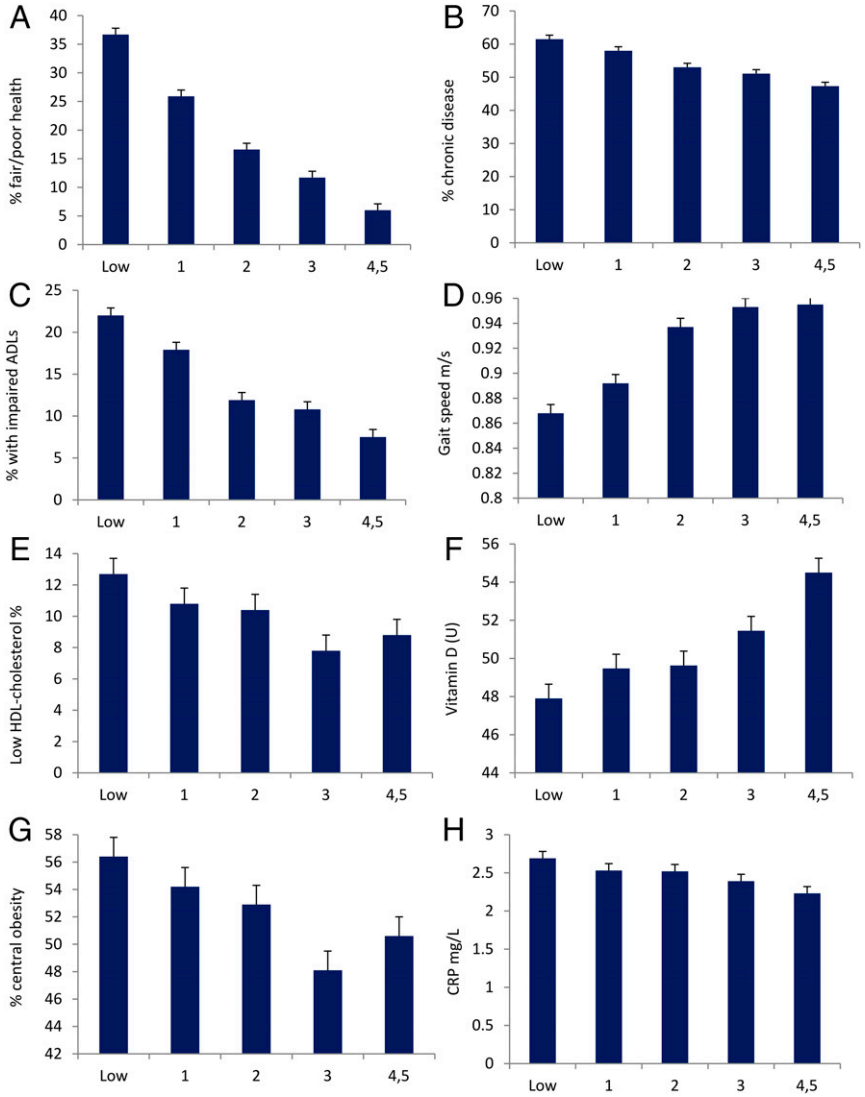

Fig. 2. Cross-sectional associations between life skills and health and biological outcomes. The horizontal axis in each graph represents the number of life skills ranging from low to 4 or 5. (*A*) Proportion of respondents who stated that they were in fair or poor health. (*B*) Proportion of respondents with one or more serious chronic diseases. (*C*) Proportion of respondents with impaired activities of daily living. (*D*) Mean gait speed on a standardized walking test. (*E*) Proportion of respondents reporting fair or poor health adjusted with HDL cholesterol levels below the critical threshold. (*F*) Mean plasma vitamin D concentration. (*G*) Proportion of respondents with central (abdominal) obesity. (*H*) Mean plasma C-reactive protein concentration. All values were adjusted for age, gender, parental occupation, educational attainment, and cognitive function. Error bars are SEM.

Measurement of Life Skills. Conscientiousness and emotional stability were assessed by using the Midlife Development Inventory Personality Scales (29). Persistence or determination was assessed with a single item, participants being asked the extent to which they had felt "determined" over the past 30 d (responses ranged from "not at all" to "very much"). Optimism was measured with two items; participants were asked to rate their agreement with the statements "I feel that life is full of opportunities" and "I feel that the future looks good for me." Sense of control was indexed by the single item "At home, I feel I have control over what happens in most situations." The life skills index was created by summing the number of characteristics on which participants were in the highest category as detailed in Table 1.

Covariates. Childhood socioeconomic status was assessed in terms of the occupation of the participant's father or main carer when they were 14 y old. Educational attainment was measured as the individual's highest educational qualification and divided into five categories. Cognitive capacity at baseline was measured by aggregating performance on five objective tests administered by face-to-face interviewers. These tests were immediate recall, delayed recall, verbal fluency, and speed and accuracy on a letter cancellation task (30). We *z* transformed scores on the five tests and averaged these to generate an index of cognitive function. Marital status was not included as a covariate, because preliminary analyses indicated that it did not modify associations between noncognitive life skills and social, economic, or other outcomes.

Economic and Psychosocial Outcomes. Wealth was derived from a detailed assessment of the participant's economic resources, and included financial, housing, and physical wealth but excluded pension wealth. Income was computed as total weekly net family income from all sources including employment, state benefits, pensions, and other assets. Positive subjective wellbeing was assessed with four items from the CASP19 as detailed (19). Depressive symptoms were measured by using the eight-item Centre for Epidemiologic Studies Depression Scale, with a score of ≥4 being used to indicate significant symptomatology. Social isolation was assessed by using

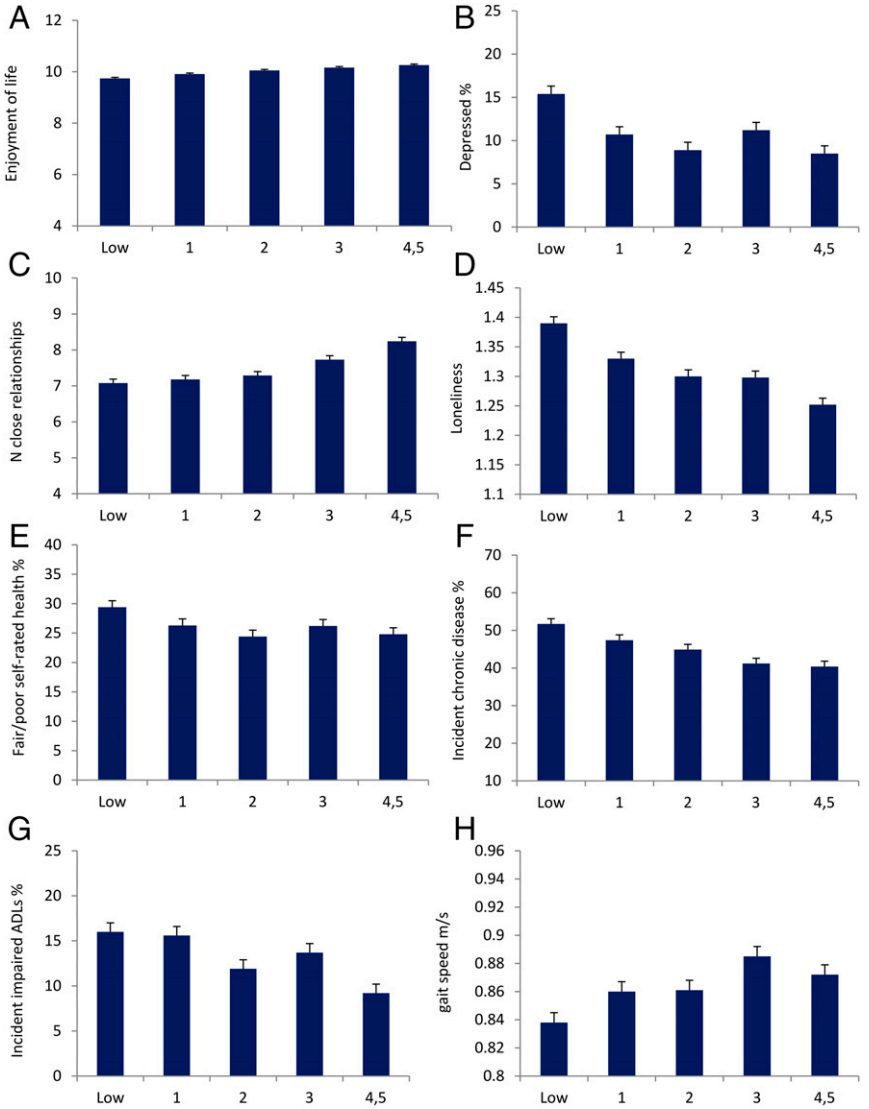

Fig. 3. Longitudinal associations between life skills and psychological, social, health, and functional outcomes. The horizontal axis in each graph represents the number of life skills ranging from low to 4 or 5 recorded at baseline (2010). (*A*) Mean enjoyment of life scores in 2014 adjusted for enjoyment of life in 2010. (*B*) Proportion of individuals with depressive symptom scores ≥4 in 2014 adjusted for 2010 scores. (*C*) Mean number of close relationships in 2014 adjusted for close relationships in 2010. (*D*) Mean loneliness in 2014 adjusted for loneliness in 2010. (*E*) Proportion of respondents reporting fair or poor health adjusted for self-rated health in 2010. (*F*) Proportion of respondents with one or more incident serious chronic diseases between 2010 and 2014. (*G*) Proportion of respondents with incident impaired activities of daily living between 2010 and 2014. (*H*) Mean gait speed on the standardized walking test in 2014 adjusted for gait speed in 2010. All values were additionally adjusted for age, gender, parental occupation, educational attainment, and cognitive function. Error bars are SEM.

an index related to extent of contact with children, other family members, and friends, and participation in organizations and clubs. Number of close relationships was determined by self-report, and loneliness by using the three-item short form of the Revised UCLA loneliness scale (31). Volunteering was assessed as a measure of prosocial behavior. Participants were asked whether they carried out any volunteer work, and those who volunteered at least once per month were classified as volunteers.

Health, Disability, and Biomarkers. Self-rated health was assessed on a five-point rating, and we analyzed the proportion of individuals giving fair/poor ratings. Information about six doctor-diagnosed chronic diseases (coronary heart disease, stroke, cancer, diabetes, chronic lung disease, and arthritis) was collected. Participants were questioned about the presence of impairments in six ADLs (e.g., difficulty in bathing or showering) that lasted at least 6 mo. Gait speed was assessed with two eight-foot walking tests from a standing start by respondents aged ≥60 y. The health-related biomarkers were obtained during a separate home visit by a study nurse. Central obesity was measured as waist circumference, with gender-specific cut-points used to define central obesity. Blood samples were analyzed for HDL cholesterol, vitamin D (plasma 25-hydroxyvitamin D), and high-sensitivity plasma C-reactive protein.

Statistical Analysis. The proportion of respondents who possessed all five life skills was small (137 or 1.7%), so we combined the groups with four or five skills in a single category, making five categories in all. We used OLS regression to analyze associations between life skills and continuously distributed outcomes, whereas binary logistic regression was used to analyze the categorical outcomes, with the low skill group as the reference category. All models included age, sex, parental occupation, educational attainment, and cognition. *SI Appendix*, Tables S3–S8 detail unadjusted and fully adjusted associations between life skills and outcomes. Like all panel studies of the general population, ELSA shows attrition across waves of data collection, with older, less affluent, and less educated participants being more likely to drop out (17). We therefore used weights in the longitudinal analyses to correct for sampling probabilities and for differential nonresponse and to calibrate back to the 2011 National Census population distributions for age and sex.

ACKNOWLEDGMENTS. The English Longitudinal Study of Ageing was developed by a team of researchers based at the University College London, NatCen Social Research, the Institute for Fiscal Studies, and the University of Manchester. The data were collected by NatCen Social Research. The funding is provided by National Institute of Aging Grant R01AG017644 and a consortium of UK government departments coordinated by the Economic and Social Research Council. A.S. is supported by the British Heart Foundation, and J.W. was funded by Cancer Research UK. The developers and funders of the English Longitudinal Study of Ageing and the UK Data Archive do not bear any responsibility for the analyses or interpretations presented here.

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Life Skills, Wealth, Health and Wellbeing in Later Life

Supporting information

Data source

Data were analyzed from the English Longitudinal Study of Ageing (ELSA), a longitudinal panel study of men and women aged 50 and older living in England that started in 2002 (1). The sample is assessed on a two yearly basis, and is periodically refreshed to ensure the full age range is maintained. Comparisons of sociodemographic characteristics with the national census show that the sample was representative of the English population. The questionnaires and general methods of data collection are detailed at www.elsa-project.ac.uk. The primary data for these analyses were collected on wave 5 of ELSA in 2010, since that was the occasion on which the measures of life skills were administered. There were 10,274 respondents to wave 5, of whom 8,119 were included in these analyses. The remaining individuals had missing data on one or more life skills, or one or more of the primary covariates. In comparison with those included in the analyses, individuals with missing data tended to be older, less well educated, and had poorer cognition ($p<0.001$). Importantly, however, they were no less likely than respondents included in the analyses to have high life skills. Biomarkers were assessed in wave 6 (2012). Longitudinal analyses of changes in psychosocial and health outcomes over a four year period involved comparison of wave 5 (2010) with data collected in wave 7 (2014).

Life skills

The five life skills included in these analyses were:

Conscientiousness was assessed using the Midlife Development Inventory (MIDI) Personality Scales (2), a set of measures have been used widely in previous analyses of the Midlife in the United States (MIDUS) and Health and Retirement Study (HRS). Participants were asked how much each of 26 adjectives described themselves on a scale ranging from 1 (*not at all*) to 4 (*a lot*). Four items (e.g. organized, responsible) contributed to the conscientiousness scale, and the Cronbach alpha for the scale in this study was 0.67.

Emotional stability was also assessed using the MIDI Personality Scales, using the six items contributing to the neuroticism scale (e.g. moody, worrying, Cronbach alpha 0.68).

Persistence or determination was assessed with a single item. Participants were asked the extent to which they had felt 'determined' over the past 30 days, using five categories: *not at all*, *a little*, *moderately*, *quite a bit*, and *very much*.

Optimism was measured with two items from the CASP19 quality of life inventory (3). Participants were asked to rate their agreement with the statements 'I feel that life is full of opportunities' and 'I feel that the future looks good for me' using four categories: *never* (1), *not often* (2), *sometimes* (3), and *often* (4). The Cronbach alpha was 0.80. Ratings on the two items were averaged.

Control. Sense of control was indexed by the single item 'At home, I feel I have control over what happens in most situations' with six response options ranging from *strongly disagree* to *strongly agree*.

The life skills index was created by summing the number of characteristics on which participants were in the highest category. The highest category for persistence, optimism and control was determined by the responses selected, while for conscientiousness we defined the high category as the top quartile (allowing for ties), and for emotional stability as the bottom quartile of the response distribution. The categorization and number of people defined as possessing each skill is summarized in Table 1.

Covariates

The following five covariates were included in all analyses:
Age was modeled as a continuous variable.
Gender was divided into male and female, with men being the reference category in all analyses.
Parental occupation. Childhood socioeconomic status was assessed in terms of the occupation of the participant's father or main carer when they were 14 years old. Responses were allocated to 15 categories, subsequently reduced to three levels: *routine*, *intermediate*, and *managerial/professional*. The reference group in subsequent analyses was the routine category.
Education. Educational attainment was measured as the individual's highest educational qualification, divided into five categories: *no qualifications*, *basic qualifications* (O levels and equivalent, indicating attainment of qualifications at the end of the state-regulated schooling), *high school qualifications* (A level or equivalent), *further qualifications* (additional qualifications beyond high school), and *university* (degree or higher). The reference group in analyses was the no qualification category.
Cognition. Cognitive capacity at baseline was measured by aggregating performance on five objective tests administered by interviewers as part of wave 5 of ELSA. These were immediate recall (recall of a list of 10 words presented aurally), delayed recall (recall of the same list after other cognitive tests were administered), verbal fluency (naming as many animals as possible over one minute), and speed and accuracy measured during a letter cancellation task (4). We *z* transformed scores on the five tests and averaged these to generate an index of cognitive function.

All these factors except for gender were associated with scores on the life skills index, although correlations were low (<0.15, see Table S1). Respondents with more life skills tended to be slightly younger, come from more affluent family backgrounds, have greater educational attainment and higher cognitive scores than those in the lower skill categories.

Marital status was not included as a covariate, since preliminary analyses indicated that it did not modify associations between life skills and social, economic, or other outcomes. The ELSA sample is predominantly of white ethnic background, with 97.5% in the present analyses being classified as white. Ethnicity was not therefore included as a factor in the analyses.

Economic and psychosocial outcomes
Wealth was derived from a detailed assessment of the participant's economic resources, and included financial, housing and physical wealth (such as land, business wealth and jewelry), but excluded pension wealth (5). Cross-sectional analyses were based on the proportion of people in each life skill category who were in the highest wealth quintile, though comparable results emerged when wealth was modeled as a continuously distributed variable. In 4-year longitudinal analyses, we analyzed the proportion of people in each life skill category in the highest quintile of wealth in 2014, adjusting for 2010 wealth.
Income was computed as total weekly net family income from all sources including employment, state benefits, pensions and other assets. Cross-sectional analyses were based on the proportion of people across life skill categories who were in the highest income quintile, though comparable results emerged when income was modeled as a continuous variable. In 4-year longitudinal analyses, we analyzed the proportion of people in each life skill category in the highest quintile of income in 2014, adjusting for 2010 income.
Enjoyment of life. Positive subjective wellbeing was assessed with four items from the CASP19 (3) as detailed elsewhere (6). Items such as 'I enjoy the things that I do' and 'I enjoy the company of others' were rated on 4-point scales from 0 (*never*) to 3 (*often*). Ratings were summed to generate a total score which could range from 0-12. In cross-sectional analyses, enjoyment of life was analyzed as a continuously distributed variable. In longitudinal analyses, we analyzed 2014 scores as continuous variables adjusting for baseline (2010) scores.

Depressive symptoms were measured using the 8-item Centre for Epidemiologic Studies Depression Scale (CES-D) as used in the HRS and other studies (7). A score of ≥4 or greater was used to indicate marked symptomatology, as in previous studies (8). We analyzed the proportion of respondents with scores of ≥4 across life skill categories in cross-sectional analyses. In longitudinal analyses we analyzed the proportion of respondents with scores of ≥4 on follow-up, with baseline depression scores as covariates.

Social isolation was assessed using an index described in previous analyses of ELSA (9). One point was added if the individual had less than monthly contact (including face-to-face, telephone, or written/e-mail contact) with each of children, other family members, and friends, and if they did not participate in organizations such as social clubs or residents groups, religious groups, or committees. Scores ranged from 0 to 4, with higher scores indicating greater social isolation. For the purposes of analysis, any individual with a score ≥1 was regarded as more socially isolated. Social isolation was not included in longitudinal analyses since levels tend to remain rather stable on average over this time period.

Number of close relationships was computed by asking respondents the number of children, other family or friends with whom they have a close relationship. The maximum number in each category was censored at 10, so scores could range from 0 to 30. Close relationships were analyzed as a continuously distributed variable in cross-sectional analyses. Longitudinal associations with life skills were assessed by analyzing scores in 2014, adjusting for baseline (2010) numbers of close relationships.

Loneliness was measured with the three-item short form of the Revised UCLA loneliness scale (10). An example of an item is "How often do you feel you lack companionship?" with response options of *hardly ever or never*, *some of the time*, and *often*. Ratings were summed to produce a loneliness score ranging from 3 to 9, with a higher score indicating greater loneliness. In cross-sectional analyses, we analyzed the proportion of people across life skill categories who were in the highest loneliness tertile, though comparable results emerged when loneliness was modeled as a continuous variable. In longitudinal analyses, we analyzed mean loneliness scores in 2014 adjusting for 2010 loneliness.

Volunteering was assessed as a measure of prosocial behavior. Participants were asked whether they carried out any volunteer work. Individuals who volunteered at least once per month were classified as volunteers (11).

Health and disability outcomes

Self-rated health is a widely used indicator of general health status that predicts future health and disability outcomes and all-cause mortality (12). Respondents were asked to rate their health on a scale of *excellent*, *very good*, *good*, *fair* and *poor*. We analyzed the proportion of individuals giving fair/poor ratings across life skill levels. In longitudinal analyses, we used the same classification in 2014, including 2010 rates as covariates.

Chronic diseases. Information about six physician-diagnosed chronic diseases (coronary heart disease, stroke, cancer, diabetes, chronic lung disease and arthritis) was collected, and the prevalence of having one or more chronic disease was analyzed in relation to life skills. In longitudinal analyses, we computed the incidence of each condition over the four year follow-up period among people who did not have that condition at baseline. The incidence of one or more new chronic disease was analyzed. The most common incident condition was arthritis; analyses were therefore repeated excluding new cases of arthritis.

Impaired activities of daily living. Participants were questioned about the presence of impairments in six ADLs (e.g. bathing or showering) that lasted at least 6 months. The measure has been widely used in population studies of older people (13). We analyzed the proportion of participants reporting one or

more impaired ADL across levels of life skills. Over the four year follow-up period, we assessed whether impaired ADLs had emerged among participants who were free of ADL impairment at baseline.

Gait speed is an objective test of physical function that is known to relate to mortality among older people (14). It was assessed with two 8-foot walking tests from a standing start by respondents aged ≥ 60 years. The tests were carried out in the participants' homes under the supervision of a trained interviewer. Individuals who had health conditions or disabilities that prevented walking were not eligible for the test. Gait speed (in m/s) was analyzed in relation to life skills as a continuously distributed variable. The analysis of gait speed on four year follow-up included baseline gait speed as a covariate.

Health-related biomarkers

The health-related biomarkers were assessed in wave 6 (2012) of ELSA. They were obtained during a separate home visit by a study nurse, and not all participants had this visit because of refusals and difficulty in making contact. The total number of nurse visits completed in wave 6 was 7,730. The assessments included anthropometric measures, together with blood samples from participants <80 years old, provided they did not suffer from clinical conditions or medications that rendered them ineligible. The following biomarkers were assessed:

Central obesity is an indicator of fat distribution to abdominal depots, and is regarded to be particularly relevant to metabolic disorders and cardiovascular disease risk (15). We measured central obesity as waist circumference, with the waist defined as the midpoint between the lower rib and the upper margin of the iliac crest. Gender-specific cut-points were used to define central obesity as recommended by the National Heart Lung and Blood Institute: 102 cm for men, and 88 cm for women. The proportion of respondents across life skill levels with waist circumferences above these thresholds was analyzed.

C-reactive protein is a widely-used indicator of inflammation, and is a marker of risk for a range of health outcomes including coronary heart disease and depression (16, 17). High sensitivity plasma C-reactive protein concentration was analyzed as a continuous variable, excluding individuals with values ≥ 20 mg/L, since these may indicate the presence of an acute infection or serious acute illness.

High density lipoprotein (HDL) cholesterol was measured using standard methods from both fasting and non-fasting samples. Low HDL-concentration is an important cardiovascular risk factor (18), and was classified into sex-specific high and low risk categories (<1.0 mmol/l for men and <1.2mmol/l for women).

Vitamin D. Plasma 25-hydroxyvitamin D was measured from blood samples in 2012. Vitamin D is important for bone and muscle health among older people, while evidence for other effects remains controversial (19). We analyzed vitamin D as a continuous variable in relation to life skills.

Statistical analysis

Cross-sectional analyses. The proportion of respondents who possessed all five life skills was small (137 or 1.7%), so we combined the groups with four or five skills in a single category, making five categories in all: 0 (29.4%), 1 (30.8%), 2 (20.6%), 3 (11.9%) and 4,5 (7.4%). We used OLS regression to analyze associations between life skills and continuously distributed outcomes: enjoyment of life, number of close relationships, gait speed, C-reactive protein and plasma vitamin D concentration. Dummy variables were created to compare across levels of life skills, parental occupation and educational attainment. Binary logistic regression was used to analyze the binary outcomes: wealth, income, depression, social isolation, loneliness, volunteering, self-rated health, presence of chronic disease, impaired ADLs, central obesity and HDL-cholesterol. The reference category for all analyses was the low life skill group. All models included age, sex, parental occupation, educational attainment

and cognition. Results in Tables S2-8 are presented as unstandardized and standardized regression coefficients with standard errors in parentheses for the OLS regressions, and as odds ratios with 95% confidence intervals for the binary logistic regressions. In tables S3-S8, we present unadjusted results for life skills as well as fully adjusted models. We tested for linear, quadratic and cubic contrasts across life skill levels. The number of participants varied across analyses depending on the availability of data on the outcome measure.

Figures 1-3 illustrate associations between life skills and outcomes using mean scores (continuous variables) or proportion of people in the relevant category (binary variables), adjusted for age, sex, parental occupation, educational attainment and cognition.

Longitudinal analyses. Like all panel studies of the general population, ELSA shows attrition across waves of data collection, with older, less affluent, and less educated participants being more likely to drop out (1). We therefore used weights to correct for sampling probabilities and for differential non-response and to calibrate back to the 2011 National Census population distributions for age and sex. The weights accounted for the differential probability of being included in Wave 7 of ELSA. Details can be found in http://doc.ukdataservice.ac.uk/doc/5050/mrdoc/pdf/5050_elsa_w6_technical_report_v1.pdf.

Longitudinal analyses took two forms. First, we analyzed 2014 outcomes controlling for values in 2010, since change scores could be compromised by ceiling or floor effects. The set of analyses involved calculating incident negative outcomes in people free of these outcomes at baseline, as in the cases of incident chronic disease and impaired ADLs. All analyses included age, gender, parental occupation, educational attainment and cognition in the regression models.

Sensitivity analyses. The first set of sensitivity analyses tested the possibility that associations between life skills and favorable outcomes are driven by one specific component of the overall index. We computed a series of life skill indices in which we removed each of the five components in turn. For instance, when we omitted conscientiousness the index was composed of four components only (emotional stability, optimism, persistence and control). All analyses were then repeated with this reduced index and compared with the principal results. Findings are summarized in Table S9.

The second set of sensitivity analyses explored the notion that associations between number of life skills and outcomes was driven by socioeconomic circumstances or else by health. The full set of regression analyses was repeated after adding wealth or self-rated health into the models, and results are summarized in Table S10.

The third sensitivity analysis addressed the issue of whether the computation of the life skills index in terms of the number of skills scores in the top category might have artificially inflated the strength of associations with other outcomes. We therefore computed an alternative life skills index based on *z* transformed scores for each of the five characteristics. These were averaged to generate a score that reflected the complete distribution of scores rather than using the top category alone. The mean for continuous scores was 0 with a standard deviation of 0.59. Regressions based on these continuous scores are summarized in Table S10.

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Table S1 Characteristics of life skill groups

	Life skill groups					
	Low (n = 2383)	1 (n = 2497)	2 (n = 1675)	3 (n = 966)	4/5 (n = 598)	*P (linear contrast)*
Age (years) mean ± SD	66.7 ± 9.3	67.4 ± 9.3	66.4 ± 8.9	65.8 ± 8.8	65.5 ± 8.3	<0.001
Gender, n (%)						
Men	1108 (46.5)	1078 (43.2)	714 (42.6)	426 (44.1)	290 (48.5)	0.77
Women	1275 (53.5)	1419 (56.8)	961 (57.4)	540 (55.9)	308 (51.5)	
Parental occupation, n (%)						
Routine	804 (33.7)	796 (31.9)	510 (30.4)	297 (30.7)	171 (28.6)	<0.001
Intermediate	995 (41.8)	1038 (41.6)	700 (41.8)	370 (38.3)	222 (37.1)	
Professional/ managerial	584 (24.5)	663 (26.6)	465 (27.8)	299 (31.0)	205 (34.3)	
Educational qualifications, n (%)						
None	686 (28.8)	637 (25.5)	336 (20.1)	190 (19.7)	86 (14.4)	<0.001
Basic	574 (24.1)	606 (24.3)	423 (25.3)	190 (19.7)	137 (22.9)	
High school	389 (16.3)	408 (16.3)	257 (15.3)	144 (14.9)	90 (15.1)	
Further	334 (14.0)	384 (15.4)	296 (17.7)	182 (18.8)	118 (19.7)	
University	400 (16.8)	462 (18,5)	363 (21.7)	260 (26.9)	167 (27.9)	
Baseline cognition (z scores) mean ± SD	-0.057 ± 0.68	-0.022 ± 0.65	0.071 ± 0.61	0.134 ± 0.63	0.171 ± 0.62	<0.001

Table S2 Intercorrelations of life skills and values at each level

	Life skill groups (means ± standard deviation)					
	Low (n = 2383)	1 (n = 2497)	2 (n = 1675)	3 (n = 966)	4/5 (n = 598)	*P (linear contrast)*
Conscientiousness	2.02 ± 0.45	2.23 ± 0.48	2.43 ± 0.43	2.60 ± 0.38	2.80 ± 0.24	<0.001
Neuroticism	1.65 ± 0.37	1.38 ± 0.47	1.31 ± 0.47	1.25 ± 0.47	1.05 ± 0.39	<0.001
Persistence	3.13 ± 0.84	3.47 ± 0.88	3.91 ± 0.89	4.40 ± 0.77	4.80 ± 0.46	<0.001
Optimism	2.65 ± 0.65	2.93 ± 0.68	3.32 ± 0.66	3.69 ± 0.51	3.92 ± 0.26	<0.001
Control	4.53 ± 0.88	5.11 ± 0.89	5.58 ± 0.71	5.77 ± 0.54	5.93 ± 0.36	<0.001

Correlation matrix

	Neuroticism	Optimism	Control	Determination
Conscientiousness	-0.01	0.35	0.25	0.39
Neuroticism		-0.13	-0.13	-0.04
Optimism			0.38	0.48
Control				0.29

All correlations significant at $p<0.001$ with the exception of conscientiousness and neuroticism ($p = 0.65$)

Table S3-A Associations of life skills with economic and psychological factors

			Wealth (% in top quintile) (n = 7,367)	
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			1.00 (0.99 to 1.01)	0.93
Sex			0.86 (0.76 to 0.97)	0.011
Parental occupation				
Routine (ref)			1	
Intermediate			1.35 (1.16 to 1.58)	<0.001
Managerial/professional			2.72 (2.32 to 3.19)	<0.001
Education				
No qualifications (ref)			1	
Basic			1.93 (1.56 to 2.39)	<0.001
High school			2.12 (1.69 to 2.66)	<0.001
Further			2.81 (2.25 to 3.50)	<0.001
University			5.42 (4.39 to 6.69)	<0.001
Cognition			1.30 (1.18 to 1.44)	<0.001
Life skills				
Low (ref)	1		1	
1	1.26 (1.08 to 1.47)	0.003	1.22 (1.04 to 1.43)	0.015
2	1.75 (1.49 to 2.05)	<0.001	1.56 (1.31 to 1.84)	<0.001
3	1.93 (1.60 to 2.32)	<0.001	1.57 (1.29 to 1.92)	<0.001
4,5	2.15 (1.73 to 2.66)	<0.001	1.62 (1.29 to 2.04)	<0.001
Linear trend across categories		<0.001		<0.001

Table S3-B Associations of life skills with economic and psychological factors

	Income (% in top quintile) (n = 7,367)			
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			0.95 (0.94 to 0.96)	<0.001
Sex			0.83 (0.73 to 0.94)	0.003
Parental occupation				
Routine (ref)			1	
Intermediate			1.53 (1.30 to 1.78)	<0.001
Managerial/professional			2.28 (1.93 to 2.68)	<0.001
Education				
No qualifications (ref)			1	
Basic			2.44 (1.93 to 3.09)	<0.001
High school			2.45 (1.90 to 3.14)	<0.001
Further			3.84 (3.02 to 4.89)	<0.001
University			7.78 (6.17 to 9.81)	<0.001
Cognition			1.17 (1.06 to 1.30)	<0.001
Life skills				
Low (ref)	1		1	
1	1.17 (1.01 to 1.36)	0.037	1.16 (0.98 to 1.36)	0.071
2	1.42 (1.21 to 1.67)	<0.001	1.23 (1.04 to 1.47)	0.018
3	1.63 (1.36 to 1.97)	<0.001	1.27 (1.04 to 1.56)	0.022
4,5	2.03 (1.64 to 2.52)	<0.001	1.48 (1.17 to 1.87)	0.001
Linear trend across categories		<0.001		<0.001

Table S3-C Associations of life skills with economic and psychological factors

				Enjoyment of life (n = 8,093)		
Factor	**B**	**Beta (SE)**	**P**	**B**	**Beta (SE)**	**P**
Age				0.001	0.004 (0.011)	0.71
Sex				0.074	0.020 (0.010)	0.046
Parental occupation						
routine vs intermediate				0.163	0.044 (0.012)	<0.001
routine vs managerial				0.196	0.048 (0.012)	<0.001
Education						
Basic v none				0.247	0.058 (0.012)	<0.001
High school vs none				0.280	0.056 (0.012)	<0.001
Higher vs none				0.313	0.064 (0.012)	<0.001
University vs none				0.345	0.077 (0.013)	<0.001
Cognition				0.180	0.065 (0.011)	<0.001
Life skills						
1 vs low	0.742	0.189 (0.012)	<0.001	0.718	0.183 (0.012)	0.005
2 vs low	1.460	0.326 (0.012)	<0.001	1.399	0.312 (0.012)	<0.001
3 vs low	2.093	0.374 (0.011)	<0.001	2.016	0.360 (0.011)	<0.001
4,5 vs low	2.520	0.363 (0.011)	<0.001	2.420	0.349 (0.011)	<0.001
Linear trend across categories			<0.001			<0.001

Table S3-D Associations of life skills with economic and psychological factors

	Depression (% depressed) (n = 8,085)			
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			0.99 (0.98 to 1.00)	0.006
Sex			1.59 (1.38 to 1.83)	<0.001
Parental occupation				
Routine (ref)			1	
Intermediate			1.01 (0.87 to 1.18)	0.88
Managerial/professional			0.85 (0.71 to 1.03)	0.092
Education				
No qualifications (ref)			1	
Basic			0.67 (0.55 to 0.80)	<0.001
High school			0.63 (0.51 to 0.78)	<0.001
Further			0.55 (0.44 to 0.70)	<0.001
University			0.59 (0.47 to 0.74)	<0.001
Cognition			0.73 (0.66 to 0.82)	<0.001
Life skills				
Low (ref)	1		1	
1	0.50 (0.43 to 0.58)	<0.001	0.50 (0.43 to 0.58)	<0.001
2	0.29 (0.24 to 0.36)	<0.001	0.31 (0.25 to 0.38)	<0.001
3	0.15 (0.11 to 0.21)	<0.001	0.17 (0.12 to 0.23)	<0.001
4,5	0.06 (0.03 to 0.11)	<0.001	0.07 (0.04 to 0.13)	<0.001
Linear trend across categories		<0.001		<0.001

Table S4-A Associations between life skills and social factors

				Number of close relationships (n = 8,119)		
Factor	**B**	**Beta (SE)**	**P**	**B**	**Beta (SE)**	**P**
Age				-0.008	-0.018 (0.011)	0.073
Sex				0.48	0.057 (0.011)	<0.001
Parental occupation						
routine vs intermediate				0.157	0.018 (0.013)	0.15
routine vs managerial				0.416	0.044 (0.013)	0.001
Education						
Basic v none				-0.044	-0.004 (0.014)	0.75
High school vs none				-0.147	-0.013 (0.013)	0.33
Higher vs none				0.057	0.005 (0.013)	0.71
University vs none				0.235	0.023 (0.014)	0.12
Cognition				0.109	0.017 (0.012)	0.15
Life skills						
1 vs low	0.347	0.038 (0.013)	0.004	0.319	0.035 (0.013)	0.007
2 vs low	1.159	0.112 (0.013)	<0.001	1.096	0.106 (0.013)	<0.001
3 vs low	1.386	0.107 (0.012)	<0.001	1.294	0.100 (0.012)	<0.001
4,5 vs low	1.893	0.118 (0.012)	<0.001	1.802	0.112 (0.012)	<0.001
Linear trend across categories			<0.001			<0.001

Table S4-B Associations between life skills and social factors

	Social isolation (%) (n = 8,118)			
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			0.98 (0.97 to 0.99)	<0.001
Sex			0.66 (0.61 to 0.73)	<0.001
Parental occupation				
Routine (ref)			1	
Intermediate			0.87 (0.78 to 0.96)	0.009
Managerial/professional			0.73 (0.64 to 0.82)	<0.001
Education				
No qualifications (ref)			1	
Basic			0.74 (0.65 to 0.85)	<0.001
High school			0.76 (0.65 to 0.88)	<0.001
Further			0.54 (0.46 to 0.63)	<0.001
University			0.44 (0.38 to 0.51)	<0.001
Cognition			0.89 (0.83 to 0.96)	0.003
Life skills				
Low (ref)	1		1	
1	0.93 (0.83 to 1.04)	0.18	0.98 (0.87 to 1.10)	0.73
2	0.75 (0.66 to 0.85)	<0.001	0.82 (0.72 to 0.93)	0.003
3	0.71 (0.61 to 0.82)	<0.001	0.79 (0.67 to 0.92)	0.003
4,5	0.68 (0.56 to 0.81)	<0.001	0.76 (0.63 to 0.92)	0.005
Linear trend across categories		<0.001		<0.001

Table S4-C Associations between life skills and social factors

	Loneliness (% in top tertile) (n = 8,115)			
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			1.00 (0.99 to 1.01)	0.91
Sex			1.50 (1.36 to 1.66)	<0.001
Parental occupation				
Routine (ref)			1	
Intermediate			0.98 (0.87 to 1.10)	0.71
Managerial/professional			0.98 (0.86 to 1.12)	0.80
Education				
No qualifications (ref)			1	
Basic			0.86 (0.75 to 0.99)	0.04
High school			0.89 (0.76 to 1.04)	0.13
Further			0.90 (0.77 to 1.07)	0.23
University			0.88 (0.74 to 1.03)	0.11
Cognition			0.86 (0.80 to 0.94)	<0.001
Life skills				
Low (ref)	1		1	
1	0.51 (0.46 to 0.57)	<0.001	0.51 (0.45 to 0.57)	<0.001
2	0.31 (0.27 to 0.36)	<0.001	0.31 (0.27 to 0.36)	<0.001
3	0.18 (0.14 to 0.21)	<0.001	0.18 (0.15 to 0.22)	<0.001
4,5	0.11 (0.08 to 0.14)	<0.001	0.11 (0.08 to 0.15)	<0.001
Linear trend across categories		<0.001		<0.001

Table S4-D Associations between life skills and social factors

	Volunteering (% at least once per month) (n = 8,110)			
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			1.02 (1.01 to 1.02)	<0.001
Sex			1.32 (1.19 to 1.46)	<0.001
Parental occupation				
Routine (ref)			1	
Intermediate			1.08 (0.96 to 1.22)	0.21
Managerial/professional			1.42 (1.24 to 1.62)	<0.001
Education				
No qualifications (ref)			1	
Basic			2.01 (1.71 to 2.37)	<0.001
High school			2.02 (1.69 to 2.40)	<0.001
Further			3.26 (2.74 to 3.87)	<0.001
University			4.32 (3.65 to 5.12)	<0.001
Cognition			1.33 (1.22 to 1.44)	<0.001
Life skills				
Low (ref)	1		1	
1	1.14 (1.01 to 1.30)	0.038	1.07 (0.94 to 1.22)	0.31
2	1.48 (1.29 to 1.70)	<0.001	1.29 (1.12 to 1.48)	<0.001
3	1.49 (1.27 to 1.75)	<0.001	1.22 (1.03 to 1.44)	0.021
4,5	2.10 (1.75 to 2.53)	<0.001	1.68 (1.39 to 2.04)	<0.001
Linear trend across categories		<0.001		<0.001

Table S5-A Associations between life skills and health and disability

	Fair or poor self-rated health (%) (n = 8,114)			
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			1.01 (1.00 to 1.02)	<0.001
Sex			0.98 (0.88 to 1.10)	0.71
Parental occupation				
Routine (ref)			1	
Intermediate			0.82 (0.73 to 0.93)	0.002
Managerial/professional			0.74 (0.63 to 0.86)	<0.001
Education				
No qualifications (ref)			1	
Basic			0.60 (0.52 to 0.70)	<0.001
High school			0.67 (0.57 to 0.79)	<0.001
Further			0.47 (0.39 to 0.56)	<0.001
University			0.34 (0.28 to 0.41)	<0.001
Cognition			0.69 (0.63 to 0.76)	<0.001
Life skills				
Low (ref)	1		1	
1	0.60 (0.53 to 0.68)	<0.001	0.61 (0.53 to 0.69)	<0.001
2	0.34 (0.29 to 0.40)	<0.001	0.37 (0.32 to 0.44)	<0.001
3	0.23 (0.19 to 0.28)	<0.001	0.26 (0.21 to 0.32)	<0.001
4,5	0.11 (0.08 to 0.16)	<0.001	0.13 (0.09 to 0.19)	<0.001
Linear trend across categories		<0.001		<0.001

Table S5-B Associations between life skills and health and disability

	Chronic disease (%) (n = 8,119)			
Factor	**Unadjusted OR (95% CI)**		**Adjusted OR (95% CI)**	**P**
Age			1.06 (1.05 to 1.07)	<0.001
Sex			1.33 (1.21 to 1.46)	<0.001
Parental occupation				
Routine (ref)			1	
Intermediate			0.85 (0.76 to 0.95)	0.004
Managerial/professional			0.93 (0.82 to 1.05)	0.22
Education				
No qualifications (ref)			1	
Basic			0.84 (0.73 to 0.96)	0.015
High school			0.93 (0.80 to 1.09)	0.36
Further			0.82 (0.69 to 0.95)	0.010
University			0.68 (0.58 to 0.79)	<0.001
Cognition			0.89 (0.82 to 0.96)	0.002
Life skills				
Low (ref)	1		1	
1	0.89 (0.79 to 0.99)	0.043	0.85 (0.76 to 0.96)	0.009
2	0.68 (0.60 to 0.77)	<0.001	0.69 (0.60 to 0.78)	<0.001
3	0.59 (0.51 to 0.69)	<0.001	0.63 (0.54 to 0.74)	<0.001
4,5	0.49 (0.41 to 0.58)	<0.001	0.53 (0.44 to 0.65)	<0.001
Linear trend across categories		<0.001		<0.001

Table S5-C Associations between life skills and health and disability

	Impaired ADLs (%) (n = 8119)			
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	
Age			1.04 (1.03 to 1.05)	<0.001
Sex			1.08 (0.95 to 1.23)	0.23
Parental occupation				
Routine (ref)			1	
Intermediate			0.88 (0.76 to 1.01)	0.086
Managerial/professional			0.86 (0.72 to 1.01)	0.070
Education				
No qualifications (ref)			1	
Basic			0.78 (0.66 to 0.93)	0.004
High school			0.80 (0.66 to 0.96)	0.018
Further			0.64 (0.52 to 0.78)	<0.001
University			0.49 (0.39 to 0.61)	<0.001
Cognition			0.75 (0.68 to 0.83)	<0.001
Life skills				
Low (ref)	1		1	
1	0.78 (0.68 to 0.90)	<0.001	0.77 (0.67 to 0.89)	<0.001
2	0.44 (0.37 to 0.52)	<0.001	0.47 (0.39 to 0.56)	<0.001
3	0.35 (0.27 to 0.44)	<0.001	0.39 (0.31 to 0.50)	<0.001
4,5	0.19 (0.13 to 0.28)	<0.001	0.23 (0.16 to 0.33)	<0.001
Linear trend across categories		<0.001		<0.001

Table S5-D Associations between life skills and health and disability

				Gait speed (n = 5,620)		
Factor	**B**	**Beta (SE)**	**P**	**B**	**Beta (SE)**	**P**
Age				-0.011	-0.306 (0.012)	<0.001
Sex				-0.048	-0.087 (0.012)	<0.001
Parental occupation						
routine vs intermediate				0.028	0.050 (0.014)	<0.001
routine vs managerial				0.048	0.077 (0.014)	<0.001
Education						
Basic v none				0.077	0.117 (0.014)	<0.001
High school vs none				0.059	0.078 (0.014)	<0.001
Higher vs none				0.096	0.127 (0.014)	<0.001
University vs none				0.121	0.169 (0.015)	<0.001
Cognition				0.060	0.137 (0.013)	<0.001
Life skills						
1 vs low	0.023	0.039 (0.016)	0.013	0.024	0.040 (0.014)	0.005
2 vs low	0.089	0.131 (0.015)	<0.001	0.065	0.096 (0.014)	<0.001
3 vs low	0.119	0.138 (0.015)	<0.001	0.087	0.101 (0.013)	<0.001
4,5 vs low	0.130	0.123 (0.014)	<0.001	0.086	0.081 (0.013)	<0.001
Linear trend across categories			<0.001			<0.001

Table S6–A Associations between life skills and biomarkers

	Low HDL cholesterol (%) (n = 4,727)			
	Unadjusted OR (95% CI)	**P**	**Adjusted OR (95% CI)**	**P**
Age			0.99 (0.98 to 1.00)	0.061
Sex			0.67 (0.55 to 0.81)	<0.001
Parental occupation				
Routine (ref)			1	
Intermediate			0.83 (0.67 to 1.02)	0.083
Managerial/professional			0.84 (0.65 to 1.08)	0.16
Education				
No qualifications (ref)			1	
Basic			0.84 (0.64 to 1.10)	0.21
High school			1.02 (0.76 to 1.36)	0.92
Further			0.75 (0.55 to 1.02)	0.068
University			0.59 (0.43 to 0.82)	0.002
Cognition			0.80 (0.67 to 0.94)	0.007
Life skills				
Low (ref)	1		1	
1	0.80 (0.64 to 1.00)	0.059	0.85 (0.67 to 1.07)	0.16
2	0.74 (0.57 to 0.95)	0.021	0.81 (0.65 to 1.05)	0.12
3	0.53 (0.38 to 0.75)	<0.001	0.58 (0.41 to 0.82)	0.002
4,5	0.61 (0.41 to 0.91)	0.015	0.67 (0.44 to 0.99)	0.049
Linear trend across categories		<0.001		<0.001

Table S6-B Associations between life skills and biomarkers

				Vitamin D (%) (n = 4,718)		
Factor	**B**	**Beta (SE)**	**P**	**B**	**Beta (SE)**	**P**
Age				0.081	0.029 (0.015)	0.061
Sex				-1.624	-0.034 (0.017)	0.022
Parental occupation						
routine vs intermediate				0.92	0.019 (0.017)	0.26
routine vs managerial				1.87	0.036 (0.018)	0.044
Education						
Basic v none				1.273	0.023 (0.019)	0.22
High school vs none				1.741	0.027 (0.018)	0.13
Higher vs none				2.063	0.033 (0.019)	0.071
University vs none				1.561	0.027 (0.020)	0.18
Cognition				1.113	0.028 (0.015)	0.067
Life skills						
1 vs low	1.69	0.033 (0.018)	0.060	1.602	0.031 (0.018)	0.075
2 vs low	2.02	0.035 (0.017)	0.040	1.731	0.030 (0.017)	0.08
3 vs low	3.85	0.054 (0.016)	0.001	3.589	0.051 (0.016)	0.002
4,5 vs low	7.08	0.080 (0.016)	<0.001	6.568	0.074 (0.016)	<0.001
Linear trend across categories			<0.001			<0.001

Table S6-C Associations between life skills and biomarkers

	Central obesity (%) (n = 6,077)			
	Unadjusted OR (95% CI)	**P**	**Adjusted OR (95% CI)**	**P**
Age			1.00 (0.99 to 1.01)	0.23
Sex			1.45 (1.31 to 1.62)	<0.001
Parental occupation				
Routine (ref)			1	
Intermediate			0.78 (0.69 to 0.88)	0.001
Managerial/professional			0.76 (0.66 to 0.87)	<0.001
Education				
No qualifications (ref)			1	
Basic			0.84 (0.72 to 0.98)	0.029
High school			0.84 (0.71 to 0.99)	0.043
Further			0.68 (0.57 to 0.80)	<0.001
University			0.54 (0.46 to 0.64)	<0.001
Cognition			0.95 (0.87 to 1.04)	0.23
Life skills				
Low (ref)	1		1	
1	0.91 (0.80 to 1.04)	0.17	0.91 (0.80 to 1.04)	0.18
2	0.82 (0.71 to 0.95)	0.007	0.87 (0.75 to 1.00)	0.057
3	0.67 (0.56 to 0.79)	<0.001	0.71 (0.59 to 0.84)	<0.001
4,5	0.71 (0.58 to 0.87)	0.001	0.78 (0.64 to 0.97)	0.024
Linear trend across categories		<0.001		<0.001

Table S6-D Associations between life skills and biomarkers

				C-reactive protein (mg/L) (n = 4,624)		
Factor	**B**	**Beta (SE)**	**P**	**B**	**Beta (SE)**	**P**
Age				0.021	0.059 (0.015)	<0.001
Sex				0.227	0.038 (0.015)	0.011
Parental occupation						
routine vs intermediate				-0.232	-0.039 (0.017)	0.024
routine vs managerial				-0.459	-0.070 (0.018)	<0.001
Education						
Basic v none				-0.213	-0.031 (0.019)	0.1
High school vs none				-0.224	-0.028 (0.019)	0.13
Higher vs none				-0.524	-0.068 (0.019)	<0.001
University vs none				-0.673	-0.094 (0.020)	<0.001
Cognition				-0.055	-0.011 (0.016)	0.47
Life skills						
1 vs low	-0.170	-0.027 (0.018)	0.13	-0.168	-0.026 (0.018)	0.14
2 vs low	-0.257	-0.036 (0.017)	0.039	-0.172	-0.024 (0.017)	0.17
3 vs low	-0.406	-0.046 (0.017)	0.006	-0.306	-0.035 (0.017)	0.036
4,5 vs low	-0.618	-0.056 (0.016)	<0.001	-0.461	-0.042 (0.016)	0.008
Linear trend across categories			<0.001			<0.001

Table S7- A **Prospective associations of life skills with economic, psychological and social factors four years later**

	Wealth (% in top quintile 2014) (n = 5,395)			
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			0.97 (0.95 to 0.98)	<0.001
Sex			1.12 (0.91 to 1.38)	0.28
Parental occupation				
Routine (ref)			1	
Intermediate			1.27 (0.98 to 1.65)	0.073
Managerial/professional			1.52 (1.16 to 1.99)	0.002
Education				
No qualifications (ref)			1	
Basic			1.08 (0.76 to 1.54)	0.068
High school			1.53 (1.05 to 2.23)	0.025
Further			1.49 (1.04 to 2.14)	0.030
University			2.36 (1.66 to 3.35)	<0.001
Cognition			1.14 (0.96 to 1.35)	0.14
Wealth 2010			9.19 (7.99 to 10.70)	<0.001
Life skills				
Low (ref)	1		1	
1	1.61 (0.96 to 1.40)	0.12	1.09 (0.83 to 1.42)	0.55
2	1.63 (1.34 to 1.98)	<0.001	1.05 (0.79 to 1.39)	0.76
3	1.62 (1.29 to 2.03)	<0.001	1.04 (0.75 to 1.45)	0.80
4,5	1.87 (1.43 to 2.44)	<0.001	0.97 (0.66 to 1.41)	0.87
Linear trend across categories		<0.001		0.99

Table S7-B **Prospective associations of life skills with economic, psychological and social factors four years later**

	Income (% in top quintile 2014) (n = 5,707)			
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			0.98 (0.97 to 0.99)	<0.001
Sex			0.98 (0.82 to 1.16)	0.78
Parental occupation				
Routine (ref)			1	
Intermediate			1.26 (1.01 to 1.57)	0.043
Managerial/professional			1.74 (1.38 to 2.20)	<0.001
Education				
No qualifications (ref)			1	
Basic			1.30 (0.94 to 1.80)	0.11
High school			1.61 (1.15 to 2.27)	0.006
Further			1.76 (1.26 to 2.44)	0.001
University			2.70 (2.16 to 4.08)	<0.001
Cognition			1.11 (0.96 to 1.29)	0.18
Income 2010			2.51 (2.30 to 2.75)	<0.001
Life skills				
Low (ref)	1		1	
1	1.00 (0.81 to 1.22)	0.96	0.94 (0.74 to 1.18)	0.57
2	1.30 (1.05 to 1.61)	0.15	1.03 (0.81 to 1.32)	0.81
3	1.46 (1.15 to 1.86)	0.002	1.03 (0.78 to 1.36)	0.84
4,5	1.61 (1.21 to 2.14)	0.001	1.25 (0.97 to 1.42)	0.88
Linear trend across categories		<0.001		0.81

Table 7-C **Prospective associations of life skills with economic, psychological and social factors four years later**

				Enjoyment of life 2014 (n = 5,221)		
Factor	**B**	**Beta (SE)**	**P**	**B**	**Beta (SE)**	**P**
Age				-0.014	-0.066 (0.012)	<0.001
Sex				0.162	0.044 (0.012)	0.053
Parental occupation						
routine vs intermediate				0.073	0.020 (0.013)	0.14
routine vs managerial				0.096	0.023 (0.014)	0.091
Education						
Basic v none				0.085	0.020 (0.015)	0.17
High school vs none				0.062	0.013 (0.014)	0.37
Higher vs none				0.134	0.028 (0.014)	0.053
University vs none				0.275	0.060 (0.015)	<0.001
Cognition				0.034	0.011 (0.012)	0.36
Enjoyment of life 2010				0.604	0.592 (0.013)	<0.001
Life skills						
1 vs low	0.652	0.165 (0.017)	<0.001	0.188	0.047 (0.014)	0.011
2 vs low	1.222	0.274 (0.017)	<0.001	0.321	0.072 (0.014)	<0.001
3 vs low	1.629	0.297 (0.016)	<0.001	0.426	0.078 (0.014)	<0.001
4,5 vs low	2.022	0.295 (0.015)	<0.001	0.525	0.077 (0.013)	<0.001
Linear trend across categories			<0.001			<0.001

Table 7-D **Prospective associations of life skills with economic, psychological and social factors four years later**

	Depression 2014 (% depressed) (n = 5,794)			
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			1.02 (1.00 to 1.03)	0.009
Sex			1.61 (1.31 to 1.98)	<0.001
Parental occupation				
Routine (ref)			1	
Intermediate			0.93 (0.75 to 1.17)	0.54
Managerial/professional			0.79 (0.60 to 1.05)	0.10
Education				
No qualifications (ref)			1	
Basic			0.92 (0.70 to 1.19)	0.51
High school			0.77 (0.57 to 1.05)	0.098
Further			0.73 (0.52 to 1.01)	0.058
University			0.67 (0.48 to 0.95)	0.024
Cognition			0.90 (0.76 to 1.06)	0.20
Depression 2010			9.01 (7.32 to 11.09)	<0.001
Life skills				
Low (ref)	1		1	
1	0.48 (0.39 to 0.59)	<0.001	0.55 (0.44 to 0.69)	<0.001
2	0.26 (0.20 to 0.35)	<0.001	0.37 (0.27 to 0.50)	<0.001
3	0.27 (0.19 to 0.39)	<0.001	0.44 (0.31 to 0.64)	<0.001
4,5	0.08 (0.04 to 0.16)	<0.001	0.14 (0.065 to 1.05)	<0.001
Linear trend across categories		<0.001		<0.001
Cubic trend across categories		0.017		0.009

Table 7-E **Prospective associations of life skills with economic, psychological and social factors four years later**

				Number of close relationships 2014 (n = 5,345)		
Factor	**B**	**Beta (SE)**	**P**	**B**	**Beta (SE)**	**P**
Age				-0.007	-0.014 (0.013)	0.29
Sex				0.181	0.020 (0.013)	0.12
Parental occupation						
routine vs intermediate				0.141	0.016 (0.015)	0.29
routine vs managerial				0.351	0.035 (0.015)	0.023
Education						
Basic v none				-0.097	-0.009 (0.016)	56
High school vs none				-0.129	-0.011 (0.015)	0.48
Higher vs none				-0.16	-0.013 (0.016)	0.39
University vs none				0.066	-0.006 (0.017)	0.73
Cognition				0.013	0.002 (0.013)	0.90
Close relationships 2010				0.535	0.506 (0.013)	<0.001
Life skills						
1 vs low	0.395	0.041 (0.018)	0.020	0.160	0.017 (0.015)	0.28
2 vs low	0.969	0.089 (0.017)	<0.001	0.208	0.019 (0.015)	0.20
3 vs low	1.274	0.095 (0.017)	<0.001	0.564	0.042 (0.014)	0.003
4,5 vs low	2.113	0.126 (0.016)	<0.001	1.146	0.068 (0.014)	<0.001
Linear trend across categories			<0.001			<0.001

Table 7–F **Prospective associations of life skills with economic, psychological and social factors four years later**

				Loneliness 2014 (n = 5,794)		
Factor	**B**	**Beta (SE)**	**P**	**B**	**Beta (SE)**	**P**
Age				0.001	0.024 (0.012)	0.054
Sex				0.025	0.026 (0.012)	0.032
Parental occupation						
routine vs intermediate				-0.005	-0.005 (0.014)	0.75
routine vs managerial						
Education						
Basic v none				-0.028	-0.025 (0.015)	0.093
High school vs none				-0.033	-0.025 (0.014)	0.075
Higher vs none				-0.020	-0.016 (0.015)	0.28
University vs none				-0.050	-0.041 (0.016)	0.009
Cognition				-0.010	-0.012 (0.012)	0.32
Loneliness 2010				0.577	0.591 (0.012)	<0.001
Life skills						
1 vs low	-0.154	-0.148 (0.017)	<0.001	-0.049	-0.044 (0.014)	0.001
2 vs low	-0.255	-0.218 (0.017)	<0.001	-0.085	-0.072 (0.014)	<0.001
3 vs low	-0.311	-0.215 (0.016)	<0.001	-0.081	-0.056 (0.014)	<0.001
4,5 vs low	-0.402	-0.223 (0.016)	<0.001	-0.131	-0.073 (0.013)	<0.001
Linear trend across categories			<0.001			<0.001

Table S8-A **Prospective associations of life skills with health and disability four years later**

	Fair or poor self-rated health (%) 2014 (n = 5,751)			
Factor	**Adjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			1.02 (1.01 to 1.03)	<0.001
Sex			0.95 (0.81 to 1.12)	0.54
Parental occupation				
Routine (ref)			1	
Intermediate			0.91 (0.76 to 1.08)	0.28
Managerial/professional			0.86 (0.70 to 1.07)	0.17
Education				
No qualifications (ref)			1	
Basic			0.74 (0.60 to 0.92)	0.006
High school			0.73 (0.57 to 0.92)	0.008
Further			0.71 (0.55 to 0.91)	0.007
University			0.60 (0.46 to 0.79)	<0.001
Cognition			0.90 (0.79 to 1.02)	0.10
Self-rated health 2010			3.84 (3.51 to 4.22)	<0.001
Life skills				
Low (ref)	1		1	
1	0.68 (0.58 to 0.79)	<0.001	0.83 (0.69 to 1.00)	0.050
2	0.40 (0.33 to 0.48)	<0.001	0.69 (0.55 to 0.86)	0.001
3	0.36 (0.29 to 0.46)	<0.001	0.74 (0.56 to 0.98)	0.033
4,5	0.16 (0.11 to 0.23)	<0.001	0.48 (0.31 to 0.73)	0.001
Linear trend across categories		<0.001		0.041

Table S8–B Prospective associations of life skills with health and disability four years later

	Incident chronic disease (%) 2014 (n = 5,872)			
Factor	**Unadjusted OR (95% CI)**	**P**	**Adjusted OR (95% CI)**	**P**
Age			1.03 (1.02 to 1.04)	<0.001
Sex			1.48 (1.32 to 1.67)	<0.001
Parental occupation				
Routine (ref)			1	
Intermediate			0.85 (0.74 to 0.97)	0.017
Managerial/professional			0.83 (0.71 to 0.97)	0.019
Education				
No qualifications (ref)			1	
Basic			0.84 (0.71 to 0.99)	0.042
High school			0.84 (0.70 to 1.02)	0.072
Further			0.80 (0.66 to 0.96)	0.018
University			0.72 (0.59 to 0.87)	0.001
Cognition			0.97 (0.88 to 1.07)	0.52
Life skills				
Low (ref)	1		1	
1	0.83 (0.72 to 0.96)	0.012	0.79 (0.68 to 0.92)	0.002
2	0.75 (0.64 to 0.88)	<0.001	0.75 (0.63 to 0.88)	0.001
3	0.61 (0.50 to 0.74)	<0.001	0.63 (0.52 to 0.77)	<0.001
4,5	0.55 (0.43 to 0.69)	<0.001	0.58 (0.46 to 0.74)	<0.001
Linear trend across categories		<0.001		<0.001

Table S8-C **Prospective associations of life skills with health and disability four years later**

	Incident impaired ADLs 2014 (n = 4,984)			
	Unadjusted OR (95% CI)	**CI**	**Adjusted OR (95% CI)**	**P**
Age			1.06 (1.05 to 1.07)	<0.001
Sex			0.97 (0.80 to 1.16)	0.73
Parental occupation				
Routine (ref)			1	
Intermediate			0.86 (0.69 to 1.06)	0.14
Managerial/professional			0.95 (0.74 to 1.21)	0.66
Education				
No qualifications (ref)			1	
Basic			0.77 (0.60 to 0.99)	0.044
High school			0.96 (0.73 to 1.26)	0.78
Further			0.70 (0.53 to 0.94)	0.017
University			0.54 (0.39 to 0.74)	<0.001
Cognition			0.81 (0.70 to 0.94)	0.006
Life skills				
Low (ref)	1		1	
1	0.99 (.80 to 1.23)	0.93	0.95 (0.76 to 1.19)	0.65
2	0.71 (0.55 to 0.92)	0.008	0.72 (0.56 to 0.94)	0.014
3	0.76 (0.57 to 1.03)	0.072	0.83 (0.61 to 1.13)	0.24
4,5	0.45 (0.30 to 0.69)	<0.001	0.48 (0.31 to 0.73)	0.001
Linear trend across categories		<0.001		<0.001
4^{th} order trend across categories		0.023		0.023

Table S8-D **Prospective associations of life skills with health and disability four years later**

				Gait speed 2014 (m/s) (n = 3,588)		
Factor	**B**	**Beta (SE)**	**P**	**B**	**Beta (SE)**	**P**
Age				-0.007	-0.187 (0.15)	<0.001
Sex				-0.031	-0.056 (0.015)	<0.001
Parental occupation						
routine vs intermediate				0.018	0.033 (0.016)	0.045
routine vs managerial				0.018	0.028 (0.017)	0.095
Education						
Basic v none				0.016	0.025 (0.017)	0.14
High school vs none				0.019	0.026 (0.017)	0.12
Higher vs none				0.027	0.036 (0.017)	0.033
University vs none				0.056	0.075 (0.018)	<0.001
Cognition				0.028	0.061 (0.015)	<0.001
Gait speed 2010				0.542	0.511 (0.016)	<0.001
Life skills						
1 vs low	0.026	0.044 (0.022)	0.046	0.023	0.039 (0.017)	0.020
2 vs low	0.068	0.102 (0.022)	<0.001	0.024	0.036 (0.017)	0.029
3 vs low	0.103	0.122 (0.021)	<0.001	0.052	0.062 (0.016)	<0.001
4,5 vs low	0.090	0.087 (0.020)	<0.001	0.035	0.034 (0.015)	0.025
Linear trend across categories			<0.001			0.002

Table S9 Sensitivity analyses: life skill index excluding each component in turn

	Full index		Excluding conscientiousness		Excluding emotional stability		Excluding persistence		Excluding optimism		Excluding control	
	OR, β[1]	*P*[2]	*OR, β*	*P*	*OR, β*	*P*	*OR, β*	*P*	*OR, β*	*P*	*OR, β*	*P*
Wealth	1.62	<0.001	1.78	<0.001	1.50	<0.001	1.74	<0.001	1.28	0.005	1.43	<0.001
Income	1.48	<0.001	1.36	0.001	1.39	<0.001	1.47	<0.001	1.20	0.065	1.38	<0.001
Enjoyment	0.349	<0.001	0.413	<0.001	0.430	<0.001	0.405	<0.001	0.329	<0.001	0.344	<0.001
Depression	0.07	<0.001	0.12	<0.001	0.15	<0.001	0.08	<0.001	0.15	<0.001	0.12	<0.001
Social isolation	0.76	<0.001	0.72	<0.001	0.74	<0.001	0.81	0.001	0.85	0.012	0.78	0.001
Close relationships	0.112	<0.001	0.134	<0.001	0.150	<0.001	0.131	<0.001	0.101	<0.001	0.121	<0.001
Loneliness	0.11	<0.001	0.14	<0.001	0.16	<0.001	0.12	<0.001	0.18	<0.001	0.16	<0.001
Volunteering	1.68	<0.001	1.48	<0.001	1.57	<0.001	1.42	<0.001	1.30	0.001	1.61	<0.001
Self-rated health	0.13	<0.001	0.21	<0.001	0.18	<0.001	0.17	<0.001	0.24	<0.001	0.18	<0.001
Chronic disease	0.53	<0.001	0.58	<0.001	0.61	<0.001	0.56	<0.001	0.65	<0.001	0.53	<0.001
Impaired ADLs	0.23	<0.001	0.32	<0.001	0.35	<0.001	0.25	<0.001	0.32	<0.001	0.27	<0.001
Gait speed	0.086	<0.001	0.105	<0.001	0.114	<0.001	0.115	<0.001	0.080	<0.001	0.113	<0.001
Low HDL-cholesterol	0.67	<0.001	0.69	0.008	0.63	0.002	0.57	0.001	0.68	0.012	0.69	<0.001
Vitamin D	0.074	<0.001	0.061	<0.001	0.060	<0.001	0.072	<0.001	0.053	<0.001	0.079	<0.001
Central obesity	0.78	<0.001	0.82	0.005	0.78	<0.001	0.71	<0.001	0.75	0.002	0.77	0.002
C-reactive protein	-0.042	<0.001	-0.038	0.002	-0.050	0.001	-0.031	0.002	-0.042	0.002	-0.043	0.008
Longitudinal results[3]												
Enjoyment of life	0.077	<0.001	0.087	<0.001	0.091	<0.001	0.094	<0.001	0.074	<0.001	0.078	<0.001
Depression	0.14	<0.001	0.28	<0.001	0.35	0.004	0.18	<0.001	0.34	<0.001	0.30	<0.001
Close relationships	0.068	<0.001	0.057	<0.001	0.073	<0.001	0.057	<0.001	0.051	<0.001	0.061	<0.001
Loneliness	-0.073	<0.001	-0.076	<0.001	-0.065	<0.001	-0.097	<0.001	-0.060	<0.001	-0.065	<0.001
Self-rated health	0.48	0.041	0.67	0.039	0.69	0.15	0.52	<0.001	0.60	0.081	0.54	0.061
Chronic disease	0.58	<0.001	0.62	<0.001	0.62	<0.001	0.57	<0.001	0.72	<0.001	0.63	<0.001
Impaired ADLs	0.48	<0.001	0.66	0.002	0.64	0.004	0.54	<0.001	0.68	<0.001	0.56	<0.001
Gait speed	0.034	0.002	0.056	<0.001	0.051	0.001	0.051	<0.001	0.513	0.005	0.099	0.014

[1] Adjusted odds ratio (OR) for the highest life skill category, or standardized regression coefficient *β* for continuously distributed outcomes. Results for continuously distributed variables are shown with 3 decimal points, and OR with 2 points. All analyses are adjusted for age, sex, parental occupation, education and cognitive function.

[2] *P* is for linear gradients across life skill categories.

[3] Longitudinal analyses are weighted for non-response in 2014

Table S10 Sensitivity analyses: life skill index with additional adjustments for wealth and self-rated health, and regressions involving continuously distributed life skill scores

	Full index		Additional adjustment for wealth		Additional adjustment for self-rated health		Continuously distributed life skills scores[4]	
	OR, β[1]	*P*[2]	*OR, β*	*P*	*OR, β*	*P*	*OR, β*	*P*
Wealth	1.62	<0.001			1.41	<0.001	1.54	<0.001
Income	1.48	<0.001	1.18	0.084	1.26	0.021	1.26	<0.001
Enjoyment	0.349	<0.001	0.336	<0.001	0.304	<0.001	0.577	<0.001
Depression	0.07	<0.001	0.09	<0.001	0.11	<0.001	0.26	<0.001
Social isolation	0.76	<0.001	0.84	0.012	0.83	0.008	0.69	<0.001
Close relationships	0.112	<0.001	0.101	<0.001	0.106	<0.001	0.196	<0.001
Loneliness	0.11	<0.001	0.11	<0.001	0.13	<0.001	0.35	<0.001
Volunteering	1.68	<0.001	1.61	<0.001	1.52	<0.001	1.58	<0.001
Self-rated health	0.13	<0.001	0.13	<0.001			0.32	<0.001
Chronic disease	0.53	<0.001	0.57	<0.001	0.74	<0.001	0.68	<0.001
Impaired ADLs	0.23	<0.001	0.25	<0.001	0.43	<0.001	0.41	<0.001
Gait speed	0.086	<0.001	0.067	<0.001	0.038	<0.001	0.159	<0.001
Low HDL-cholesterol	0.67	<0.001	0.74	0.045	0.79	0.075	0.75	0.001
Vitamin D	0.074	<0.001	0.058	<0.001	0.062	<0.001	0.58	<0.001
Central obesity	0.78	<0.001	0.84	0.022	0.89	0.060	0.82	<0.001
C-reactive protein	-0.042	<0.001	-0.035	0.020	-0.022	0.014	-0.084	<0.001
Longitudinal results[3]								
Enjoyment of life	0.077	<0.001	0.074	<0.001	0.072	<0.001	0.134	<0.001
Depression	0.14	<0.001	0.15	0.001	0.17	0.002	0.50	<0.001
Close relationships	0.068	<0.001	0.069	<0.001	0.065	<0.001	0.089	<0.001
Loneliness	-0.073	<0.001	-0.070	<0.001	-0.066	<0.001	-0.070	<0.001
Self-rated health	0.48	0.041	0.49	0.063			0.38	<0.001
Chronic disease	0.58	<0.001	0.64	<0.001	0.74	0.007	0.71	<0.001
Impaired ADLs	0.48	<0.001	0.50	0.001	0.67	0.085	0.63	<0.001
Gait speed	0.034	0.002	0.031	0.004	0.022	0.025	0.122	<0.001

[1] Adjusted odds ratio (OR) for the highest life skill category, or standardized regression coefficient *β* for continuously distributed outcomes. Results for continuously distributed variables are shown with 3 decimal points, and OR with 2 points. All analyses are adjusted for age, sex, parental occupation, education and cognitive function.

[2] *P* is for linear gradients across life skill categories.

[3] Longitudinal analyses are weighted for non-response in 2014
[4] Adjusted odds ratios (OR) or standardized regression coefficients β (for continuously distributed outcomes) for continuously distributed life skill scores. *P* is for linear associations with continuously distributed life skill scores.