Ageing 4

Subjective wellbeing, health, and ageing

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See Comment page 587

The is the fourth in a Series of five papers about ageing

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Subjective wellbeing and health are closely linked to age. Three aspects of subjective wellbeing can be distinguished—evaluative wellbeing (or life satisfaction), hedonic wellbeing (feelings of happiness, sadness, anger, stress, and pain), and eudemonic wellbeing (sense of purpose and meaning in life). We review recent advances in the specialty of psychological wellbeing, and present new analyses about the pattern of wellbeing across ages and the association between wellbeing and survival at older ages. The Gallup World Poll, a continuing survey in more than 160 countries, shows a U-shaped relation between evaluative wellbeing and age in high-income, English speaking countries, with the lowest levels of wellbeing in ages 45–54 years. But this pattern is not universal. For example, respondents from the former Soviet Union and eastern Europe show a large progressive reduction in wellbeing with age, respondents from Latin America also shows decreased wellbeing with age, whereas wellbeing in sub-Saharan Africa shows little change with age. The relation between physical health and subjective wellbeing is bidirectional. Older people with illnesses such as coronary heart disease, arthritis, and chronic lung disease show both increased levels of depressed mood and impaired hedonic and eudemonic wellbeing. Wellbeing might also have a protective role in health maintenance. In an analysis of the English Longitudinal Study of Ageing, we identify that eudemonic wellbeing is associated with increased survival; 29·3% of people in the lowest wellbeing quartile died during the average follow-up period of 8·5 years compared with 9·3% of those in the highest quartile. Associations were independent of age, sex, demographic factors, and baseline mental and physical health. We conclude that the wellbeing of elderly people is an important objective for both economic and health policy. Present psychological and economic theories do not adequately account for the variations in patterns of wellbeing with age across different parts of the world. The apparent association between wellbeing and survival is consistent with a protective role of high wellbeing, but alternative explanations cannot be ruled out at this stage.

Introduction

People's self-reports of their subjective wellbeing are becoming a focus of intense debate in public policy and economics, and improvement of the wellbeing of the population is emerging as a key societal aspiration. The Report by the Commission on the Measurement of Economic Performance and Social Progress[1] initiated by the French Government and chaired by Joseph Stiglitz argued that present measures of economic performance such as gross domestic product are insufficient as indicators of the progress of society, and that self-reported wellbeing should also be taken into account. In the UK, the Office for National Statistics is driving a national debate about the measurement of wellbeing,[2] and in the USA, the Gallup-Healthways Wellbeing Index Poll interviews 1000 adults every day about wellbeing, and similar initiatives are taking place in other countries.[3]

Subjective wellbeing and health are closely related, and the link could become increasingly important at older ages, if only because the prevalence of chronic illness increases with advancing age. As life expectancy increases and treatments for life-threatening disease become more effective, the issue of maintaining wellbeing at advanced ages is growing in importance. Studies of older people show that assessments of quality of life

Key messages

- Major advances in the measurement and interpretation of subjective wellbeing have been made
- Three measures—life evaluation, hedonic experience, and meaningfulness—represent different aspects of life experience and have distinct associated factors
- In high-income English-speaking countries, life evaluation dips in middle age, and rises in old age, but this U-shape pattern does not hold in three other regions (countries of the former Soviet Union and eastern Europe, sub-Saharan Africa, and Latin America and the Caribbean) where life evaluation decreases with age
- Outside high-income English-speaking countries, worry, lack of happiness, and physical pain rise with age, whereas anger and stress decrease
- In the former Soviet Union and eastern European countries, elderly people are particularly disadvantaged relative to young people, in terms of lower life evaluation and high levels of worry, low happiness, and physical pain
- A two-way relation between physical health and subjective wellbeing exists; poor health leads to reduced subjective wellbeing, while high wellbeing can reduce physical health impairments
- Evidence shows that subjective wellbeing is associated with longer survival

Search strategy and selection criteria

We searched PubMed and Web of Science with the terms "happiness", "positive wellbeing", "life satisfaction", "aging", "health", and "mortality". Our search included articles published in English between Jan 1, 2000, and March 31, 2012. We identified additional reports from the reference lists of selected articles. Some important older publications are cited either directly or indirectly through review articles.

are affected by the person's state of health,[4] but the frequent finding that average self-reported life evaluation in the population increases with age suggests that subjective wellbeing is affected by many factors other than health. These factors include material conditions, social and family relationships, and social roles and activities —factors that also change with age. Research suggests that subjective wellbeing might even be a protective factor for health, reducing the risk of chronic physical illness and promoting longevity. Some researchers[5] have argued that subjective wellbeing should be addressed as a measurement of health evaluation and be considered in health-care resource allocation. This Series paper summarises the present evidence linking subjective wellbeing with health in an ageing population.

Measurement of subjective wellbeing

Within the construct of subjective wellbeing, at least three different approaches capture a different aspect—life evaluation, hedonic wellbeing, and eudemonic wellbeing (panel).[6] Life evaluation refers to peoples' thoughts about the quality or goodness of their lives, their overall life satisfaction, or sometimes how happy they are generally with their lives. Measurement uses such questions as the Cantril ladder,[7] wherein individuals are asked to place themselves on an 11-step ladder with worst possible life representing the lowest rung and best possible life representing the top rung. Instructions are usually vague about how the evaluation should be made. Hedonic wellbeing refers to everyday feelings or moods such as experienced happiness (the mood, not the evaluation of life), sadness, anger, and stress, and is measured by asking respondents to rate their experience of several affect adjectives such as happy, sad, and angry.[8] Notably, the negative adjectives are not merely the opposite of positive indicators of wellbeing, but carry unique information about a person's emotional state; thus, hedonic wellbeing is not a simple unipolar dimension, but is composed of at least two modestly inversely associated positive and negative dimensions. Therefore, positive and negative adjectives are required for a reasonable assessment of hedonic wellbeing.

Eudemonic wellbeing focuses on judgments about the meaning and purpose of one's life; because the construct is more diverse, several questionnaires exploring various aspects of meaning have been developed.[9] An important distinction between the types of wellbeing is the level of cognitive processing necessary; feelings can be reported fairly directly, whereas life evaluations and meaning questions are likely to demand substantial thinking, including aggregation over time and comparison with self-selected standards (eg, my life compared with what, when, or whom?).

How do the three types of measures fit into human wellbeing? Economic status, freedom, and physical health are all important for human development as is mental health. Some scholars[10] have argued that life evaluation questions capture everything that matters, whereas others recognise their importance but without giving them any special status.[11]

The past decade has seen a revolution in the assessment of hedonic wellbeing. Conventionally, measures of hedonic wellbeing ask the respondent to think about the previous week or month, which—in view of the inability of people to remember their affective states—is likely to induce an evaluative, not a hedonic response. However, new approaches have greatly reduced this challenge by having individuals report about brief and recent periods, and thus more directly explore emotional states without the overlay of evaluation. Reporting periods for such assessments can range from the immediate moment through to longer periods such as a day; to establish improved reliability of hedonic indices several momentary ratings are usually averaged. Ecological momentary assessment[12]—whereby individuals are randomly prompted to report affect—has many good features, but at least one study has shown results that can be closely replicated by the day reconstruction method[13]—in which people remember episodes from the previous day, and associated feelings with them—or even, for large sample averages, by asking people about their feelings for the entire previous day (the procedure used in the Gallup-Healthways interview[3]).

Wellbeing in older people

What is the association between wellbeing and age? The best information available is from large-scale international surveys that have asked about life evaluation, although more recent surveys have also included measurement of hedonic and eudemonic wellbeing. One recent study[14] examined assessments of life evaluation (broadly defined "happiness" with life or life satisfaction) in several European, American, Asian, and Latin American cross-sectional surveys during several periods, and replicated previous findings of a U-shaped association between age and wellbeing, with the nadir at middle age and higher wellbeing in younger and older adults. The U-shape of life evaluation is often taken to be a standard finding, and has recently been replicated in non-human primates,[15] but several studies have reported different results.[16]

For example, an analysis[16] of longitudinal data from Australia, the UK, and Germany did not find such a shape once individual fixed effects were incorporated. A

Panel: **Types of subjective wellbeing**

- Evaluative wellbeing: evaluations of how satisfied people are with their lives
- Hedonic wellbeing: feelings or moods such as happiness, sadness and anger
- Eudemonic wellbeing: judgments about the meaning and purpose of life

study[17] analysing 1-year data from the Gallup-Healthways Wellbeing Index in the USA compared life evaluation with hedonic wellbeing; hedonic wellbeing was assessed with ratings of yesterday's emotions, and life evaluation was assessed with Cantril ladder. Striking differences in the pattern of wellbeing with age were detected between life evaluation and negative emotions. Life evaluation showed the U-pattern with a nadir in the mid-50s; however, the occurrence of a lot of stress or a lot of anger yesterday decreased throughout life, and more rapidly so after age 50 years. Worry remained high until age 50 years and reduced thereafter, whereas two positive emotions were similar in pattern to that of life evaluation. These findings are consistent with other results such as a study on income and wellbeing,[18] and argue that hedonic and evaluative wellbeing are essentially different, so several indicators should ideally be assessed.

One especially intensive study[19] supports improvement in hedonic wellbeing with advancing age. Analyses of five momentary samples of affect (with the format ''how are you feeling right now?'') per day recorded for 7 days showed that the frequency of negative emotions lessened at middle age, but intensity did not. High intensity measurement of affect enabled distinctions to be made between severity and frequency, a contrast that is not possible with yesterday or longer reporting periods, thus providing new insight into the lives of older people and dispeling the idea that the intensity of experiences diminishes with age.

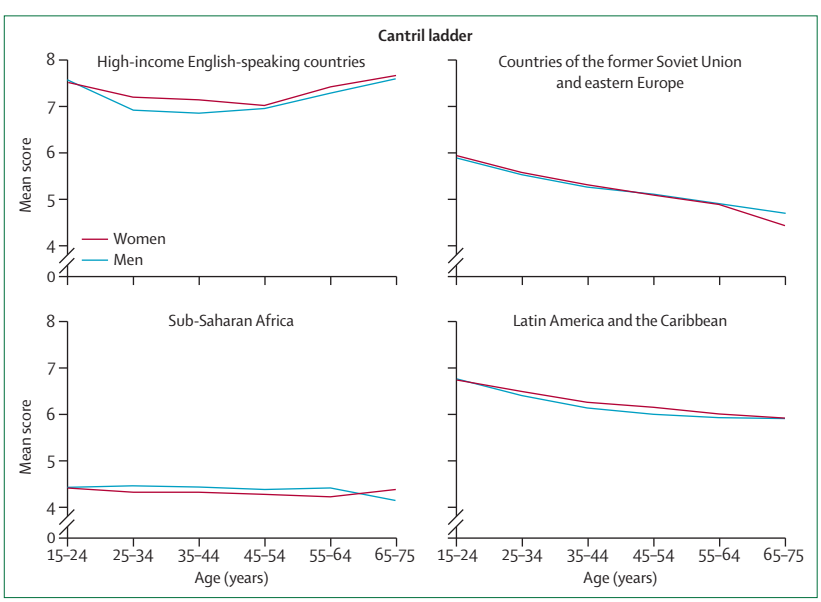

Figure 1: **Life evaluation and age in four regions**
Cantril ladder ranges from 0 (worst possible life) to 10 (best possible life). For all evaluations, people aged 76 years and older were excluded. The high-income English-speaking countries include the USA, Canada, the UK, Ireland, Australia, and New Zealand. 13 762 observations for happiness and a little fewer than 25 000 for the other measures were made; happiness measures were not collected in all waves. The former Soviet Union and eastern European countries are Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kosovo, Kyrgyzstan, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Tajikistan, Turkmenistan, Ukraine, and Uzbekistan. 63 325 observations for happiness and about 113 000 for the other measures were made. Countries in sub-Saharan Africa include Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo (Brazzaville), Democratic Republic of the Congo, Cote d'Ivoire, Ethiopia, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Namibia, Niger, Rwanda, Senegal, Sierra Leone, Somaliland, South Africa, Sudan, Tanzania, Togo, Uganda, Zambia, and Zimbabwe. 124 800 observations were made, with country sample sizes ranging from about 1000 for six countries to 7000 (Mauritania). Countries in Latin America and the Caribbean include Argentina, Belize, Bolivia, Brazil, Costa Rica, Chile, Colombia, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Trinidad and Tobago, Uruguay, and Venezuela. 96 154 observations were made, with country sample sizes ranging from 500 to 5000. Means by age were calculated for each country, and the regional average was obtained by weighting by each country's total population. Sample size is about proportional to the number of countries in the region. Graph shows the relation between the mean score and age for men and women.

The pre-eminent theory emerging from these and other results is a socioemotional selectivity theory,[20] which postulates that as people age they accumulate emotional wisdom that leads to selection of more emotionally satisfying events, friendships, and experiences. Thus, despite factors such as the death of loved ones, loss of status associated with retirement, deterioration of health, and reduced income—although perhaps also reduced material needs—older people maintain and even increase self-reported wellbeing by focusing on a more restricted set of social contacts and experiences. Although findings support this notion,[21] the theory predicts only increased wellbeing in older ages, and does not predict the U-shape pattern of life satisfaction or the flat and then decreased pattern for stress. However, the theory offers an explanation of how, despite declining health and income with age, subjective wellbeing might improve. By contrast, an economic theory can predict the dip in wellbeing in middle-age; this is the period at which wage rates typically peak and is the best time to work and earn the most, even at the expense of present wellbeing, so as to have increased wealth and wellbeing later in life.

These findings suggest that older populations, although generally less healthy and less productive, might be more satisfied with their lives, and experience less stress, worry, and anger than do middle-aged people. However, our continuing research shows that these patterns of subjective wellbeing are not universal across populations. Gallup's World Poll, which began in 2006, continually surveys residents in more than 160 countries, covering more than 98% of the world's population, with random nationally representative samples, typically of 1000 individuals in each country. Telephone interviews are used in high-income countries, and face-to-face interviews elsewhere. Gallup uses pretested questions to restrict method bias, and even if bias cannot be entirely excluded, it should not affect the age patterns within countries, although individuals in institutions and the disabled elderly population will largely be missed in the telephone surveys. The surveys are done once a year and last 2–4 weeks. In this Series paper, we use data from 2006 to 2010 to examine patterns of wellbeing with age in different regions of the world; we assess data from regions because examination of results by country is unwieldy, but it should be noted that the sample sizes are different for each region, roughly proportional to the number of countries in each.

To help comparison, the scales are the same for all regions. For the ladder, we show life evaluation as the mean score on the Cantril ladder (figure 1), whereas for hedonics (figures 2–6), we show the proportion of the population who reported a lot of the emotion on the previous day, except for experienced happiness, in which we show the proportion who reported that they did not experience a lot of happiness. Thus, for all the hedonic experiences, higher values are worse.

The U-shaped profiles of the high-income English-speaking countries are not replicated in other regions. The former Soviet Union and eastern European countries are diverse in their political and health experiences during the transition in social organisation after the collapse of communism, but they have the transition itself in common, and show the diversity of ageing experience worldwide. In these transition countries, life evaluations were lower overall than in the high-income English speaking countries, and elderly people showed particularly lower evaluations than did those in the high-income English speaking countries. Not being happy, which is uncommon in the high-income English speaking and Latin American and Caribbean countries, is quite common in the transition countries, particularly in older people, of whom nearly 70% of those older than 65 years were not happy in the previous day (figure 5). Worry increased with age in the transition countries, but decreased in the high-income English speaking countries (figure 2).

These findings undoubtedly show the recent experiences of the region (cohort effects), and the distress these events have brought to the older people, who have lost a system that, however imperfect, gave meaning to their lives, and, in some cases, their pensions and their health care. The results and patterns elsewhere testify to the absence of a globally universal ageing pattern. In sub-Saharan Africa, life evaluation is very low at all ages (showing the strong positive cross-country relation between life evaluation and income[22]), but there is little or no variation with age (figure 1). The prevalence of worry, stress, and unhappiness all increase slightly with age.

The middle-income region of Latin America and Caribbean countries is different yet again, with life evaluation falling with age—although not as sharply as in the eastern European countries—whereas worry and stress peak in middle age, although the age-profile is not as evident as elsewhere. The differences between men and women are slight relative to the similarities in their age profile, although notably elderly women in the former Soviet Union and eastern Europe have substantially more worry, stress, and pain than do elderly men, irrespective of the fact that in several of these countries the health of men has suffered more. Even so, the Cantril ladder measures of overall life evaluation are almost identical for men and women, another indication of the importance in distinguishing different aspects of wellbeing. Notably, the proportion of young adults reporting physical pain is rather similar across the four regions, but the age-related trajectories are steeper in the former Soviet countries, sub-Saharan African, and Latin American and Caribbean countries than in the high-income English-speaking countries (figure 6). For physical pain, as for the Cantril ladder, worry, and lack of happiness, the elderly in the former communist countries suffer more than the young.

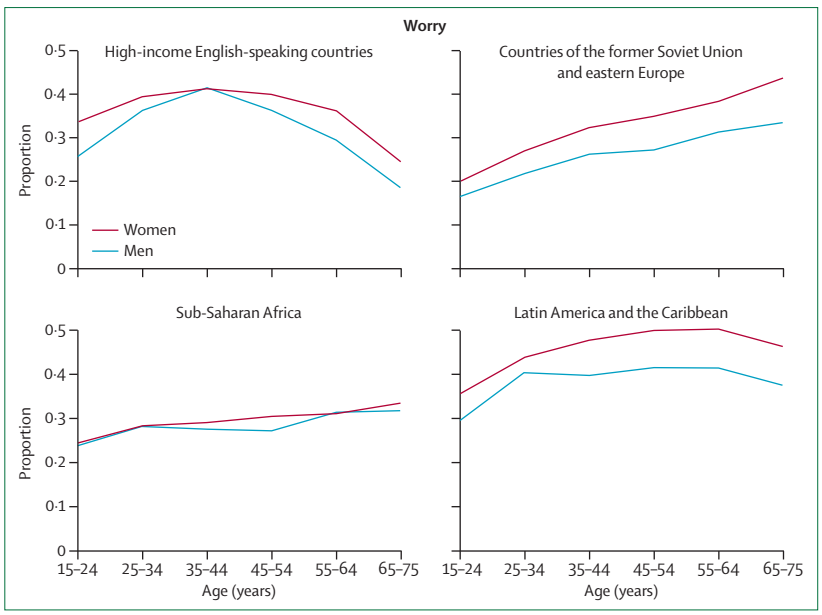

Figure 2: **Proportion of respondents who reported that they experienced a lot of worry yesterday by age in four regions**
See figure legend 1.

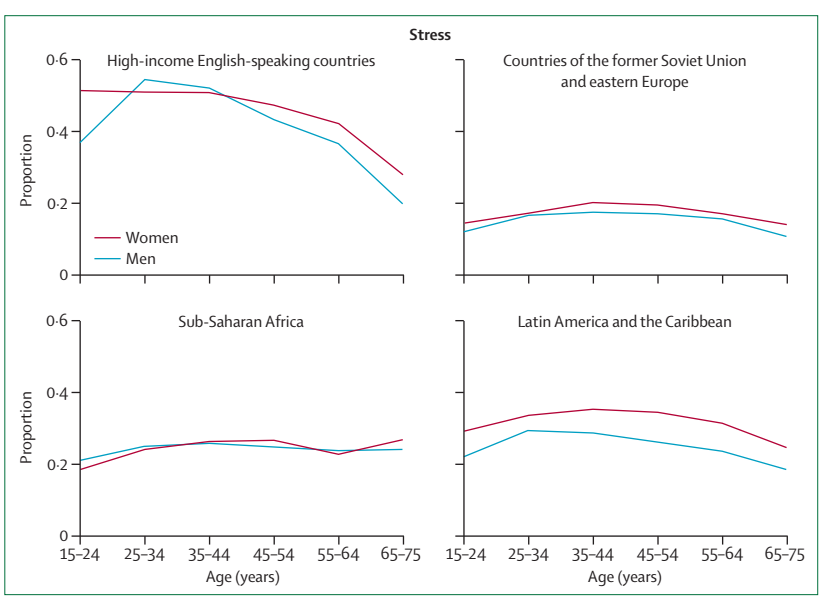

Figure 3: **Proportion of respondents who reported that they experienced a lot of stress yesterday by age in four regions**
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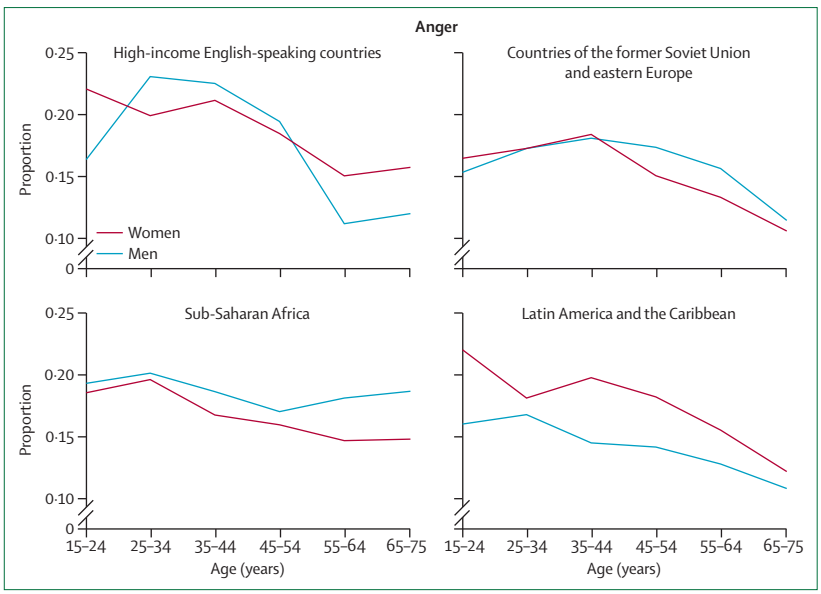

Figure 4: **Proportion of respondents who reported that they experienced a lot of anger yesterday by age in four regions**
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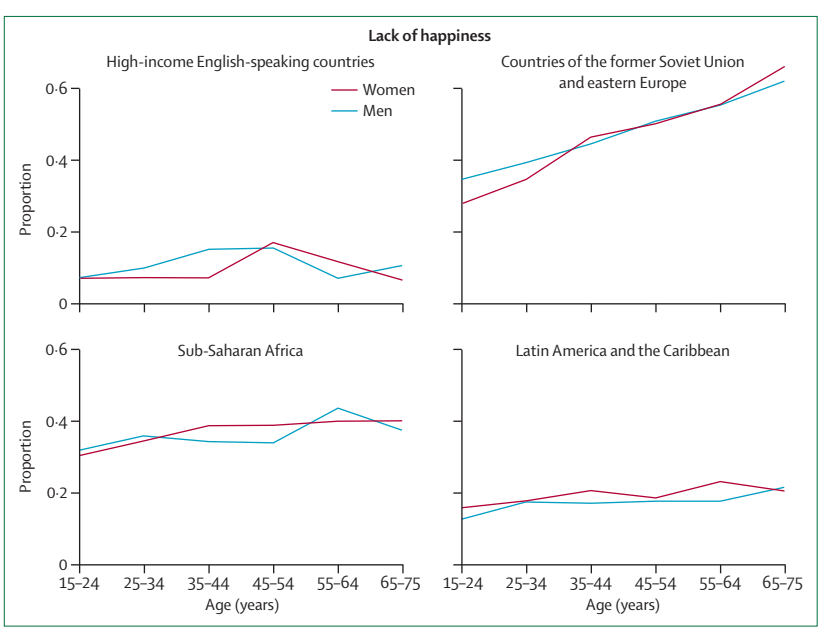

Figure 5: **Proportion of people who did not report experiencing a lot of happiness yesterday by age in four regions**
See figure legend 1.

See Online for appendix

One strength of these new results is that they use identical questions on different aspects of subjective wellbeing for random samples for a large number of countries. One possible weakness compared with earlier results[14,16,23]—with which they are only partly consistent—is the absence of a time dimension, which cannot be realistically explored with only 4 years of data.

Many challenges remain in the understanding of the patterns of age and wellbeing around the world. A fundamental difficulty for this research specialty is obtaining funding for the continuation of worldwide polls, which should not be underestimated, especially in fiscally difficult times. Concerns have been voiced with regards to potential difficulties with methods including ensuring comparability in the sampling techniques and standardisation of the interpretation of questions and response scales across countries. Finally, work needs to be done to understand the reasons for the reported age patterns. Present theories do not yet adequately account for the age patterns and country differences. Despite these and other challenges, we believe that in the past decade, substantial progress has been made in the measurement of age differences in self-reported wellbeing.

Subjective wellbeing as a determinant of physical health at older ages

The notion that impaired subjective wellbeing is associated with increased risk of physical illness is not new; established research has linked depression and life stress with premature mortality, coronary heart disease, diabetes, disability, and other chronic disorders.[24] What is new is the possibility that positive subjective wellbeing is a protective factor for health.[25] Prospective epidemiological studies[26] suggest that positive life evaluations and hedonic states such as happiness predict lower future mortality and morbidity. Research of this type is susceptible to the well recognised drawbacks of observational epidemiology, including confounding—the possibility that wellbeing is coupled with other factors such as higher education attainment that account for associations with health outcome—and reverse causality—the possibility that the person who reports poor wellbeing is already ill at the time of initial assessment. Publication bias is also an issue, with evidence that studies reporting a favourable effect of wellbeing on health are more likely to be seen in print.[25]

However, strong evidence is beginning to emerge from both retrospective questionnaire assessments of eudemonic wellbeing and momentary hedonic measures taken repeatedly during the day.[27–30] To show this pattern, we have undertaken new analyses relating eudemonic wellbeing to mortality, with data from the English Longitudinal Study of Ageing (ELSA).[31] 9050 core members of the cohort (mean age 64·9 years [SD 10·0] years) were followed up for an average of 8·5 years, and 1542 dated deaths were analysed. Eudemonic wellbeing was assessed with items from a standard questionnaire assessing autonomy, sense of control, purpose in life, and self-realisation (appendix). The cohort was divided into quartiles of wellbeing, and Cox proportional hazards regression was applied. The proportion of deaths was 29·3% in the lowest quartile, 17·5% in the second quartile, 13·4% in the third quartile, and 9·3% in the highest quartile. The regression analyses show the graded association between eudemonic wellbeing and survival

(table). Compared with the lowest quartile, the highest quartile of wellbeing was associated with a 58% (95% CI 50·7–63·8) reduction in risk after adjustment for age and sex. This effect was attenuated to a 30% (95% CI 16·7–41·7%) reduction in risk after adjustment for sociodemographic factors including education and wealth, initial health status, measures of depression, and health behaviours such as smoking, physical activity, and alcohol consumption. Other independent predictors of mortality in the final model were older age, being male, less wealth, being unmarried, not being in paid employment, a diagnosis at baseline of cancer, coronary heart disease, diabetes, heart failure, chronic lung disease, and stroke, and reporting a limiting longstanding illness, smoking, and physical inactivity (appendix). Figure 7 shows a Kaplan-Meier plot of survival in relation to baseline eudemonic wellbeing in the fully adjusted model of covariates.

These results do not unequivocally show that eudemonic wellbeing is causally linked with mortality. There is danger in overstatement of evidence for a causal link because people could believe that they are to blame for not seeing the meaning in life or perceiving greater control in the face of serious illness.[33] The association could be due to unmeasured confounders or eudemonic wellbeing could be a marker of underlying biological processes or behavioural factors that are responsible for the effect on survival. But the findings do raise intriguing possibilities about positive wellbeing being implicated in reduced risk to health. The findings further raise the question of whether wellbeing-selective mortality can help to explain the reported age patterns of subjective wellbeing. The US life table for 2008 shows a decadal mortality rate of 12·7% for 60-year-olds.[34] If all this mortality came from those with the lowest life evaluation—which is the maximum possible effect—the average ladder rating would have increased from 6·78 at 60 years of age to 7·32 in the survivors compared with an actual average of 7·10 at 70 years of age. Of course, we do not know the ladder scores of either survivors or decedents, but this calculation suggests that effects of selective mortality might be big enough to play a part. By contrast, however, mortality rates from age 60 years are higher in Latin America and sub-Saharan Africa than in the high-income, English speaking countries, which should lead to a stronger U-shape than in the English-speaking countries, and not the reported complete absence shown here.

Progress is being made in the understanding of the behavioural and biological correlates of positive subjective wellbeing. Of lifestyle factors, physical activity is probably the most important link between subjective wellbeing and health. Regular physical activity at older ages is already recommended for the maintenance of cardiovascular health, muscle strength and flexibility, glucose metabolism, and healthy bodyweight, and is also consistently correlated with wellbeing.[35] Biologically,

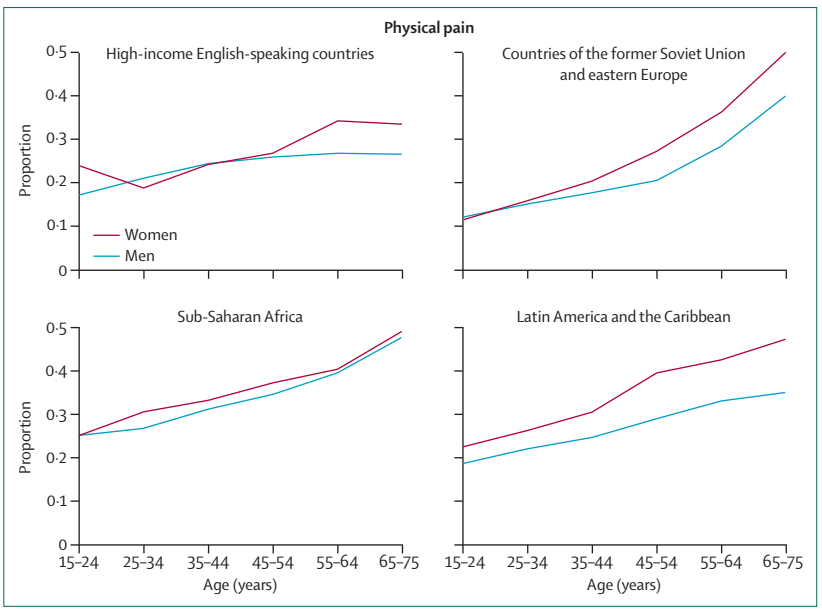

Figure 6: **Proportion of the population reporting physical pain yesterday by age in four regions**
See figure legend 1.

positive wellbeing is associated with reduced cortisol output during the day,[36,37] which is potentially important because increased cortisol plays a part in lipid metabolism, immune regulation, central adiposity, hippocampal integrity, and bone calcification. Positive affect has been related to reduced inflammatory and cardiovascular responses to acute mental stress, and is associated with reduced concentrations of inflammatory markers such as C-reactive protein and interleukin 6 in older women, and with increased concentrations of the steroid hormone dehydroepiandrosterone sulphate in men.[38] Notably, these effects are more robust when positive affect is measured by aggregation of momentary estimates of affective states during the day than by questionnaire measures.[39] The next step in this research is to establish whether these processes are contributors to associations between positive self-reported wellbeing and sustained health in older people.

Physical illness as a determinant of impaired subjective wellbeing

Clinical and community studies[24] show that a wide range of medical disorders are associated with increased levels of depression, and with illnesses that are prevalent at older ages. Many individuals show increases in depressive symptoms after diagnoses of diabetes, coronary heart disease, stroke, some cancers, and chronic kidney disease.[40–42] Collaborative care that focuses both on mental health and physical illness has beneficial effects.[43] Ill health is also associated with reduced positive wellbeing. For example, a study[44] of 11 523 older men and women in ELSA showed that chronic illnesses were associated with reduced hedonic and eudemonic

	Covariates	Eudemonic wellbeing	
		Quartiles	Adjusted hazard ratio (95% CI)
Model 1	Age, sex	1 (lowest)	1 (reference)
		2	0·620 (0·547–0·702)
		3	0·547 (0·475–0·629)
		4 (highest)	0·422 (0·362–0·493)
Model 2	Age, sex, plus demographic indicators	1 (lowest)	1 (reference)
		2	0·665 (0·586–0·754)
		3	0·613 (0·531–0·708)
		4 (highest)	0·489 (0·417–0·574)
Model 3	Age, sex, plus demographic indicators, plus health indicators	1 (lowest)	1 (reference)
		2	0·746 (0·656–0·849)
		3	0·733 (0·631–0·852)
		4 (highest)	0·624 (0·526–0·740)
Model 4	Age, sex, plus demographic indicators, plus health indicators, plus depression	1 (lowest)	1 (reference)
		2	0·761 (0·666–0·869)
		3	0·753 (0·644–0·881)
		4 (highest)	0·643 (0·538–0·768)
Model 5	Age, sex, plus demographic indicators, plus health indicators, plus depression, plus health behaviours[5]	1 (lowest)	1 (reference)
		2	0·780 (0·683–0·891)
		3	0·805 (0·688–0·942)
		4 (highest)	0·697 (0·583–0·833)

Reference group is the lowest eudemonic wellbeing group. Deaths: 608 of 2078 in the lowest eudemonic wellbeing group, 418 of 2388 in the second, 289 of 2151 in the third, and 227 of 2433 in the highest. Demographic indicators: wealth, education, ethnic origin, marital status, and employment status. Health indicators: limiting longstanding illness, cancer, coronary heart disease, stroke, diabetes, heart failure, and chronic lung disease. Depression: history of depressive illness and increased scores on the Center for Epidemiologic Studies Depression Scale.[32] Health behaviours: smoking, physical activity, and alcohol intake.

Table: **Eudemonic wellbeing and mortality: complete sample**

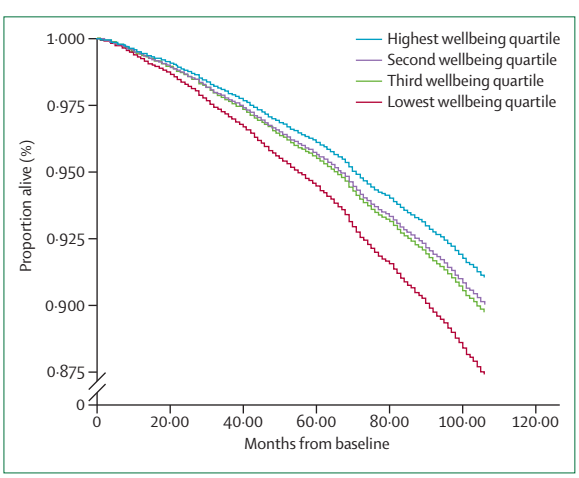

Figure 7: **Eudemonic wellbeing and survival**
Kaplan-Meier survival curves for the four quartiles of eudemonic wellbeing in the English Longitudinal Study of Ageing.[31] Survival in months from baseline is modelled after adjustment for age, sex, demographic indicators, baseline health indicators, history of depressive illness and depression symptoms, and baseline health behaviours.

wellbeing. The greatest effects were for stroke, chronic lung diseases, and rheumatoid arthritis, with slight but still pronounced impairments in individuals with diabetes and cancer. The reductions in happiness (assessed during the previous week) and eudemonic wellbeing increased progressively with the number of comorbidities. These analyses were cross-sectional, so whether reduced self-reported wellbeing preceded or followed illness onset is unknown. Firmer conclusions should await prospective analyses of these associations. Additionally, shifts in responses of patient-reported outcomes are known to take place as people adapt to illness, leading to greater reduced distress and impairment of quality of life (and possibly increased happiness) than might be expected.[45]

The end of life is another setting in which health clearly affects psychological state, yet the medical establishment has struggled to ensure optimum wellbeing. High quality end-of-life care is crucial to a "good death", but faces many institutional and financial barriers, particularly for individuals in long term care.[46] A primary focus of medical and palliative care is the relief of pain and suffering, but surveys show that unrelieved pain and poor management of dyspnoea are common in many types of nursing facility. Hospice care is associated with increased quality pain and symptom management, but aspects of wellbeing, such as a sense of dignity and relief of distress, are seldom addressed systematically. The application of standardised measures of quality of dying, usually completed by relatives or carers, might encourage more direct assessments of the experiences promoting optimum psychological well-being.[47] Analyses of population-based cohorts might also provide valuable information about the use of advanced directives and the extent to which fulfilment of preferences enhances wellbeing at the end of life.[48] Additionally, short-term psychotherapy designed to enhance the dignity of end of life experiences could have beneficial effects.[49]

Conclusions

Research into subjective wellbeing and health at older ages is at an early stage. Nevertheless, the wellbeing of elderly people is important, and evidence suggests that positive hedonic states, life evaluation, and eudemonic wellbeing are relevant to health and quality of life as people age. Health-care systems should be concerned not only with illness and disability, but also with supporting methods to improve positive psychological states. Contemplation of large scale clinical trials to assess the effects of efforts to increase enjoyment of life on longevity are premature; we do not yet know whether wellbeing is sufficiently modifiable by psychological, societal, or economic interventions to test effects on health outcomes. Much of our knowledge about subjective wellbeing at older ages comes from longitudinal population cohort studies, and sustained investment in these research resources is essential. New methods for assessment of hedonic wellbeing and time use are enhancing our understanding of the processes underlying positive psychological states at older ages. Most studies are of high-income countries and not those with low or middle incomes. However, cross-national surveys such as the Gallup World Poll, and

longitudinal cohorts studies of ageing in Brazil, China, India, and South Korea, and the WHO Study on Global Ageing and Adult Health are beginning to redress the balance. The implications of this new knowledge about subjective wellbeing for economic and health policy are yet to be established.

Contributors
AS, AD, and AAS were responsible for the format of this Series paper and drafted the paper. AS did the analyses of ELSA, while AD and AAS did analyses of the Gallup World Poll. All authors contributed to revision and approved the final version.

Declaration of interests
AS declares no competing interests. AD and AAS are consulting senior scientists with the Gallup Organization.

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Supplementary appendix

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Subjective wellbeing, health and ageing

Online supplement

Eudemonic wellbeing and survival in the English Longitudinal Study of Ageing

The English Longitudinal Study of Ageing (ELSA) is a longitudinal cohort study men and women aged 50 and older living in England.[1] It began in 2002 with 11,391 respondents who had previously taken part in the Health Survey for England. Comparisons of the characteristics of participants against results from the national census show that the sample is representative sociodemographically of the English population. Of the core sample, 10,798 (94.8%) consented to have their data linked to mortality records, and 9,058 had complete data on eudemonic wellbeing and other measures used in these analyses. These participants were tracked from wave 1 of ELSA (2002/3) until early 2011, an average of 8 years, 6 months. There were 2,051 deaths over this period. Complete data on all the measures relevant to these analyses were available from 1,544 fatalities and 7,514 survivors.

Measures

Eudemonic wellbeing was assessed with 15 items of the CASP-19 questionnaire, excluding items related to enjoyment.[2] Although the CASP-19 was devised with four subscales, different psychometric solutions have been proposed.[3] The grouping of items here was made in order to capture several dimensions of eudaimonia in one scale. Thus items measured control (e.g. 'I feel that what happens to me is out of my control', reverse scored), personal growth (e.g. 'I choose to do things that have never done before'), autonomy (e.g. 'I feel that I can please myself what I do'), purpose in life (e.g. 'I feel that my life has meaning'), and self-acceptance (e.g. 'I feel satisfied with the way my life has turned out'). The Cronbach α was 0.86, indicating good internal consistency. Scores could range from 0 – 45.

Socioeconomic indicators included ethnicity, marital status, employment status, and total household wealth, including financial wealth (savings and investments), the value of

any home and other property (less mortgage), the value of any business assets and physical wealth such as artwork and jewellery, net of debt. Wealth is the most robust indicator of socioeconomic circumstances and standard of living in ELSA,[4] and was divided into age-adjusted quintiles for the purposes of analysis. Education was classified into lower (no qualifications), intermediate (O level, A level, etc), and higher (degree and higher degree). Baseline health status was assessed by asking participants if they suffered from one or more long-standing illnesses, and if the illness limited their daily activities. The two questions were combined to form a dichotomous variable, classifying participants as suffering from a limiting long-standing illness or not. Additionally, the presence of doctor diagnosed cancer, coronary heart disease (CHD), stroke, diabetes, heart failure, and chronic lung disease (asthma, bronchitis, and chronic obstructive lung disease) was established. Baseline mental health status was assessed in terms of doctor diagnosed depressive illness over the previous two years, together with the presence of elevated symptoms of depression. Depressive symptoms were measured using the 8-item Centre for Epidemiologic Studies Depression Scale (CES-D), an instrument with good internal reliability ($\alpha = 0.80$ in this sample) and validity among older people.[5] As in previous studies, a score of ≥4 was used to indicate significant depressive symptoms.[6] Three health behaviours were also assessed: current smoking, engagement in any vigorous or moderate activity at least once per week, and drinking alcohol at least daily. Mortality data were obtained through linkage with the National Health Service Central Data Registry

Statistical analysis

Participants were into quartiles of eudemonic well-being; the groups are of unequal sized because of ties in values. Cox proportional hazards regression models were used to estimate hazard ratios (HR) of death and 95% confidence intervals, with the lowest eudemonic wellbeing quartile as the reference group. Five models were tested. Model 1 adjusted for age (categorised as 50-59, 60-69, 70-79, and ≥80 years) and gender. The demographic indicators (wealth, education, ethnicity, marital status and employment status)

were added in model 2, and model 3 included health indicators (limiting longstanding illness, cancer, CHD, stroke, diabetes, heart failure, and chronic lung disease at baseline). Depressive illness and symptoms of depression were added in model 4 to establish whether associations between eudemonic wellbeing and mortality are independent of negative emotional states. The three health behaviours (smoking, physical activity, and alcohol consumption) were added in model 5. Results are presented as adjusted hazard ratios with 95% confidence intervals.

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