Self-Rated Health and Mortality: A Review of Twenty-Seven Community Studies

Self-Rated Health and Mortality: A Review of Twenty-Seven Community Studies*

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We examine the growing number of studies of survey respondents' global self-ratings of health as predictors of mortality in longitudinal studies of representative community samples. Twenty-seven studies in U.S. and international journals show impressively consistent findings. Global self-rated health is an independent predictor of mortality in nearly all of the studies, despite the inclusion of numerous specific health status indicators and other relevant covariates known to predict mortality. We summarize and review these studies, consider various interpretations which could account for the association, and suggest several approaches to the next stage of research in this field.

The sociological study of mortality differentials emerged with the beginning of sociology, and the contribution of social science to understanding mortality risks in populations has continued throughout the twentieth century. Socioeconomic status and measures of social networks and support are now routinely included in mortality studies, along with the traditional risk factors of smoking, alcohol use, overweight, and the respondents' disease history and current health status. Such assessments of health status frequently also ask respondents to rate their overall health with the categories of excellent, good, fair, and poor, or some variant. It is these simple global assessments that now appear to have mortality risks of their own, independent of other medical, behavioral, or psychosocial risk factors.

The study of self-ratings of health as predictors of mortality in population-based longitudinal research has flourished in the past 15 years. In this relatively short time, over two dozen studies have been published in the U.S. and international literature that test the association between simple, global health assessments and mortality in the samples used: Most find a significant, independent association that persists when numerous health status indicators and other relevant covariates are included.

There are several reasons for the rapid appearance of these studies. Although a few early studies (LaRue et al. 1979; Pfeiffer 1970; Singer et al. 1976) had suggested such an association, the first clear demonstration came with Mossey and Shapiro's 1982 analysis of the Manitoba Longitudinal Study, which showed that elderly Canadians' self-ratings of health were better predictors of seven-year survival than their medical records or self-reports of medical conditions. This was an appealing finding for several reasons. It emerged at a time when the field of psychosocial epidemiology was rapidly gaining prestige, with the publication of the series of studies on social networks as determinants of mortality that began with the Alameda County findings (Berkman and Syme 1979; House, Landis, and Umberson 1988). At the same time, other studies of health perceptions and self-care were exposing the bottom of the "iceberg" of symptoms that are unreported to

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and untreated by the medical care system (Verbrugge and Ascione 1987). Together, these research directions seemed to under-score the validity of lay perspectives on health and the usefulness of holistic definitions of health, as in the World Health Organization's "complete state of physical, mental, and social well-being." George Kaplan wrote in 1983 that poor perceived health may be "a common feature" which links various adverse psychosocial states such as social isolation, negative life events, depression, and job stress (Kaplan and Camacho 1983:292), suggesting that self-ratings of health held the key to understanding other psychosocial influences on health. Thus, self-ratings pro-vide a simple, direct, and global way of capturing perceptions of health using criteria that are as broad and inclusive as the responding individual chooses to make them.

There is another, more pragmatic reason for the outburst of these studies, and that is the appealing nature of the question itself. Virtually all of the studies that have appeared since 1982 have been secondary analyses of data collected earlier for some other purpose. Global self-ratings of health were included in so many population-level studies because they are simultaneously economical measures of health status as well as conversational ways to open the topic of health status when it is to be covered in the interview in more detail. Many researchers, reading the early studies, must have realized that they could quickly replicate and even improve upon the analysis with their own already collected data.

The purpose of this review is to collect and appraise the published studies of self-ratings of health and of mortality. We limit our review to studies (1) published in English, (2) of representative community (not patient) samples followed prospectively, and (3) which provide estimates of the effect of self-ratings of health on mortality or survival time, after covariates for (at least) health status and sociodemographic factors are included in the analysis. Studies were identified for the review by searching Medline for the follow-ing keywords: self-assessed health, self-ratings of health, self-rated health, self-assessments of health, perceived health, self-perceptions of health, subjective health, self-evaluated health, self-evaluations of health, global health, and self-reported health. A number of other articles, in which self-ratings of health were not the focus of the

study, were identified through citations and monitoring of leading journals. This search located 27 such studies published by mid-1996.

REVIEW OF THE STUDIES

Interviewer: Is it hard for you to compare your own health with that of other people of your own age, would you say it is . . .
Respondent (85-year-old woman): Well most of them are dead, aren't they? (Jylhä 1994:988)

Table 1 summarizes the characteristics of these studies. They are presented chronologi-cally (alphabetically within year) and identi-fied by their national origin, sample size, age range, follow-up period, wording of the question, type of other health status measures considered, other covariates, and findings regarding the independent effect of self-ratings of health on mortality or survival time.

These studies have come from all over the world—Sweden, Lithuania, Israel, Great Britain, the Netherlands, France, Poland, Hong Kong, Japan, Australia, Canada, and the United States. Follow-up periods ranged from 2 to 7 years in 20 of the studies, from 9 to 13 years in 6 studies, and 28 years in one study. Excluding the last study (Deeg et al. 1989), in which only 1 percent of the already elderly sample survived for 28 years, survival rates ranged from 32 to 95 percent, with 22 studies reporting over 70 percent survival. In some studies, the outcome is treated as survival time; in others it is a binary variable for mortality. In either case, and in both short and long follow-up periods, the predictive effect of self-ratings is the rule, with few exceptions.

The question eliciting the self-rating differs from study to study. In some cases the question asks respondents to compare their health to that of others their age, presumably asking them to dismiss aging-related condi-tions; in others the global nature of the question is underscored with the phrase "in general" or "all in all." In still others respondents are instructed to rate their health "at the present time." The consistency of the effects seems to show that the concept of self-rated health status is relatively insensitive to the semantic variations in the questions eliciting it. It is possible that comparisons with socially similar others are implicit in the

TABLE 1. Community Studies Reporting Association Between Self-Rated Health and Mortality

Study	Sample	Self-Rating Item	Other Health Status Variables	Other Covariates	Adjusted OR[a] Compared to Best (95% CI)
Mossey and Shapiro 1982	Manitoba Longitudinal Study on Aging, Canada N = 3,128 Ages 65 + 1971–1977 72.0% survived	For your age, in general, would you say your health is: Excellent, Good, Fair, Poor, Bad	Manitoba Health Services data: ICDA–8 diagnoses physician visits hospitalization Self-reports of conditions	Sociodemographics Life satisfaction	1971–1973 Poor 2.9 (1.8, 4.7) Fair 2.0 (1.5, 2.8) Good 2.8 (1.2, 3.2) 1974–1977 Poor 2.8 (1.9, 3.9) Fair 2.0 (1.2, 3.2) Good 1.4 (1.2, 1.6)
Kaplan and Camacho 1983	Alameda County, California N = 6,928 Ages 16–94 1965–1974 89.7% survived	All in all, would you say your health is: Excellent, Good, Fair, Poor	Self-reports of: functional disability chronic conditions symptoms energy level	Sociodemographics Health practices Social networks Psychological functioning	Poor 3.6 (1.8, 2.1)
Krzyzanowski and Wysocki 1986	Cracow, Poland N = 3,047 Ages 19–70 1968–1981 83.6% survived	(exact wording n.a.) Fair or better, Poor	Forced expiratory volume % Body mass index Self-reports of: heart disease respiratory symptoms	Sociodemographics Smoking	Males Poor 2.6 (1.6, 4.3)[b]
Jagger and Clarke 1988	Leicester, England N = 1,203 Ages 75 + 1981–1985 67.8% survived	Do you think your health is . . . for your age: Good, Fair, Poor	Self-reports of: physical disability incontinence Cognitive function Prescription medications	Sociodemographics	Poor 2.1 (1.5, 3.0) Fair 1.3 (1.0, 1.7)
Kaplan, Barell, and Lusky 1988	Kiryat Ono, Israel N = 1,078 Ages 65 + 1978–1983 72.2% survived	Do you consider yourself a . . . person: Healthy, Fairly healthy, Sick, Very sick	Self-reports of: chronic conditions functional disability medications	Sociodemographics	Very sick 2.1 (n.a.) Sick 2.1 (n.a.)
Deeg et al. 1989	Netherlands N = 2,645 Ages 65 + 1955–1983 1% survived	(Self-perceived health decline): Yes, No (exact wording n.a.)	MD performed examination Biomedical data Memory test Self-reports of: functional disability symptoms health care use medication use	Sociodemographics Family history Social networks Life satisfaction	
Grand et al. 1990	Rural areas, southwest France N = 645 Ages 60 + 1982–1986 83% survived	General health rating from very good to very bad (5 points). Health compared to other elderly (exact wording n.a.)	Self-reports of: morbidity disability health care utilization hospitalization medication use	Sociodemographics Lack of projects for future Feeling of uselessness Physical exercise	
Idler and Angel 1990	NHEFS, U.S. N = 6,440 Ages 25–74 1971–1984 72% survived	Would you say your health in general is: Excellent, Very good, Good, Fair, Poor	Physician observed: ICDA–8 diagnoses, weighted by severity	Sociodemographics Health practices	All Males Poor 1.5 (1 1, 2.2) Males 45–64 Poor 2.8 (1.5, 5.3) Fair 2.2 (1.2, 4.1) Good 1.9 (1.0, 3 7)
Idler, Kasl, and Lemke 1990	New Haven, Connecticut N = 2,812 Ages 65 + 1982–1986 77.8% survived Iowa County, Iowa N = 3,097 Ages 65 + 1982–1986 85.9% survived	CT: How would you rate your health at the present time: Excellent, Good, Fair, Poor, Bad Iowa: Compared to other people your age would you say that your general health is: Excellent, Good, Fair, Poor, Very poor	Self-reports of: chronic conditions functional disability pain symptoms Interviewer-measured blood pressure Interviewer-observed prescription medications	Sociodemographics Health practices	CT Males Poor 5.3 (1.9, 14.7) Fair 3.2 (1.4, 7.2) Good 2.5 (1.1, 5.8) CT Females Poor 3.0 (1.3, 6.9) Fair 2.6 (1.3, 5.4) Good 2.3 (1 1, 4.6) Iowa Males Poor 4.8 (2.2, 10.6) Fair 2.3 (1.3, 4.0) Iowa Females Poor 3.2 (1.5, 6.7)
Ho 1991	Hong Kong N = 1,054 Ages 70 + 1985–1987 91.5% survived	How is your health, compared with others your age: Better, Same, Worse	Self-reports of: symptions-last two weeks chronic conditions-last year functional disability Interviewer-measured height, weight, blood pressure	Sociodemographics Health practices Social networks Social support Bradburn Affect Balance Scale	Worse 2.0 (1.3, 3.3)
Idler and Kasl 1991	New Haven, Connecticut N = 2,812 Ages 65 + 1982–1986 77.8% survived	How would you rate your health at the present time: Excellent, Good, Fair, Poor, Bad	Self-reports of: chronic conditions functional disability pain symptoms Interviewer-measured blood pressure Interviewer-observed prescription medications	Sociodemographics Health practices External resources Internal resources	Males Poor 6.7 (2 0, 22.7) Fair 4.1 (1.7, 10.1) Good 3.2 (1.2, 8.1) Females Poor 3.1 (1.3, 7.2) Fair 2.8 (1.4, 5.8) Good 2.4 (1 2, 4.8)

(continued)

TABLE 1. *(continued)*

Study	Sample	Self-Rating Item	Other Health Status Variables	Other Covariates	Adjusted OR[a] Compared to Best (95% CI)
Rakowski, Mor, and Hiris 1991	LSOA, U.S. N = 1,252 (healthy) Ages 70+ 1984–1986 92.5% survived	Would you say your health in general is: Excellent, Very good, Good, Fair, Poor	Self-reports of: functional disability hip fracture height and weight	Sociodemographics Social networks	1.4 (1.1, 1.7)
Wannamethee and Shaper 1991	BRHS, Great Britain N = 7,725 (males) Ages 40–59 1983–1987 95.1% survived	How would you describe your health status at present: Excellent, Good, Fair, Poor	Self-reports of: major chronic conditions regular medical treatment chest pain breathlessness weight/height	Social class Health practices	With diagnosis Fair/Poor 1.5 (1.1, 2.0)
Parker, Thorslund, and Nordström 1992	Tierp, Sweden N = 421 Ages 75+ 1986–1990 75–84: 74% survived 85+: 57% survived	(exact wording n.a.) Very healthy, Fairly healthy, Somewhat sick, Very sick	Nurse evaluations of: somatic status mental status dementia Self-reports of: ADL/IADL symptoms	Sociodemographics Life satisfaction Social networks	
Thomas et al. 1992	Bronx, New York N = 1,855 Ages 65+ 1984–1987 92.9–94.7% survived	(exact wording n.a.) Excellent/good, Fair/poor	Self-reports of: problems in daily living sensory impairments use of psychotropic meds serious chronic illness sleep problems	Sociodemographics Use of services	Fair/poor 2.0 (1.3, 3.1)
Shahtahmasebi, Davies, and Wenger 1992	North Wales N = 534 Ages 65+ 1979–1987 50.1% survived	(exact wording n.a.) Excellent/good, All right for age, Fair, Poor	Self-reports of: health-limited activities MD/RN visit home help OARS score	Sociodemographics PGC Morale Scale Social support	Poor 2.4 (n.a.) Fair 2.0 (n.a.) All right 1.5 (n.a.)
Wolinsky and Johnson 1992	LSOA, U.S. N = 4,503 Ages 70+ 1984–1988 76.4% survived	Would you say your health in general is: Excellent, Very good, Good, Fair, Poor	Self-reports of: functional disability chronic conditions	Sociodemographics Health attitudes Social supports	Males Poor 1.7 (n.a.) Females Poor 2.2 (n.a.) Fair 1.9 (n.a.)
Chipperfield 1993	Manitoba, Canada N = 4,303 Ages 65+ 1971–1983 32% survived	How would you rate your health compared to others your age: Excellent (1)—Poor (5)	Self-reports of: chronic conditions functional disability	Sociodemographics Mental health problems Life satisfaction	Well Poorer 2.5 (1.2, 5.2) T: p: Iii Better 0.5 (0.3, 0.8)[c]
Pijls, Feskens, and Kromhout 1993	Zutphen, Netherlands N = 783 Ages 65–85 1985–1990 77.0% survived	We would like to know what you think about your health. Please check what fits best in your case. Do you feel: Healthy, Rather healthy, Moderately healthy, Not healthy	Physician observed: physical examination blood pressure serum cholesterol Self-reports of: chronic conditions cardiovascular symptoms medications family history of disease	Sociodemographics Health practices	Not healthy 5.4 (2.7, 11.0) Moderately 2.4 (1.5, 3.8)
Rakowski et al. 1993	LSOA, U.S. N = 5,630 Ages 70+ 1984–1990 72% survived	Would you say your health in general is: Excellent, Very good, Good, Fair, Poor	Self-reports of: functional ability chronic conditions weight/height	Sociodemographics Social support Activity compared to age peers	Poor 1.8 (1.3, 2.4) Fair 1.5 (1.2, 1.9)
Wolinsky et al. 1993	LSOA, U.S. N = 3,646 Ages 70+ 1986–1988 89% survived	Would you say your health in general is: Excellent, Very good, Good, Fair, Poor	Self-reports of: functional ability chronic conditions Health care utilization Changes in functional ability 1984–1986	Sociodemographics Social support Health worries Control over health	
McCallum, Shadbolt, and Wang 1994	Sydney, Australia N = 1,050 Ages 60+ 1981–1988 78.0% survived	Would you say your overall health is: Excellent, Good, Fair, Poor	Self-reports of: serious illness/accident functional ability	Sociodemographics Country of origin PGC Morale Scale Social support	Females Fair 2.4 (1.1, 5.2) Good 3.2 (1.5, 6.7)
Schoenfeld et al. 1994	MacArthur EPESE, U.S. N = 1,192 Ages 70–79 1988–1991 95.0% survived	How would you rate your health at the present time? Would you say it is: Excellent, Good, Fair, Poor, Bad	Self-reports of: chronic conditions functional ability hospitalizations Cognitive function	Sociodemographics Health practices	More healthy Poor/bad 93.5 (35.2, 248.3) Fair 20.6 (10.7, 39.5) Good 4.5 (3.3, 6.3)
Sugisawa, Liang, and Liu 1994	Japan N = 2,200 Ages 60+ 1987–1990 92.7% survived	(exact wording n.a.) Excellent, Very good, Good, Fair, Poor	Self-reports of: chronic diseases functional disability	Sociodemographics Health practices	37% reduction in mortality for each increment in scale
Wolinsky, Callahan, and Johnson 1994	LSOA, U.S. N = 6,504 Ages 70+ 1984–1990 71.1% survived	Would you say your health in general is: Excellent, Very good, Good, Fair, Poor	Self-reports of: chronic conditions functional disability	Sociodemographics Health worries Social support	Poor 1.9 (n.a.) Fair 1.6 (n.a.) Good 1.3 (n.a.)

(continued)

TABLE 1. (continued)

Study	Sample	Self-Rating Item	Other Health Status Variables	Other Covariates	Adjusted OR[a] Compared to Best (95% CI)
Appels et al. 1996	Kaunas, Lithuania Rotterdam, Netherlands N = 2,452 (Kaunas) N = 3,365 (Rotterdam) Ages 45–60 (males) 1972–1982 Kaunas: 83% survived Rotterdam: 90% survived	What do you think of your own health condition compared to that of other men of your age: Better, Same, Worse	Physician observation of: CHD blood pressure cholesterol glucose tolerance weight/height	Sociodemographics Health practices	Kaunas Poor 1.6 (1.0, 2.6) Rotterdam Poor 1.6 (1.2, 2.1)
Borawski, Kinney, and Kahana 1996	Florida N = 885 Ages 72 + 1989–1992 91.1% survived	Do you consider yourself to be: Very healthy, Fairly healthy, Sick, Very sick	Self-reports of: chronic conditions medications pain shortness of breath weight/height parental longevity	Sociodemographics Health practices	Sick/Very sick 6.6 (n.a.) Fairly healthy 2.9 (n.a.)

Note: n.a., not available.
[a]Shows ORs significant at $p < .05$ only, empty cell means no OR less than $p = .05$.
[b]95% CI calculated for this table from published data.
[c]Compared to poorest health.

cognitive process that produces these ratings (Feinberg, Loftus, and Tanur 1985); if so, directing the respondent's attention this way would then be redundant, which it appears to be. In any case, the wording of the question in English is a minor difference compared with the many languages the interviews are conducted in, and here again the robustness of the concept appears to override translation difficulties.

All of the studies in Table 1 adjusted for age and either controlled for gender or analyzed data separately for males and females. Most of them controlled for socioeconomic status in some way, usually by entering education and/or income level. Five of the 27 studies had a full range of adult ages or a sample of nonelderly people.

Variables measuring health status in other than global ways are critical to the analyses; self-ratings of health would not be interesting to researchers as predictors of mortality unless they appear to add something beyond the known mortality risks. Most of the studies in Table 1 included some measures of chronic conditions: Five studies used physician or nurse examinations, one had extensive data from medical records, and the remaining 21 studies relied on self-reports of chronic conditions. Most of the self-report studies included only 6 to 10 of the most serious chronic conditions with no weighting for severity. All but three studies with elderly samples also contained measures of functioning which ranged from a few items about limitations in activities of daily living to extensive scales of functioning and disability (e.g., Wolinsky and Johnson 1992). Additional health status indicators, at least some of

which were included in almost all studies are prescription medication use; health care utilization, including physician visits and hospitalizations; interviewer or physician/nurse-performed measurements such as height, weight, blood pressure, ventilatory function, glucose tolerance, and serum cholesterol; and symptom and pain self-reports. Five studies of elderly samples included measures of memory or cognitive function. Twelve studies included health practice risk factors such as past smoking and alcohol consumption, exercise, or level of activity. Three studies included self-reports of family history of disease or parental longevity. Beyond these measures of sociodemographic and health status, 18 studies include measures of social networks or support or more subjective measures of life satisfaction or distress.

We make two observations about this large set of health status indicators and risk factors. First, we eliminated some studies from this review which had self-ratings but few other measures of health status. As a consequence, many of these studies are exemplary for their modeling of mortality risk factors, and all are strong in this area; indeed, in many cases health status measurement was the explicit purpose of the research. Second, many studies report only the health status or other covariates which play a role in mortality prediction, so most of the factors mentioned in Table 1, especially the relatively novel ones such as parental longevity or feelings of loneliness, carry significant mortality risks of their own.

Table 1 shows odds ratios and associated 95 percent confidence intervals for indepen-

dent effects of self-ratings in multivariate analyses. Some studies report an initial association of self-ratings with mortality which diminishes as additional health status covariates are entered into the equation; however, in quite a few cases, self-ratings are simply included incidentally as one of a set of health status indicators, and no attention is given to decomposing their effects. In Table 1, odds ratios for self-rated health are reported from the final step of the analysis, for a comparison of the poorest with the best level (usually "excellent") the respondent could choose. In all but four studies self-rated health holds an independent effect when all covariates are entered. The results also almost always show a dose-response pattern such that the probability of death is highest for the category of extreme "poor" health, less for "fair" health, and so on (McCallum, Shadbolt, and Wang [1994] is an exception). The highest odds ratios are reported by Schoenfeld et al. (1994), from their sample of highly functioning elderly: "Poor" reported health increased the risk of mortality 93.5 times in the subsample of this group that had no apparent medical problems. For most studies odds ratios range from 1.5 to 3.0 for the extreme risk category; the odds of mortality for poor self-rated health often exceed those for smokers or males when they are reported in the same study.

Blank boxes in Table 1 show studies with no significant multivariate effects for any level of self-rated health or for any subgroup. There are four of these: Deeg et al. (1989); Parker, Thorslund, and Nordström (1992); Grand et al. (1990); and Wolinsky et al. (1993), from the Netherlands, Sweden, France, and the United States, respectively. In each of these cases, self-rated health was predictive of mortality at the bivariate level, but the introduction of covariates reduces the association to nonsignificance. Two of the four had medical evaluations, the other two included only self-reports of current health status as covariates. These studies will be examined in more detail below.

The unique effect of self-rated health on the prediction of mortality seems to be more apparent for men than for women; five of the seven studies that estimated risk ratios separately by gender found stronger effects for men. One of the remaining two (McCallum et al. 1994) found a significant effect for women, after controls were entered, but only for good and fair and not for poor ratings of health. This may imply a different process by which women incorporate information into their self-ratings.

Univariate distributions of self-ratings of health do not differ for men and women (U.S. Department of Health and Human Services 1995), and men and women appear to refer to the same criteria when asked to explain their ratings of health (Krause and Jay 1994). This is intriguing because while women experience more nonfatal chronic and acute conditions (Verbrugge and Ascione 1987), they apparently do not necessarily judge themselves to be in worse health as a result of these conditions—a valid conclusion in light of their better longevity (Leventhal 1994). One study (Fylkesnes and Førde 1991), showed that models which contain diseases and medications, symptoms, physiological measures, and health practice measures explain more of the variance in self-ratings of health for women than they do for men. Women may be judging conditions in light of a lifetime of more prevalent health problems, or in comparison with other women who also experience many conditions. If poor ratings of health by men reflect more serious conditions, and if more of the variance in women's self-ratings is explained by existing conditions, it is clear why men's poor ratings are more predictive of mortality than are women's poor ratings.

To sum up, in 23 of the 27 studies in Table 1, the findings are consistent and effect sizes are quite large; self-ratings of health, which take only seconds to obtain in a survey interview, reliably predict survival in populations even when known health risk factors have been accounted for. These findings have had the effect of conferring a retroactive significance on three decades of social scientific research (Angel and Thoits 1987; Haberman 1969; Maddox 1962; Suchman, Phillips, and Streib 1958). From the first, interdisciplinary studies of health have shown that there are discrepancies between global self-ratings and medically obtained health status information and that these discrepancies were often associated with social and demographic factors such as gender or age. Such findings imply that survey respondents' perceptions of health status are holistic; they include information on medical status, but that information is evaluated differently by men and women in different social positions,

with different reference groups providing different social comparisons. The significance of these findings for social scientific approaches to understanding health can hardly be exaggerated.

What are these sensitive measures telling us? How does one explain these extremely consistent findings? In order to understand the mechanisms at work in the association, we next propose a set of interpretations of the data, with particular attention to the negative cases and what they can teach us.

POSSIBLE INTERPRETATIONS

(1) *Self-rated health is a more inclusive and accurate measure of health status and health risk factors than the covariates used.*

Interviewer: What went through your mind when you rated your health as "fair"?
Respondent: Well, my health . . . see that's a hard question, it depends on different things. As far as my weight I feel that it's very, very poor but as far as my cholesterol I think it's absolutely excellent, 125, is excellent. But when you say things like my knees are hurting me, some days they are, some days they're not. My knees are in poor condition but my heart is in good condition. My ankle hurts 'cause I broke it last year. But I feel good 'cause I can walk. You can't really say, let's just say one specific thing, but if you're talking about general stuff, I have to say, oh, I may be excellent healthwise in one way, and very poor healthwise in another way.
Interviewer: So when you average it all out?
Respondent: It's right in the middle. It's like those shades of grays between the black and white. So I can't say everything about me is poor and not everything about me is excellent. (Idler, unpublished data)

(a) *Self-rated health captures the full array of illnesses a person has and possibly even symptoms of disease as yet undiagnosed but present in preclinical or prodromal stages.*

Even the extensive sets of covariates used in the studies in Table 1 do not entirely rule out this possibility. As for disease in preclinical stages, very few of the studies asked specifically about symptoms, which potentially could indicate undiagnosed disease. Regarding existing illness, in most studies respondents were asked to report the presence of specific (usually chronic) diseases. Even when the most common and most severe conditions are included, they probably do not exhaust the possibilities. Two of the studies that fully accounted for the independent effect of self-rated health on mortality incorporated physician or nurse examinations. In one of them (Deeg et al. 1989) the result may be due to a confound: Self-rated health was operationalized as good or poor subjective health, but subjects were also asked if they perceived a decline in their health, and both show bivariate associations with mortality. In the final multivariate analysis, with both measures included, self-perceived health decline is still significant, but the subjective health rating is not. This finding concerning decline may be a key one and we examine it later.

On the other hand, if physician examinations are better at picking up early symptoms of serious illness, we would expect studies which included such data to show fewer independent effects of self-rated health. In fact, three other studies also included physician examinations and all found significant effects for self-rated health beyond the physician ratings. In one of them (Pijls, Feskens, and Kromhout 1993), a complete set of cardiovascular risk factors was assessed, including anthropometric measurements, electrocardiograms, blood pressure, serum cholesterol (HDL), dietary history, smoking, minutes of exercise, hospital discharge information, cumulative incidence of cardiovascular disease during the five years of follow-up, use of medications, and family history of chronic disease, particularly heart disease. In this investigation, self-rated health was a significant predictor of five-year all-cause mortality when all the above risk factors were taken into account, but it was not a significant predictor of heart disease deaths considered by themselves. One could argue on the one hand that an equally thorough assessment of risk factors for the other causes of death could have removed the all-cause mortality finding, but risk factors for cancer and other leading causes of death are not as well understood, and indeed family history of stroke, hypertension, diabetes, and cancer *were* assessed.

In addition, two studies looked at healthy individuals. Rakowski, Mor, and Hiris (1991)

looked at the Longitudinal Study on Aging (LSOA), excluding individuals reporting a high-risk medical condition or difficulty in instrumental activities of daily living (IADL), thus leaving 1,252 of the original sample of 4,199 self-respondents at baseline. Less favorable self-rated health significantly predicted mortality over a relatively short period of two years within this healthy group, beyond controls for functional ability, body mass index, sociodemographic variables, and social support. Schoenfeld and colleagues (1994) ran a similar test using data from the high-functioning elderly sample of the Mac-Arthur Field Study of Successful Aging. Self-rated health had a very strong effect (adjusted OR of 19.6 for poor vs. excellent health), which became even stronger when the subgroup that had one or fewer chronic diseases was tested separately (see tab. 1). Self-reports of medical conditions and even medical examinations could be wrong as well as incomplete, but it is hard to explain the entire association this way, which in effect leaves self-rated health to "correct" the misdiagnosis. It is more plausible that self-ratings of health in these "healthy" individuals captured something beyond their known medical history.

A look at the findings from another perspective also suggests that existing illnesses and symptoms cannot provide a sufficient explanation. If the existence of preclinical, unmeasured illness entirely explained the effect of self-ratings of health, one would expect the most powerful effects in the short term, with steadily diminishing effects as follow-up periods increase. But as Table 1 shows, Mossey and Shapiro (1982) found similar risk ratios for the earlier and the later parts of the follow-up; risk ratios based on the LSOA are similar for a four-year (Wolinsky and Johnson 1992) and a six-year follow-up (Rakowski et al. 1993); and risk ratios are still quite high and statistically significant even in studies with the longest follow-up periods (e.g., Shahtahmasebi, Davies, and Wenger 1992; Appels et al. 1996). Taken together, the impressive number of studies with long follow-up periods and a variety of covariates suggests that this explanation may not be sufficient in itself.

(b) *Self-ratings of health represent complex human judgments about the severity of current illness.*

Most of these studies did not weight the illnesses in any way, although it is quite clear

that severity varies, over time and between individuals. Any disease that has an impact on functioning, such as heart disease or arthritis, will show a large variance in the severity of symptoms related to it. This differential weighting may be more fully captured by self-ratings than dichotomous diagnostic categories.

Another aspect not fully captured may be the effects of comorbidity. There may be complex interactions between conditions, or the effect of a "critical mass" of health problems, that are not fully reflected by an additive measure of chronic disease. Comorbidity is the rule rather than the exception at older ages: Patrick (1987) found chronically ill persons living in the community to have an average of three medical conditions, and the number of conditions to increase with age. No study has tested the association between self-rated health and interactions of conditions but there is evidence for the impact of such interactions on survival. For example, factors such as comorbidity and functional status, but not the severity of trauma, were predictive of survival among elderly patients after hip fracture (Poor, Jacobsen, and Melton 1994). A person may be able to assess the impact of these factors and their interactions with health status following events such as a hip fracture, yet this information is not typically measured.

Beyond that, Stenback (1964) suggested that the patient, in contrast to the physician (or survey instruments), has access to sensations coming from within and giving rise to a general body feeling called *cænæsthesis*. It may be that "the whole is more than the sum of the parts" and while researchers are measuring the parts, respondents have access to the whole.

(c) *Self-rated health reflects family history.*

Idler and Kasl (1991) suggested that self-assessments of health reflect a personal estimate of longevity. This estimate may be based not only on knowledge of the respondent's own current health, but also on the knowledge of familial risk factors. A family's vulnerability to specific diseases and pattern of longevity represents a social source of knowledge that grows as people age and experience the deaths of first grandparents and then parents. A well-known longitudinal study of a cohort of 184 graduates of Harvard University has found that actual ancestral longevity is strongly associated with the chronic physical illness and mortality this

cohort experienced by the time they reached their late sixties (Vaillant 1991). Three studies in Table 1 contained measures of family history or longevity; two of these studies show an independent effect of self-ratings remaining when family history is taken into account (Borawski, Kinney, and Kahana 1996; Pijls et al. 1993), and one study does not (Deeg et al. 1989). This inconclusiveness is not surprising since an effect of family history through self-rated health would probably not be based directly on the age parents died or the illness they died from, but on an interaction between these facts and the person's current health status, age, and behavioral risk factors. Approaching the age at which his father died from a heart attack may have a strong negative impact on the self-rating of a man if both he and his father were overweight and smokers. On the other hand, a long-lived family history could foster a sense of invulnerability to illness. Neither case is an example of unmeasured current health status of the individual. Rather, it is an area of information about health history which could be incorporated in surveys.

(2) *Self-rated health is a dynamic evaluation, judging trajectory and not only current level of health.*

> Respondent (in nursing home): When it (health) failed, I began to realize when I was well I had a different outlook on things. When my health failed, I got so I was neglectful (of myself). I lost interest in everything, and I didn't want to keep going. (Powers 1988:304)

Another reason for the independent effect of self-ratings of health is that they may reflect a dynamic, rather than static, perspective on health; people may be judging decline (or improvement) in various aspects of health. It may be a decline in their actual health status; a decline in their bodily reserve, reflected by a general slowing down of the body; or a perceived increase in susceptibility to disease. On the other hand, a trajectory of improvement from an earlier period of illness or disability may be evident to the respondent but not to the momentary external observer.

Most of the studies predicted mortality from one-time baseline measures and thus could not model changes in health. Only two studies included a measure of change that was assessed in both cases by the researchers

within the longitudinal design of the study and not based on retrospective recall of the respondents. Thomas et al. (1992) predicted mortality from health, depression, and socio-demographics. When changes in problems of daily living and in health conditions over 24 months were entered in an analysis predicting mortality within the next year, the effect of baseline self-rated health became weaker, but was still significant. Svärdsudd and Tibblin (1990) interviewed and examined a sample of 945 60-year-old men in Sweden, with a follow-up after seven years and records of mortality up to 15 years. Men who had a deterioration of two or more points on a 7-point scale of perceived health from age 60 to 67 were much more likely to die in the next eight years ($p < .0001$). Stronger evidence based on further analyses of the LSOA data is presented by Wolinsky and colleagues (Wolinsky et al. 1993; Wolinsky, Callahan, and Johnson 1994). Deterioration in basic ADL ($p < .001$) and lower body function ($p < .005$) between 1984 and 1986 were significant predictors of mortality between 1986 and 1988 and substantially improved the overall fit of the model. They also led subjective health status to lose its statistical significance. This is evidence that self-ratings of health are fundamental indicators of declines in health and functioning, rather than simple current assessments, and this may account for most of their independent effect on mortality.

(3) *Self-rated health influences behaviors that subsequently affect health status.*

> Respondent: I know if you're doing exercise then over time you start to feel better, and I know days when I've felt sort of blah and I've been at home, sometimes I just take the vacuum cleaner and start working, and before long I start to feel better . . . I think the physical activity does do something to make you feel better. (Litva and Eyles 1994:1087)

(a) *Poor perceptions of health may lead to less engagement in preventive practices or self-care.*

Adults with poorer perceived health may be less engaged in preventive health practices or self-care that contribute to better health. Lamb, Roberts, and Brodie (1990) found that sports participants had better perceptions of health than a matched sample of nonparticipants. Elderly people with poor perceptions of health may also be less likely to be very

active or to exercise, and inactivity has been shown to accelerate functional decline and predict morbidity (Mor et al. 1989; Rakowski and Mor 1992). Other poor health practices such as smoking and heavy alcohol consumption are also associated cross-sectionally with poor perceptions of health (Hirdes and Forbes 1993; Segovia, Bartlett, and Edwards 1989). Haug, Wykle, and Namazi (1989) have shown that older respondents with better perceived health were more likely to engage in self-care, controlling for chronic conditions, symptoms, and psychosocial factors. Hence, one reason for the influence of self-rated health may be that these ratings reflect other factors indicative of healthy lifestyles and utilization practices. One or another measure of health practices is included in 13 of the 27 studies.

(b) *Poor perceptions of health may produce nonadherence to screening recommendations, medication, and treatment.*

Older individuals who perceive their health as poor may be preoccupied with their current and perhaps more visible and functionally limiting health conditions, so they neglect to engage in preventive measures such as mammography screening, to take medication for conditions such as hypertension, or to follow instructions regarding diet and exercise. This neglect of either primary or secondary prevention may facilitate the progress of disease processes and eventually result in earlier death. No studies, however, examine whether self-rated health may reflect compliance with medical care and advice.

(4) *Self-rated health reflects the presence or absence of resources that can attenuate decline in health.*

> Respondent: My leg. That's the only thing that's holding me back. I feel good. And when I look around . . . I'm not sick. Believe me, some of these men and ladies around here . . . I'm not sick. I don't wanta brag, but I wouldn't wanta be the way some of these people are that hafta be here. (Powers 1988:303)

(a) *The external social environment may provide such resources.*

Just as self-rated health may reflect an assessment of internal levels of resistance, it may also indicate an evaluation of external resources for coping with future illness. Many possible indicators of external resources such as income, education, living arrangements, and social networks have been covered quite well by the control variables in most studies since they have direct effects on morbidity and mortality. Still, self-rated health may be more accurate in reflecting the adequacy of these resources to meet future needs and not only their absolute level, which is typically the measure. Indeed, Sugisawa, Liang, and Liu (1994) found that social support and social participation have indirect effects on mortality through self-rated health, but that social contacts and marital status had neither direct nor indirect effects.

The importance of social resources for individuals' self-ratings may also come in the form of availability of social comparisons. External social resources provide opportunities for health comparisons; research with patient samples has shown that these tend to be selectively downward comparisons, with others whose health is worse (Breetvelt and Van Dam 1991; Wood, Taylor, and Lichtman 1985). The consequence is an effective enhancing of feelings of relative well-being, which could perhaps facilitate rehabilitation or recovery efforts.

(b) *Self-rated health may also reflect within-person resources.*

Negative assessments of health may stimulate the neurological system in ways that compromise the immune system, thus leaving the individual more susceptible to future disease and lowering the chance of successful recovery from it. Depression may be one indicator or mediator of such a process. Several other measures in the studies, such as control over health, that are conceptually similar to self-ratings show effects on mortality that overlap with that of self-rated health. They may reduce or eliminate the effect of self-ratings, but also help us interpret the meaning of self-rated health as a predictor of mortality. Lack of projects for the future was found to have a significant independent effect on mortality, beyond health measures, making the effect of self-rated health nonsignificant (Grand et al. 1990). The effect of lack of projects for the future may also be explained as reflecting a trajectory of declining health more accurately than self-rated health does. Bleak ideas of the future are one of the elements of the "cognitive triad" of depression (Beck 1967); if this specific aspect of depression has a negative impact on the immune system, it may well become a self-fulfilling prophecy.

Similarly, Wolinsky et al. (1993) found a significant effect on mortality for perceived control over health that was independent and stronger than that of self-rated health, and both effects became nonsignificant once declines in functional ability were entered. Loss of control may also be both a trigger for processes having negative impact on the immune system *and* a marker for declining health status. However, with our present knowledge it is premature to comment about these possibilities. To even begin to assess the merit of such suggestions, more research on possible relations of self-rated health to immune markers is clearly needed.

In summary, this list of possible mechanisms leads to a simple observation: A very long list of variables is required to explain the effect of one brief 4- or 5-point scale item: "How in general would you rate your health?"! This item is a most powerful self-assessment, combining myriad factors from many different domains of life. Very rarely in the social sciences does one item achieve such a status, being highly valid in predicting a substantively significant outcome beyond such impressive "attacks" aimed at ruling it out. Viewed from this angle, it is completely irrelevant whether the goodness-of-fit of models predicting mortality stays roughly the same with or without self-rated health; its significant effect is impressive, regardless of whether it operates as an indicator of some unmeasured process or simply as a most effective summary of all the other measures.

THE NEXT STAGE OF STUDIES

We have presented the results of 27 studies of the same independent and dependent variables and included only those with similar sample characteristics and covariates. Rarely do authors of a literature review enjoy such comparability of study designs, let alone such consistency of findings. It makes the task of summarizing the findings less a matter of deciding where the weight of the evidence lies or which study designs need to be fine-tuned, and more an opportunity to speculate about a new generation of research questions. We would argue that researchers are fast approaching, if not already reaching, the limits of what secondary analysis of these large, longitudinal data sets can tell us about the

relationship between self-ratings of health and mortality. There is a point when replication becomes redundancy.

It is the audience of this journal, social scientists involved in the study of health, who should have the most creative ideas for new studies. New approaches must come from an openness to many methods and research designs, small-scale and large, cross-sectional and longitudinal, observational and directed, qualitative and quantitative. In a recent essay, Stanislav Kasl argues that in many areas of research on the health of the elderly, the secondary analysis of large data sets has become "the repeated examination of a smallish set of independent and dependent variables [which] drives us away from our goal of expanding our understanding . . . as a basis for opening up new areas of research and giving us hints about promising new variables they may be particularly infertile" (Kasl 1995:S191). He proposes a new approach, nesting small-scale studies within larger ones and designing them to answer specific questions, rather than depending opportunistically on the data already available. Other multiple-method approaches, particularly those integrating qualitative and quantitative data collection techniques, should also be very fruitful for the study of self-rated health.

Thus we conclude this paper with another list, a non-mutually exclusive and nonexhaustive one, of ways we could find out more about self-rated health, by asking different questions and using different methods.

1. *Begin by studying outcomes other than mortality.* This is an area where the secondary data analysis approach would still be useful, and a small number of studies have already appeared in the literature. As we saw above, functional ability was frequently assessed at baseline in the mortality studies, and several studies have now taken it as an endpoint in itself. Poor self-rated health is reported to be an independent predictor of declines in functioning in studies from France (Grand et al. 1988), Finland (Jylhä 1993), Great Britain (Jagger, Spiers, and Clarke 1993), Japan (Haga et al. 1995), and the United States (Idler and Kasl 1995; Kaplan et al. 1993; Mor et al. 1994). Follow-up periods ranged from 4 to 10 years. Other study characteristics are similar to those in the mortality studies by the same authors. Two studies in which findings were negative were those of Mor and

associates (1989) and Markides and Lee (1990), with two and eight years of follow-up.

Clearly there are many other morbidity measures which could be studied. Morbidity outcomes that are also mortality risks would be of greatest interest: In addition to functional ability, new cases of heart disease, cancer, stroke, or diabetes might be sufficiently numerous to study. We would also include other health-related outcomes on which there has been some research, such as hospitalizations or nursing home admissions (Blaxter 1985; Mutran and Ferraro 1988; Wolinsky, Stump, and Johnson 1995).

2. *Study special populations.* Several interesting studies have recently appeared that look at the effect of self-ratings of health in special populations such as nursing home residents or patients with a particular disease; these studies also frequently take outcomes other than mortality. All of these studies raise issues of study design and measurement of outcome, making them more complex than the mortality studies. An early example was from Mæland and Havik (1988), who found that return to work six months after a myocardial infarction was related to the patient's retrospective rating of self-rated health at discharge, of global health before the heart attack, and of future health. Another study of the role of self-ratings of health in recovery from hip fracture, stroke, and myocardial infarction by Wilcox, Kasl, and Idler (1996) obtained self-ratings of health before the event occurred (respondents were already part of the New Haven EPESE sample) and at six weeks and six months after the event. Their findings showed that six-week post-event ratings (but not pre-event ratings) predicted recovery at six months, even when the severity of the respondent's medical condition and level of functioning at six weeks were taken into account. Wolinsky and Fitzgerald (1994) also studied hip fracture patients and found that LSOA respondents who had fractured a hip had a higher risk of a second hip fracture if they had poor perceived health. Dasbach et al. (1994), in a study of diabetics in Wisconsin, found higher mortality rates associated with poor perceived health, particularly among those with late-onset diabetes. Stones, Dornan, and Kozma (1989) also found that perceived health significantly differentiated survivors from nonsurvivors in nursing homes in Newfoundland, Canada.

We note that many of the studies included in this review are actually of the "special population" of the aged; in fact, a majority of those included under community studies include only elderly persons. This is partly because of tradition; the studies of self-rated health really began with the elderly sample in the Duke Longitudinal Studies of Aging (Maddox 1962), and many have appeared in the gerontology journals. It is also partly pragmatic; mortality studies can be performed with much shorter follow-up periods in elderly populations. But the study of self-ratings of health among the elderly has been especially interesting because older people have been shown to be more optimistic in their self-ratings than younger respondents (Maddox and Douglass 1973; Rakowski and Cryan 1990) and to hold more holistic definitions of health (van Maanen 1988), for reasons which could be due to aging, cohort, or period effects (Idler 1993).

3. *Use qualitative approaches.* Throughout this review we have inserted relevant passages that capture, in a respondent's own words, a concept we wanted to illustrate. Without discussing them directly, we hope they have already suggested the considerable potential for this approach to uncover the multifaceted meanings respondents convey with their own words. There are just a few qualitative studies of self-ratings of health. The study by Jylhä (1994) is interesting because it shows transcripts of taped interviews in which respondents were asked only to respond to the scale; the negotiating and discussing that goes on tells a great deal about both the reality of the interview situation and the meaning of self-ratings. Groves, Fultz, and Martin (1992) and Krause and Jay (1994) present coding of qualitative data from cross-sectional convenience samples of non-elderly respondents but no direct text. Both studies find primarily physical health-related meanings, including presence/absence of health problems, functioning, positive/negative health behaviors, and health service use when respondents were asked to expand on their closed-ended response. Borawski et al. (1996) present longitudinal data from a randomly selected sample of elderly retirement community residents. They find a more complex set of meanings, including physical health focused, health transcendent ("I'm

fine, except for. . ."), attitudinal/behavioral ("I don't let things bother me"/"I don't get enough exercise"), externally focused ("Doctors tell me I'm fine"), and nonreflective ("I just feel that way") meanings. These more complicated explanations of self-ratings, and those in Powers (1988) and van Maanen (1988) reflect the greater prevalence of chronic conditions among the aged and the ambiguity of many conditions that can be seen by elderly people as aging-related, rather than medical.

The complex meaning respondents offer for their answers underscores the strength and weakness of global items, in research on self-rated health, or in other related areas such as quality of life or life satisfaction. Psychometricians and others who believe that the error associated with single items is unacceptably high regard global rating items with suspicion. The problem with global items, from this point of view, is that researchers have no idea of, or control over, the areas of life respondents are assessing. On the other hand, Gill and Feinstein (1994:624), in an article assessing quality of life measures, conclude that global ratings "offer investigators the most overtly sensible approach" because they allow a full expression of a patient's values and preferences. They conclude that "unlike beauty, which rests in the eye of the beholder, quality of life is inherently an attribute of the patient (or 'beholdee')." Because qualitative approaches in the social sciences are uniquely suited to seeing the world through the eyes of the beholdee, they should prove extremely useful in the next stage of research. In the social sciences we often think of qualitative approaches as exploratory phases of research, which precede, rather than follow, large-scale quantitative studies. In this case, though, the pendulum should swing the other way.

4. *Study the cognitive/cultural processes associated with these judgments of health.* Qualitative approaches can tell us about the meanings respondents supply, but there may be additional influences on their replies that they cannot tell us about. For example, two studies raise important issues about cross-cultural differences that would be inaccessible to most respondents. In the first, Angel and Guarnaccia (1989) examined responses to the global self-rated health item in the Hispanic HANES, which also had, for comparison purposes, a physician's global rating of the respondent's health. They found that respondents who chose to do the interview in Spanish rated their health considerably more poorly and that the ratings were much more discrepant with the physician's rating, than those who did the interview in English. Their interpretation was not that the Spanish-speaking respondents were more hypochondriacal, but that "for Mexican-Americans and Puerto Ricans the adjectives associated with normal health differ from those used by non-Hispanic[s]"(Angel and Guarnaccia 1989:1234). One can see in the frequency tables that "fair" is the normative category for the Spanish interview, while most English-speaking respondents chose "good." A very similar case of cross-cultural differences in a single study occurs in the study by Appels et al. (1996), in which the normative category for Lithuanians is "poor," while it is "good" for the Dutch. The image of "normal" health in a society can be thought of as the entry point into these response scales. Such cross-cultural differences make the consistency of the findings from the international studies all the more remarkable.

Other investigations could begin with the survey instrument itself. Are responses to the self-rated health question affected in any way by their context in the survey instrument? Are responses to this question different when it appears after, rather than before, a chronic illness checklist? Do respondents change their self-ratings of health if asked to rate themselves again at the end of the interview? These are not just questions about survey methods, as important as those may be (Tanur 1992); they raise the question of whether the presence of conditions primarily affects subsequent judgments of overall health, or whether the perception of conditions itself might not be affected by a more fundamental evaluation of underlying health status (Feinberg et al. 1985).

A third area of study with a cognitive emphasis would be an examination of the process of reference-group comparisons, which many authors have identified as the fundamental process by which such self-ratings are made (Angel and Thoits 1987; Feinberg et al. 1985; Suls and Wills 1991). People use reference groups to identify others by their membership in social categories and then compare themselves to these socially similar and dissimilar others; this is an especially powerful idea with respect to

health judgments because the fundamental social categories of gender, race, ethnicity, age, and social class carry such objectively different mortality (and morbidity) risks. Above we argued that an age-based comparison was probably implicit in all self-ratings, but are other social categories used as well? An additional issue lies in the direction of health comparisons. An interesting study by Smith, Shelley, and Dennerstein (1994) shows that Australian women who rate their health as better than their (age/sex) peers had more complex definitions of health than those who rated their health worse, but this cross-sectional design does not resolve whether it was the complex definitions that led to the better evaluations, or the other way around. In sum, there are many things respondents can tell us about how they make these judgments but probably many things they cannot; multiple methods are needed to reveal the complicated and subtle meanings of self-ratings of health.

SUMMARY

In 1973, George Maddox wrote that self-ratings of health "clearly measure something more—and something less—than objective medical ratings" (Maddox and Douglass 1973:92). This review has been about the something more" that this global item measures, which in effect cedes control over its exact meaning to the respondent. We have reviewed a set of studies carefully selected for their exemplary research designs and representativeness and found that, in the great majority of cases, self-ratings add something more to the prediction of mortality. We have also found that secondary data analyses are approaching something of an impasse in understanding what that something more is and that other approaches, only some of which have been suggested here, are needed for progress to be made.

We conclude that self-ratings represent a source of very valuable data on health status. Global self-ratings, which assess a currently unknown array of perceptions and weight them according to equally unknown and varying values and preferences, provide the respondents' views of global health status in a way that nothing else can. We would argue that the global rating represents an irreplaceable dimension of health status and in fact that an individual's health status cannot be assessed without it.

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