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Positive Affect and Function as Influences on Self-Assessments of Health: Expanding Our View Beyond Illness and Disability

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Longitudinal data from 851 elderly residents of a retirement community (mean age = 73 years) were used to examine the correlates of self-assessments of health (SAH) and the predictors of changes in SAH over several follow-up periods ranging from 1 to 5 years. The authors hypothesized that indicators of positive health, including feelings of energy and positive mood, social support, and active functioning, are as important in determining current and future SAH as negative indicators such as disease history, disability, medication, and negative mood. Results of cross-sectional and longitudinal analyses showed that functional ability, medication use, and negative affect were salient to people judging their health, but positive indicators of activity and mood had an even stronger, independent effect. These findings show the importance of attending to the full illness-wellness continuum in studying people's perceptions of health.

IN many health surveys and questionnaires, respondents are asked to provide a global assessment of their own health. Such self-assessment of health (SAH) has intrigued researchers because SAH is an important predictor of a number of future health outcomes, such as mortality (see reviews by Benyamini & Idler, 1999; Idler, 1992; Idler & Benyamini, 1997), new morbidity (Ferraro, Farmer, & Wybraniec, 1997; Møller, Kristensen, & Hollnagel, 1996; Shadbolt, 1997), functional ability (Idler & Kasl, 1995; Kaplan, Strawbridge, Camacho, & Cohen, 1993), health care utilization and hospitalization (Mutran & Ferraro, 1988; Wolinsky, Culler, Callahan, & Johnson, 1994), recovery from illness (Wilcox, Kasl, & Idler, 1996), and future physician ratings of health (Maddox & Douglass, 1973).

In each of these studies, SAH was assessed as an independent risk factor in models that also included standard sets of better understood risk factors for the outcome in question. Such risk factors conventionally include some or all of the following: other measures of current health status, such as diagnosed comorbid chronic conditions; screening scales for serious (possibly undiagnosed) cardiac or pulmonary conditions; scales for measuring decline in physical and cognitive functioning; direct measures of blood pressure, heart rate, respiratory function, and so forth; and assessment of behavioral risk factors such as smoking, alcohol use, exercise, nutrition, and so forth. These health status and risk covariates are included because they represent competing, and better defined, risks for the outcome and also because they are correlated with SAH itself. The question underlying such studies is, Does SAH "correct" for incomplete or inaccurate measurement of health status, adding information not contained in other more specific measures of health status?

Other researchers have attempted to understand how SAH is related to other concurrent measures of health status. Data from many large, representative samples show that SAH is related both to measures of physical health and functioning and to psychosocial measures such as depression (Bjorner et al., 1996; Ferraro, 1980; Hays & Stewart, 1990; Rakowski & Cryan, 1990). However, most of the studies that evaluated the factors underlying SAH used various indicators of the presence (or absence) of disease. Rarely were indicators of active, high-level functioning, vitality, positive affect, general well-being, and so forth, examined. Even among people who do not suffer from any major physical or mental ailments, great differences can exist in levels of activity, energy, or happiness. Indicators that capture the positive end of the health spectrum may also have a profound impact on people's SAH.

Our goal in this article is to increase understanding of the information included in elderly people's SAH judgments by assessing the contribution of positive compared with negative indicators of physical and psychosocial well-being. Specifically, we examined the relative contribution of various types of information that may affect the choice a person makes on a 4- or 5-point scale in response to the simple question: "In general, how would you rate your health?" We examined these relationships cross-sectionally and also longitudinally, with follow-up data up to 5 years postbaseline.

Positive Indicators of Health

Several lines of research support our suggestion that positive indicators of health can improve understanding of the bases of SAH. The association of SAH with negative indicators of health has often been studied; Bjorner and colleagues (1996) summarized these studies and concluded that the amount of variance in SAH that is explained even

by a very complete list of health status correlates rarely exceeds 40%. For example, cross-sectional data from the Groningen Longitudinal Aging Study revealed that measures representing nine different domains explained 41.8% of the variance in perceived overall health (Kempen, Miedema, van den Bos, & Ormel, 1998). The measures representing the nine domains emphasized limitations and problems in physical, social, and role functioning and negative affects (depression, anxiety) in the affective functioning domain. The authors argued that this demonstrates the independence of SAH, but the findings leave open the possibility that explicit indicators of positive functioning, and not only of the absence of limitations, would have increased the percentage of variance explained in SAH. Similarly, longitudinal data from the NHANES-I Epidemiologic Follow-up Study (NHEFS) suggest a cycle of decline between emotional distress and perceived health (Farmer & Ferraro, 1997). Contrary to expectations, higher levels of distress did not predict poorer perceived health in the future. Farmer and Ferraro did not explore the possibility that positive mental health contributes to future perceived health.

A series of qualitative studies of SAH suggest that people consider "health," and not only "illness," when judging their own health. Narratives show that people perceived health as a complex, multidimensional concept. In general, people do note the presence or absence of disease or symptoms, but that is only one of three main aspects of health; the remaining two aspects include their ability to do what they need and want to do (functioning), and a general feeling of well-being, vitality, strength, and endurance (Castro, 1995; Herzlich, 1973; Jylhä, 1994; Krause & Jay, 1994; Manderbacka, 1998; van Maanen, 1988; Williams, 1983). Thus, in assessing health, individuals themselves include indicators of illness and disability as well as indicators of positive health and functioning, and the two types of indicators are not mutually exclusive: people may judge themselves as quite healthy, despite health problems of which they are aware and that they willingly report (Powers, 1988). Having health and being healthy are not the same (Litva & Eyles, 1994). Thus any attempt to understand SAH within the boundaries of more "objective" definitions of impaired health only is bound to be limited.

There is also some evidence from quantitative studies that examined the continuum of perceived health. The response scale of typical SAH questions ranges from positive—excellent or very good—to negative—poor or bad. Data from some studies support the suggestion that self-rated health forms a continuum from poor to good health (Mackenbach, van den Bos, Joung, van de Mhen, & Stronks, 1994; Manderbacka, Lahelma, & Martikainen, 1998), whereas other data reveal different factors associated with the poor-to-average range compared with the average-to-excellent range (Kempen et al., 1998; Smith, Shelley, & Dennerstein, 1994). Indicators of illness and disability have been more strongly associated with the poor end of the scale; positive health appears to go beyond "not bad" health, suggesting that different indicators may be necessary to discriminate at the top end of the scale.

The few quantitative studies that included positive measures of health clearly provide evidence for their importance in relation to people's actual and perceived physical and mental health. In a recent study of nursing home patients, the absence of positive affect, and not the level of negative affect, distinguished between major and minor depression (Lawton, Parmelee, Katz, & Nesselroade, 1996). In another study of elderly people, positive and negative life changes each made independent contributions to perceived health (Weinberger et al., 1986). The strongest support comes from studies examining energy or vitality: Subjective vitality was found to be highly salient to people and strongly related to physical and psychological health (Ryan & Frederick, 1997). The self-assessment of speed during everyday activities was the strongest predictor of SAH in one study (Engle & Graney, 1985–86); and similarly, energy level accounted for 48% of the variance in SAH in another study (Dixon, Dixon, & Hickey, 1993). In one of the few studies that reported no effect of SAH on mortality, a measure of tiredness–fatigue accounted for the SAH-mortality association (Avlund, Schultz-Larsen, & Davidsen, 1998). In general, low energy may be an indicator of both biological decline and unfavorable mood; both may be related to actual poor health, as well as to poor perceived health, whereas the presence of high levels of energy may contribute to high levels of SAH ratings.

Existing research clearly suggests that the most important basis for people's own judgments of their health is their physical health and functioning (Bjorner et al., 1996). We first examined the basic measures traditionally used to explain differences in health: age, sex, education as a proxy for socioeconomic status, and disease diagnoses. We also added measures of medication use and recent changes in health to provide a more sensitive assessment of the severity of the person's disease status (compared with the diagnoses alone). Although we expected these measures to explain a substantial part of the variance in SAH, they do not directly tap the subjective burden of disease a person experiences. We expected additional variance in SAH to be explained by measures of impaired physical functioning and of negative affect, including depression, anxiety, and fatigue. Thus, our first hypothesis replicated the common finding in the literature that measures of negative health status play an important role in determining current SAH.

H1: Chronic disease, functional disability, and negative affect will have a strong inverse correlation with current SAH.

The contribution of this study is in the addition of a set of measures of positive physical and psychological functioning: engagement in exercise, level of physical activity apart from exercise, work, positive affect (feelings of happiness and energy), and social support. These measures all tap positive aspects of health and well-being, and we also expected them to play an important role in determining current SAH, beyond the contribution of the negative aspects of health and well-being.

H2: Exercise, activity, work, social support, and positive affect will have a strong positive correlation with current SAH.

Most of the few studies that investigated the predictors of changes in SAH have been limited in some respect. Limita-

tions include focusing typically on relatively short time frames (e.g., 1 year, Hansell & Mechanic, 1991; 6–18 months, Mor-Barak & Miller, 1991); using young samples with little morbidity and hence low power (Goldstein, Siegel, & Boyer, 1984); using a nonstandard SAH question, for example, "How have you been feeling since I last talked to you?" (Rodin & McAvay, 1992); or predicting SAH from a composite index of physical function, role function, socioemotional function, and health problems that does not allow for separating the effects of specific measures (Gold, Franks, & Erickson, 1996). Exceptions in terms of length of follow-up are two studies based on the NHEFS data (Farmer & Ferraro, 1997; Ferraro et al., 1997), spanning 10–15 years of follow-up, but these two studies did not include positive measures of health.

SAH was rated by our respondents in annual follow-up interviews conducted 1–5 years postbaseline. Therefore, we assessed the contribution of our baseline indicators of health to changes in SAH over both the short and relatively long term. After adjusting for baseline SAH, we expected age and functional ability at baseline to be strong predictors of future SAH: Age is a powerful predictor of new disease, and impairments at baseline may indicate a trajectory of decline in functioning that is already in progress.

We also explored the associations between negative affect and future SAH. Findings cited previously (Farmer & Ferraro, 1997) suggest that distress does not lead to future declines in SAH over a period of 10 years. However, negative affect may influence SAH over shorter time frames. Moreover, our measure of negative moods included fatigue, as well as depression and anxiety, and may be more somatically based than measures used in other studies. Therefore, we tested the effects of age, functional ability, and negative affect on future SAH and expected these measures to be associated with poorer future SAH.

H3: Older age, limited physical functioning, and negative affect (fatigue, depression, anxiety) at baseline will predict poorer future SAH, adjusting for baseline SAH.

To the best of our knowledge, the effect of positive indicators of health on future SAH has not been studied. Yet it is plausible that an association exists between positive feelings of health and better future SAH. Such positive feelings may be an indicator of resources that help people cope better with existing or new physical ailments and disabilities, thus limiting the impact of disease on global SAH. Or they may even be a factor that attenuates health decline, in turn predicting less decline in SAH. In either case, higher levels of positive indicators of health would be associated with better future SAH.

H4: Positive healthiness, assessed by positive indicators of health, such as activity, social support, and positive affect, will be associated with better future SAH, after adjusting for baseline SAH, age, and physical health and functioning.

If the effect of positive healthiness is exercised mainly through the prevention of new negative health events, then adding a measure of change in physical functioning as a predictor of SAH should diminish the effect of positive healthiness on future SAH. However, if positive healthiness is a resource for good SAH, and is independent of negative indicators of health status, then it may have a persistent effect on future SAH even when declines in health occur. Thus, regardless of whether happy, energetic, and active elderly people are less prone to disease than less happy, energetic, and active elderly people, we hypothesized that positive affect serves as a resource that contributes to better SAH, despite new declines in health and function.

H5: Positive healthiness will retain its independent effect on future SAH, even after adjusting for changes in functional limitations over the follow-up period.

METHOD

Sample

The sample included 851 participants from a longitudinal survey study of community-dwelling older adults (mean age

Table 1. Demographic Characteristics of the Rutgers Aging and Health Study Sample at Baseline ($N = 851$)

Variable and Groups	Frequency	%
Age		
<70	278	33
70–79	389	46
Over 80	184	21
Gender		
Females	513	60
Males	338	40
Education		
No or some high school	40	5
Completed high school	166	20
Some college or vocational school	262	31
Completed college	176	21
Some professional or graduate school	54	6
Completed masters	98	11
Completed MD or PhD	54	6
Race		
Caucasian	845	99.3
African American	1	.1
Native American	1	.1
Asian American	3	.4
Religion		
Protestant	333	39
Catholic	224	26
Jewish	227	27
Agnostic, Atheist, None	46	6
Other	20	2
Marital status		
Married or cohabitating	520	61
Widowed	228	27
Divorced/separated	48	6
Single, never married	54	6
Living arrangements		
With spouse or partner	503	59
With someone else	30	4
Alone	318	37
Working		
No	699	82
Yes	150	18

at baseline = 73 years; see Table 1 for demographic characteristics of the sample). Participant drop-out due to withdrawal, severe illness, relocation, or death averaged 9% per year.

Participant Recruitment

Participants lived in a retirement community of 2,955 people, 65% (1,920) of whom were female. We randomly selected a set of 1,772 names from the community directory (N = 872 males, 900 females) as the initial target for telephone recruitment: 459 members of the set were eliminated for reasons such as disconnected or unlisted phone number, failure to respond after multiple calls, moved, or deceased (because the community directory is updated only periodically, at any given point in time people who have recently died or moved may still be listed). Disconnected or unavailable phones belonged mostly to people who were away for a long period of time. Of the 1,313 people reached on an initial phone call, 607 agreed to participate, a recruitment rate of 46.2% on first contact. The principal investigators also gave talks at 18 of the 19 units in the community. Following these talks, an additional 244 residents who were not in the original set of 1,313 persons volunteered to participate, bringing the sample to 851 participants. Because this number approached the maximum we could interview with our staff, we ended recruitment at that point. The decision to accept the volunteers was made on advice from members of the community advisory board, who indicated that turning people away would jeopardize recruitment, both by offending people and by creating the impression that participation was not necessary. Although we cannot compare these additional volunteers to those from the randomly selected list of residents who volunteered when called, the presentations given in public and over the phone were essentially the same. There is no reason, therefore, to assume that there was any major difference between the two sets of participants.

Design and Procedure

The longitudinal study included in-depth, in-person, annual interviews. Ninety-five percent of the interviews were conducted in respondents' homes, the remainder in the community clubhouse. Interviewers described the study objectives to each participant, who then signed a detailed consent form. Interviewers read all questions aloud and recorded the participant's responses directly into the computer. Average duration for interviews was 2.5 hr (range = 1.25–5 hr) in the first 3 years, and 1.5 hr in the 4th year on. The interviewers, advanced undergraduates and graduate students in psychology, sociology, and medicine, were trained by a board-certified internist and geriatrician on techniques for probing for medical conditions and recording medications.

Instruments and Measures

Self-assessed health.—The lead question in each interview asked for a rating of SAH: "In general, would you say your health is excellent, very good, good, fair, or poor?" (1 = "poor," 5 = "excellent"; see distribution of this and other health measures in Table 2).

Table 2. Health Status of the Rutgers Aging and Health Study Sample at Baseline (N = 851)

Indicator	Frequency	%
Self-Assessed Health[a]		
Excellent	147	17
Very good	265	31
Good	328	39
Fair	95	11
Poor	16	2
Chronic Diagnoses		
Major cardiac events	121	14
Underlying cardiac diseases	484	57
Cancer (has or had)	240	28
Hypertension	293	34
Diabetes	67	8
Pulmonary conditions	35	4
Renal failure	8	1
Diverticular diseases	109	13
Osteoarthritis	455	54
Cataracts	299	35
Hearing loss	193	23
Daily Use of Doctor-Recommended Medications		
0	201	24
1–2	366	43
3–4	174	20
5+	110	13
Number of Recent Illnesses (Past 3 Months)		
Acute		
None	625	74
1	199	23
2+	27	3
Chronic		
None	566	67
1	221	26
2+	64	7
Injuries		
None	794	93
1–2	57	7
Health Behaviors		
Exercise[b] (hr/week)		
0	106	12
1–3	160	19
4–7	253	30
7+	332	39
Physically active[c]		
Very much	89	11
Quite a bit	191	23
Moderately	343	40
A little bit	131	15
Not at all	96	11
Eats every day		
Breakfast	798	94
3 meals	682	80
Balanced diet	659	78
Smoking		
Never	288	34
Past	496	58
Current	67	8

[a]Rated on a scale where 5 = "excellent" and 1 = "poor."

[b]Sum of the total number of hours per week, on average, respondent engaged in strength building, strenuous sports, and light sports.

[c]Aside from exercise; rated on a scale where 5 = "very much" and 1 = "not at all."

Physical health measures: medical history (disease diagnoses).—The respondent's medical history was assessed by a detailed review of approximately 70 diseases from 19 illness categories, with open-ended probes for additional illnesses in each category (e.g., "Have you ever had any of the following heart or cardiovascular diseases . . . ?" and ending with "Any other . . . heart disease?"). The categories included cardiovascular, lung, allergies–hay fever, infections, cancer, noncancerous tumors–cysts, stomach–intestinal, immune, nervous system, genital–urinary, joint–bone–muscle, kidney, blood, skin, diabetes, thyroid, eye, ear, and mental illnesses. Prevalence of major diseases in this sample appear in Table 2. Six internists rated the severity of each of the diseases, from a low of 1 if it was trivial to a high of 100 if it was extremely life threatening. The Cronbach's alpha reliability coefficient for these six ratings across 427 disease codes was .97. The judge–total correlation was high and similar for all six judges (ranging from .89 to .93). To determine weights for each illness, we dropped the highest and lowest physician rating and averaged the remaining four ratings. The mean range of these four ratings was 9.9 on the 100-point scale. We computed an illness burden score—the sum of the illnesses reported in his or her medical history, each illness weighted by the mean severity rating for that illness—for each participant. This measure takes into account the "typical" severity of each illness, not its severity as manifested in each individual respondent, and therefore it is more crude than an actual physician examination of each participant. However, the measure is based on a very extensive review of the individual's medical history, and reported illnesses are weighted by their severity, a more elaborate procedure than is typically used when extracting medical history from self-reports.

Additional measures of poor health (see Table 2).—Additional measures included the following: (1) the number of medications taken daily by doctor's recommendation; (2) recent illnesses in the past 3 months; (3) recent weight loss without dieting; and (4) functional disability, assessed with the following 4 items asking about limitations in physical functioning ($\alpha = .71$): "Does your health limit the kinds or amounts of: (a) vigorous activities you can do, such as running, lifting heavy objects, or participating in strenuous sports or activities?; (b) moderate activities you can do, such as moving a table, carrying groceries, bending, or lifting?; Do you have any trouble: (c) walking one block, uphill, or a few flights of stairs?; (d) eating, dressing, bathing, or using the toilet?" (the response scale was from 1 = "not at all" to 5 = "very much"). A mean of the 4 items was computed. This 4-item scale was found to be highly correlated ($r = .84$) with an 18-item disability and activity limitations scale (see Johnson & Wolinsky, 1994, for items), assessed on a subsample of 522 of our participants 5 years postbaseline.

Good–active physical functioning.—Participants were asked to report their level of physical activity and engagement in exercise (see Table 2).

Health behaviors.—Average number of cigarettes, cigars, and pipefuls smoked per day and the number of years smoked were recorded, as were dietary habits (see Table 2; the three dietary habits were summed to create a "good dietary habits" score).

Psychological health: negative and positive affect.—We used six-item scales to assess each of five moods: depression, anxiety, fatigue, energy, and happiness (e.g., "How depressed/sad/ . . . are you usually?" "How happy/content/ . . . are you usually?"; response scale was from 1 = "not at all" to 5 = "very much"). The items were adapted from Usala and Hertzog (1989), who tested items from commonly used affect scales on an elderly sample. Cronbach's alpha ranged between .88 and .93. Principal components factor analysis with a varimax rotation revealed two factors, one loading on the negative affect and one on the positive affect measures. We computed a negative affect measure by averaging the three negative affect scores and a positive affect measure by averaging the two positive affect scores. The correlation between the two measures was −45.

Social support.—We assessed the availability of social support using nine items tapping instrumental support, emotional support, and socializing ($\alpha = .81$) formulated on the basis of the research conducted by Fischer (1982). All items were rated on a 5-point scale from 1 = "never" to 5 = "always."

Results

Cross-Sectional Associations of SAH With Health-Related Measures

Bivariate, cross-sectional associations of our measures with SAH supported Hypotheses 1 and 2: Negative indicators of health—chronic disease, functional disability, and negative affect—had a significant inverse correlation with SAH (H1), whereas positive indicators of health—exercise, activity, work, social support, and positive affect—had a significant positive correlation with SAH (H2). The zero-order correlations between SAH and our main measures are shown in Table 3 (left column).

Next, we performed an hierarchical regression analysis, examining the independent contributions of these measures when entered together. We performed the regression analysis in four steps. First, we assessed the contributions of the traditional basic measures of health, sociodemographic characteristics and disease and found they explained 27% of the variance in SAH. Next, we added functional disability and negative affect in model II. These added another 9% to the variance explained in SAH; they accounted for the effect of older age on lower SAH and for some of the effects of the disease indicators. This was in accord with our expectation that indicators of the subjective burden of disease will have an independent contribution to SAH, after we controlled for basic demographic and health measures.

In Model III we added the positive indicators of functioning: This set of positive indicators explained an additional 4% variance in SAH. Although both social support and exercise had significant bivariate associations with SAH, with the addition of the set of measures at this step, they did not

Table 3. Summary of Hierarchical Regression Analysis Predicting Self-Assessments of Health From Demographics, Negative and Positive Indicators of Health, Functioning, and Affect

Measure	Pearson Correlation	Standardized Regression Coefficients			
		I	II	III	IV
Demographics					
Age	−.20***	−.12***	−.05	−.00	.01
Male gender	−.05	−.05	−.07*	−.07*	−.06*
Education	.07	.08**	.06*	.06*	.05
Medical Status					
Medical history	−.38***	−.18***	−.11**	−.11***	−.13***
Medication	−.42***	−.29***	−.20***	−.18***	−.17***
Recent chronic onset or flare-up[a]	−.24***	−.15***	−.09**	−.09**	−.08**
Weight loss without dieting	−.17***	−.09***	−.10**	−.09**	−.08**
Impaired Physical or Psychological Functioning					
Functional disability	−.47***		−.25***	−.18***	−.16***
Negative affect	−.39***		−.19***	−.15**	−.08*
Positive Physical or Social Functioning					
Exercise	.22***			.04	.01
Physically active aside from exercise	.39***			.17***	.09**
Working	.20***			.10**	.09**
Social support	.21***			.06*	.03
Positive Psychological Functioning					
Positive affect	.49***				.25***
Adjusted R^2		.27***	.36***	.40***	.44***

[a]In the past 3 months.
*$p < .05$; **$p < .01$; ***$p < .001$.

have a significant effect. In Model IV we added positive affect, which added another 4% variance explained in SAH.

Several points are worth noting in this regression analysis. Although 27% of the variance was explained at the first step, when the medical measures were entered, their independent contribution to the final model was more modest (the total R^2 for Model IV declined by 7% when these variables were removed): Their effect was captured by the more salient indicators of physical and psychological functioning (positive and negative). Moreover, even the contribution of negative indicators of functioning was limited: Omitting functional disability and negative affect from the final model resulted in a decrease of only 2% variance explained. The positive indicators, however, which were added in Models III and IV, added 8% to the total variance. Thus, the indicators of positive functioning and mood seemed to mediate much of the effect of both medical and negative functional measures on SAH and to add an independent contribution to the explanation of SAH.

Measures that were not associated with SAH at the bivariate level are absent from Table 3: SAH was unrelated to recent minor ailments (acute illnesses and injuries) or to the health behaviors of smoking and dietary habits.

Predictors of Changes in SAH Over Time

We also examined the baseline predictors of future SAH, that is, SAH at Years 1, 3, and 5 years past baseline. Findings for Years 2 and 4 are not presented; they were essentially the same as for Years 3 and 5. First, we computed the correlation of each of the variables in the study with future SAH, partialling out baseline SAH, and found that lower future SAH was predicted by older age, male gender, more disease reported in the medical history, more medication, more disability, less social support, higher negative moods, and lower positive moods. In contrast, education, recent illnesses, weight loss, physical activity, exercise, and working were unrelated to future SAH, when we controlled for baseline SAH. We computed partial correlations at each wave for all participants at that time and also only for the 525 people who still participated in Year 5; because only slight differences existed in the pattern of correlations between the full sample at each wave and the Year 5 sample, we present the findings from the full sample available at each year of data.

Next, we performed multiple regression analyses in which all the measures that had significant partial correlations with later SAH were entered into one model predicting future SAH. This model was repeated for the three follow-up periods. Medical history and social support had no independent effect on future SAH in these multivariate models and were therefore excluded from the models presented in Table 4.

Four measures consistently predicted poorer future SAH at all follow-up periods: older age, limited functioning at baseline, higher negative affect, and lower positive affect (see left column for each follow-up year, Table 4). Thus, our third and fourth hypotheses were also confirmed. As stated in H3, indicators of possible decline in health status, that is, older age, limited physical functioning, and negative affect at baseline, predicted poorer future SAH, after we adjusted for baseline SAH. Regarding H4, indicators of positive physical and social functioning did not predict future SAH, but the measure of good psychological functioning—high positive affect—was associated with better future SAH, after we adjusted for baseline SAH, age, and physical health and functioning.

Table 4. Summary of Hierarchical Regression Analyses for Measures of Physical Health, Functional Disability, and Psychological Functioning Predicting Future Self-Assessments of Health (SAH)

Predictor	Standardized Regression Coefficients					
	1 Year Postbaseline (n = 791)		3 Years Postbaseline (n = 678)		5 Years Postbaseline (n = 525)	
Baseline SAH	.43***	.41***	.43***	.40***	.35***	.33***
Age	−.15***	−.12***	−.11***	−.06*	−.11**	−.05
Male gender	.06*	.04	.06*	.05	.02	−.01
Medication	−.08**	−.07*	−.07*	−.06	−.09*	−.07
Disability	−.08**	.07	−.08*	.05	−.10*	−.06
Negative affect	−.11***	−.10**	−.13***	−.10**	−.07	−.04
Positive affect	.13***	.12***	.11**	.10**	.17***	.15***
Disability at follow-up[a]		−.25***		−.26***		−.36***
Adjusted R^2	.48***	.51***	.44***	.48***	.38***	.46***

[a]Each model includes the level of disability at the corresponding year of follow-up.
*$p < .05$; **$p < .01$; ***$p < .001$.

People who were happier and more energetic at baseline rated their health better in the next 5 years, even after accounting for age and for the negative health indicators of baseline disease status, functioning, and negative affect. Some positive indicators of functioning, such as physical activity, work, and exercise, did not significantly predict future SAH: the effect was unique to the positive moods. This effect could be due to a protective effect of positive affect, predicting less incidence of new illness or worsening of existing illnesses. Because information about new diseases in the follow-up years was not available, we examined our participants' reports of limitations in functioning in each of the follow-up years (using the same items as in the baseline data). Indeed, high levels of positive affect at baseline did significantly predict less decline in physical functioning in each of the follow-up years, after we adjusted for baseline limitations in physical functioning (the size of these partial correlations was −.10, $p < .01$, for Year 1, and −.17, $p < .001$, for Years 3 and 5; analyses not shown in tables). Thus, higher levels of positive affect at baseline predicted less decline in functional status.

If this protective effect of high positive affect is the main explanation for its influence on future SAH, then a measure of change in physical functioning as a predictor of SAH should account for the effect of positive affect on future SAH. At each model predicting SAH at a follow-up year, when physical functioning at that year was added to the model it was associated with poorer SAH, as would be expected. However, the association between positive affect and future SAH declined only slightly following the addition of change in physical functioning, as stated in H4 (see Table 4). Thus, positive affect seemed to attenuate future decline in health status but also to serve as a resource that contributes to better perceptions of global health in the future.

Discussion

The findings support our hypotheses regarding the importance of positive indicators of health for SAH: these indicators are among the strongest predictors of current and future SAH. In the cross-sectional analyses, indicators include good physical and social functioning (exercise, activity, work, social support) and good psychological functioning (positive affect). In the longitudinal analyses, only positive psychological functioning had an independent effect.

Two possible pathways for the effect of positive affect on future SAH were supported by the data: First, higher levels of positive affect at baseline predicted less decline in functional status in each of the follow-up years (when we controlled for baseline limitations in physical functioning). Second, even after we adjusted for changes in functional limitations over the follow-up period, positive affect had an independent effect on future SAH. Thus, happier and more energetic people experienced slower declines in health, and regardless of whether they experienced such declines over the years, they were more likely to preserve favorable assessments of their health, compared with the less happy or energetic people.

There is a limitation to our study: Our sample is not representative; it is overwhelmingly White and educated. Thus, although the findings show that indicators of positive healthiness can have a strong impact on elderly people's subjective perceptions of their health, the data do not tell us whether this also happens in less advantaged populations. Notwithstanding this limitation, the distribution of responses to the SAH question and its association with mortality and other measures are similar to those published in the literature for representative samples (Benyamini & Idler, 1999; Benyamini, Leventhal, & Leventhal, 1999; National Center for Health Statistics, 1998). Although this fact provides some confidence in the validity of our results, it does not assure that the correlates and predictors of SAH are the same as in the general population. The best test would be a replication of our findings with data from a more representative sample.

There is a positive side to the characteristics of our sample: their willingness to volunteer and cooperate, year after year, with a long interview, covering in great detail the sensitive issues of physical and mental health. Collecting such detailed information from a larger and more representative sample would be much more difficult. Thus, our data have several strengths: the very thorough questioning; the inclusion of both positive and negative functioning and well-

being; and the relatively low attrition, which enabled us to collect longitudinal data from 1 to 5 years postbaseline.

The focus of our study and the most important finding is our look at the full range of health—and not only at the range from disease to absence of disease. The traditional indicators of health status reflect mainly impaired health; however, both physical and psychological functioning can be judged not only on the basis of what one cannot do, but also on the basis of what one can do. People can judge levels of illness and levels of health (Rakowski, 1984). Negative affects, such as depression or fatigue, may be among the critical factors in determining that one is ill, whereas happiness and energy may be necessary elements in deciding that one is healthy. Similar to the negative indicators of functioning, positive affect and functioning are salient measures of the impact of disease, and they account for some of the effect of the medical measures on SAH, but they also tap additional information that people seem to take into account and that is not captured by traditional measures of disease status or impaired physical or psychological functioning. Our data reveal the importance of attending to both aspects, that is, to the full illness–wellness continuum (Antonovsky, 1987), to completely understand the bases underlying people's judgments of their health status. SAH seems to be highly sensitive to both ends of this continuum.

When one examines the predictors of SAH 1–5 years later, the importance of positive indicators of health is apparent again. Positive affect (but not active functioning) predicts both short and long-term change in SAH. It is, however, possible that positive affect predicts future SAH in our sample better than negative affect (or disease, medication, disability) because the data are available only for survivors. Because the models at each data wave do not include people who withdrew or died before that time, some of the effects we found may be underestimated. For example, if frailty and negative moods are more closely associated with morbidity and mortality than are positive functioning and mood, then the effects of disability and negative affect on future declines in SAH may actually be stronger than is apparent from the data. However, it is unlikely that this is the sole explanation for our findings, because the findings from the analyses that included only the people who continued to participate throughout the full 5-year period were almost identical to those from the full sample at each data wave, which did include participants who later dropped out (mostly due to death or decline in health).

To conduct the most conservative test of our hypothesis regarding the contribution of positive indicators, we repeated our analyses using single affect measures. We used the measure of fatigue, which is more somatically linked than the more typically used measures of depression and anxiety, to represent negative affect and happiness, the less "somatic" of the two positive affect measures, to represent positive affect. In these models, happiness showed a somewhat weaker but overall similar effect on SAH to that of the combined positive affect measure at the bivariate and multivariate level. Thus, the strong effect of positive affect cannot be explained solely by a failure to measure medical or functional impairments that overlap with ratings of low energy.

The distinctiveness of positive affect is suggested by research showing that older adults (aged 60 or older), compared with younger adults, tend to downplay negative aspects of a situation and to give them a neutral meaning (Diehl, Coyle, & Labouvie-Vief, 1996); thus, although negative affect may be diminished, positive affect may not be easy to create where none exists. Positive affect in the form of vitality or feelings of energy may boost SAH and may even play a causal, protective role in a person's remaining active, fit, and in control of his or her health, and thus may determine future health. The present findings support this possibility. Physical activity is known to lower the risk for disability (Clark, 1996) and mortality (Lissner, Bengtsson, Björkelund, & Wedel, 1996; Rakowski & Mor, 1992); fitness is similarly related to longevity (Blair et al., 1989). Surprisingly, our participants' self-ratings of their level of physical activity or self-reports of engagement in exercise did not predict future SAH, when we controlled for baseline SAH. Their ratings of happiness and energy seem to be more sensitive as predictors of future SAH. Altogether, these findings point to the importance of measuring positive and not only negative affect and, in general, of measuring psychological and not only physical functioning.

Our findings also underscore the importance of understanding subjective assessments by examining factors that are subjectively salient and meaningful to the people conducting the assessment. Traditional indicators of health status that are based on disease diagnoses and on age and other sociodemographic characteristics are insufficient to explain differences in SAH. Although medical history in this study was self-reported, it was collected and coded with extreme detail. Because they were self-reported, all these diagnoses were known to the person and had the potential to affect their rating of health. If a person has been told by a doctor that he or she has, for example, heart disease, and may be at risk for a heart attack, that person may rate his or her health lower, even if the person has noted no symptoms or limitations. However, the effect of this mainly cognitive pathway seems to be limited: The impact of chronic diagnoses on SAH is mediated, at least in part, by more concrete manifestations of the disease in the form of functional limitations. Similarly, health behaviors, such as smoking, do not have a direct impact on SAH. The knowledge that one is at risk for disease because one has smoked in the past did not result in lower SAH among our respondents. Rather, the largest contribution to SAH came from indicators of the subjective burden of disease—the extent to which people can do what they need to do and what they want to do.

Functional abilities and limitations are a very salient issue; disability in old age may pose barriers to the achievement of goals and the ability to carry on identities that are important to a person (Ogilvie, 1987). Disability may also make the fear of difficulties in coping with future health problems more real, whereas the ability to remain active and maintain feelings of happiness and energy despite health problems may ease some of this fear.

Identifying the sources of SAH and their relative importance does not in itself tell us anything definite about SAH as a predictor of various health outcomes. The validity of SAH can be explained only by factors that fulfill two conditions: They must be associated with both SAH and the

health outcome in question (Benyamini et al., 1999). The findings do suggest which measures fill the first of the two conditions, a clear association with SAH: indicators of both positive (and negative) psychological and physical functioning. Further research is necessary to examine their association with mortality and other health outcomes, to fulfill the second condition.

However, identifying the bases for SAH is important in itself, not only for deciphering the SAH–mortality relationship. Respondents' SAH are a reflection of the way they view their health. They are the context in which people judge information about health threats, health behaviors, and medical diagnoses and recommendations. The bases of SAH may be different from the indicators used by health care providers; physicians and patients have different types of information available to them. Physical and psychological functioning are powerful sources of information for the patient, yet they are hardly accessible to the physician and potentially not even relevant to the decisions he or she needs to make. Issues such as well-being and the preservation of self-identity may be highly salient to the patient, yet they may be unacknowledged by the physician, who is trained to prevent and cure disease. Yet knowledge of a patient's "health resources" may alert physicians to factors that increase host resistance and enable successful coping with stressful life situations, resources that could potentially be mobilized in clinical encounters (Hollnagel & Malterud, 1995; McWhinney, 1989). If our findings have identified some of the factors that influence the "well" end of the SAH scale, they may have relevance for clinical practice with such a focus, in addition to the light they shed on the processes underlying the generation of these valuable assessments of health.

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