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Concepts of Self-Rated Health: Specifying the Gender Difference in Mortality Risk

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Purpose: This study addresses the question of how the relation between self-rated health (SRH) and mortality differs between genders. In addition to the general question, four specific concepts of SRH are distinguished: SRH in comparison with age peers, SRH in comparison with one's own health 10 years ago, and current and future health perceptions. For these concepts, the gender-specific risks of mortality were evaluated for a short and a longer follow-up period. ***Design and Methods:*** Baseline and mortality data from the Longitudinal Aging Study Amsterdam ($N = 1917$, initial ages 55–85 years) were used. Mortality risks were evaluated in Cox regression models at 3 and 7.5 years of follow-up, both adjusted for age and for sociodemographic characteristics, indicators of functional and mental health, lifestyle, and social involvement. All SRH measures were scaled from 1 (positive) to 5 (negative). ***Results:*** Baseline correlations between SRH concepts were similar for men and women. After 3 years, 12% of the men and 7% of the women had died; after 7.5 years, these percentages were 27 and 15, respectively. In fully adjusted models, current health perceptions predicted 3-year mortality in men (risk ratio of 1.33). At 7.5 years, mortality in men was predicted by current health perceptions and by SRH compared with age peers (risk ratios of 1.25 and 1.23, respectively). In women, no SRH concept predicted either 3-year or 7.5-year mortality. ***Implications:*** SRH was a predictor of mortality only in men, not in women. The gender difference showed most clearly at longer follow-up, in the SRH concept "comparison with age peers."

Key Words: Self-rated health, Gender, Mortality, Duration of follow-up

Older persons' own perception of their health, often termed self-rated health (SRH), increasingly has been recognized as a simple but comprehensive measure of global health. There is ample evidence that SRH is a predictor of subsequent mortality, independent of other health indicators (Benyamini & Idler, 1999; Idler & Benyamini, 1997; Mossey & Shapiro, 1982). This evidence comes from close to 40 studies from various countries, with the use of different wordings to measure SRH and different follow-up periods to ascertain mortality. The studies that distinguished between genders, however, showed inconsistencies in the predictive ability of SRH for mortality. In some studies the relation between SRH and mortality was demonstrated only for women, whereas in other studies it was demonstrated only for men (Benyamini & Idler, 1999). Among the likely explanations for this gender difference, two are examined in this contribution. First, the meaning of health, and thus the meaning attached to the SRH question, may differ between men and women. Second, implicated by the first, the potential confounders of the association between SRH and mortality may differ between men and women. Failure to adjust for gender-specific pertinent confounders may result in overestimation of the predictive ability of SRH for mortality in one or both genders.

The most widely used format for ascertaining SRH is the simple question; "How is your health in general?," with three to five response categories ranging from "excellent" to "poor." This format leaves the standard for what constitutes excellent or poor health up to the respondent. In addition to standards to rate their current health, respondents may include in their health rating expectations of their future health (Idler & Benyamini, 1997). Thus,

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the meaning of a particular response may differ among respondents. Other formats of SRH questions do specify the standard, and they ask the respondents to compare their health with that of age peers, or with their own health some years ago. A comparison with age peers and a backward or forward time perspective may be among the elements that produce the response to the general question.

In the studies on the SRH–mortality relation, the time perspective may also be important with regard to the length of follow-up. For the general SRH question, the predictive ability does not appear stronger or weaker for short or long follow-up periods. The few studies in which no predictive ability was found have widely different lengths of follow-up (Benyamini & Idler, 1999; Idler & Benyamini, 1997). Nevertheless, when a time perspective is explicitly included in the wording of the SRH question, the predictive ability of this question for mortality may differ according to the length of follow-up.

The meaning of each of the elements that possibly produce the response to the general SRH question, to the comparison with age peers, and to the time perspective may differ between the genders. First, if we assume that each gender refers to same-gender age peers, the distribution of health and mortality in the older population is such that men are more likely to have survived a considerable proportion of their age peers than women, and women are more likely than men to have age peers who are in poor health. These "facts of life" may mean that people of each gender perceive their own health differently in comparison with their age peers. Second, older women have better chances of survival than older men, given a specific health state (Arber & Ginn, 1991; Manton, 1988), implying that health problems in women follow a longer and more severe course than those in men (Deeg, Portrait, & Lindeboom, 2002). Thus, when they have to respond to the SRH question, older women have lived longer and will consider it more likely that they will live longer with health problems than men will. The different past and future time perspectives for women and men with respect to health are likely to cause gender differences in health perceptions.

This study addresses the question of how the relations between various concepts of SRH and mortality differ between genders. In addition to the general question, which is considered neutral with respect to its concept, four specific concepts of SRH are distinguished: SRH in comparison with age peers, SRH in comparison with one's own health 10 years ago, and current and future health perceptions. For each of these concepts, the gender-specific risks of mortality are evaluated for a short (3-year) and a longer (7.5-year) follow-up period. In addition, a very broad range of possible confounders is examined in order to establish the unique, gender-specific predictive ability of each SRH concept for mortality.

Methods

Sample

This study uses baseline and mortality data from the Longitudinal Aging Study Amsterdam (LASA). LASA is based on a nationally representative cohort: Its sample was recruited from the municipal registries in 11 municipalities in three geographic regions that together represent the sociocultural variety that exists in The Netherlands. The initial ages of the people in the sample were 55–85 years, with oversampling of men and older-old persons. The sample was first used for the NESTOR study on Living Arrangements and Social Networks of older adults (LSN), which had a response rate of 62.3%; N= 3,805 (Knipscheer, De Jong Gierveld, Van Tilburg, & Dykstra, 1995). Approximately 10 months after the LSN interview, the participants were approached for the first LASA cycle (1992–1993). The 1992–1993 cycle is the baseline for the current study (Deeg, Knipscheer, & Van Tilburg, 1993).

By the start of the LASA baseline, there were 3,679 surviving LSN participants. Of these survivors, 3,107 subjects took part in the interviews and tests, yielding a response rate of 84.5%; the 15.5% nonresponse consisted of 3.6% ineligibility through frailty, 1.1% not contacted after eight or more attempts, and 10.7% refusals. Nonresponse was associated with higher age but not with gender (Smit & De Vries, 1994).

The baseline LASA cycle consisted of a face-to-face interview, after which the interviewer left a questionnaire with the instruction to fill it out and send it back to the study center. Of all persons interviewed, 74.1% responded to the questionnaire, with a slight overrepresentation of younger-old people (Smit & De Vries, 1994). Three of the five SRH concepts were included in the face-to-face interview; two were included in the questionnaire. Because two SRH concepts were included in the questionnaire, and fewer persons responded to the questionnaire than to the face-to-face interview, the comparison of associated mortality risks for all five SRH concepts is based on the respondents who completed the questionnaire and had no missing values on any one of the five measures (N = 1,917; 982 men and 935 women).

Baseline Data

SRH.—The general, single-item question, "How is your health in general?," had five response categories: 1, very good; 2, good; 3, fair; 4, sometimes good and sometimes poor; and 5, poor (Van Sonsbeek, 1991). The questions adding "compared with your age peers" and "compared to your health 10 years ago" had five response categories on a Likert scale: 1, much better; . . . ; 5, much poorer. Current and future health perceptions were derived

from the RAND General Health Perceptions Questionnaire (Brook et al., 1979). This questionnaire includes statements on various aspects of health perceptions, including current health (e.g., "I am as healthy as anybody I know") and health outlook or future health (e.g., "I think my health will be worse in the future than it is now"). To each item, the subject could respond on a Likert scale: 1, definitely true; . . . ; 5, definitely false. On the basis of a pilot study in a general Dutch population (Kriegsman, Van Eijk, & Deeg, 1995), a minimum set of items was selected to cover each dimension. Thus, four and three items were selected that best represented the current health (range: 4–20) and future health (range, 3–15) subscales, respectively (see Appendix A). The Cronbach's alpha for these subscales in this study were .74 and .63, respectively.

For estimates comparable with estimates based on the single-item measures to be achieved, the two measures derived from the General Health Perceptions Questionnaire were scaled to the same range, that is, from 1, positive, to 5, negative.

Covariates.—Baseline covariates were included to take into account as many potential confounders as possible of the association between SRH and mortality (Appels, Bosma, Grabuskas, Gostautas, & Sturmans, 1996; Helmer, Barberger-Gateau, Letenneur, & Dartigues, 1999; Idler & Kasl, 1991; Idler, Kasl, & Lemke, 1990; McCallum, Shadbolt, & Wang, 1994). They included sociodemographics, chronic diseases and impairments, depressive and cognitive symptoms, functional limitations, physical performance, disability, lifestyle, social network characteristics and social support, social activities, and personality characteristics.

Socio-demographic covariates included, in addition to gender, age, education, income, marital status, household size, living arrangements, geographic region, and degree of urbanization. Education was assessed as the highest educational level attained: 1, less than elementary school; . . . ; 9, university. Estimated income was derived from the area code, and was coded as minimum; . . . ; 5, over twice modal (Van Tilburg, Dykstra, Liefbroer, & Broese van Groenou, 1995). Marital status was indicated by three dummy variables, distinguishing the never married, divorced, and widowed from the still married. Household size was coded as 0, living alone; and 1, living with others. Living arrangements were 0, community living; or 1, institutionalization. Three geographic regions were distinguished by use of two dummy variables: West versus Northeast and South, and South versus Northeast and West. Degree of urbanization was coded as 1, rural, that is, <500 addresses/km^2; . . . ; 5, highly urban, that is, $>2{,}500$ addresses/km^2.

Seven major chronic disease categories were questioned in the interview: respiratory diseases, heart diseases, atherosclerosis, diabetes, stroke, arthritis, and cancer. In addition, respondents could indicate whether they had any other chronic somatic condition, for instance hypertension, back problems, or gastrointestinal disorders. Answers were coded as 0, no; or 1, yes. In a validation study, respondents' self-reports were compared with information obtained from their general practitioners, and the self-reports proved to be reliable (Kriegsman, Penninx, Van Eijk, Boeke, & Deeg, 1996).

Incontinence of urine was included in the list of chronic diseases, and it was also coded as 0, no; or 1, yes.

Vision and hearing impairments were each questioned with two items, indicating difficulty with reading the small print in the paper and with recognizing a face across the room, and difficulty with having a conversation with one person and with a group of more than two persons, if applicable with a visual or hearing aid (Van Sonsbeek, 1988; Wilson & McNeil, 1981). Difficulty with at least one item was coded as 1; no difficulty was coded as 0.

Cognitive impairments were ascertained by using the Dutch translation of the Mini-Mental State Exam, or MMSE (Folstein, Folstein, & McHugh, 1975; Launer, Dinkgreve, Jonker, Hooijer, & Lindeboom, 1993). On 23 questions and tasks, respondents received 1 or more points when they gave the correct answer or performed the task correctly. Scores ran from 0 (all answers incorrect) to 30 (unimpaired). Prior to the administration of the MMSE, respondents were asked if they had memory complaints, coded as 0, no; and 1, yes (Geerlings et al., 2000).

Depressive symptoms were ascertained by using the Dutch translation of the 20-item Center for Epidemiologic Studies Depression scale, or CES-D (Beekman, Van Limbeek, Deeg, Van Tilburg, & Wouters, 1994; Radloff, 1977). Respondents were asked to indicate how often during the past week they had experienced each symptom with response categories of 0, (almost) never, to 3, (almost) always. The score range is 0 (no symptoms) to 60 (maximum number of symptoms).

Functional limitations were indicated by three items: "Can you climb up and down a staircase of 15 steps without stopping?," "Can you cut your own toenails?," and "Can you use your own or public transportation?" Response categories were "yes, without difficulty," "yes, with difficulty," "not able without help," and "cannot" (Kriegsman, Deeg, Van Eijk, Penninx, & Boeke, 1997; Van Sonsbeek, 1988). A "yes, without difficulty" response was scored as 0 and all others as 1. The three items were combined into one score ranging from, 0, having difficulty with none of the three activities; . . . ; 3, having difficulty with all three activities.

Physical performance of the upper body was tested by asking the respondent to put on and take off a cardigan that was brought in by the interviewer (Magaziner Zimmerman, Gruber-Baldini,

Hebel, & Fox, 1997). Lower body physical performance was tested by two tasks: walking 3 m back and forth along a line, and getting up from and sitting down in a kitchen chair five times with arms folded (Guralnik et al., 1994). The time to perform these activities was measured in seconds. Respondents who could not perform the activity were given a score of 5; those who could perform the activity were given a score of from 1 to 4, if the number of seconds needed was in the first to fourth quartile, respectively. The three scores were summed to a performance summary score. Irregularities in the performance (balance or gait) were recorded and summed to a performance problem score (Tinetti, Williams, & Mayewski, 1986).

Disability was assessed by using items from the Medical Outcomes Study on health problems limiting daily activities (coded as 1, no limitations; 2, slight limitations; and 3, severe limitations), number of disability days, and number of bed days in the past month (Anderson, Sullivan, & Usherwood, 1990).

The receipt of help was asked for two general tasks: self-care and housekeeping (Portrait, Lindeboom, & Deeg, 2000). Each was coded as 0, no help; or 1, help from others.

Lifestyle included cigarette or alcohol use (Netherlands Central Bureau of Statistics, 1989), body mass index as an indicator of nutritional status, and medication use. Smoking was coded as 0, never; 1, former smoker; 2, current smoker. Alcohol use was coded as 0, none; 1, moderate; 2, heavy, with the latter defined as drinking more than six glasses at one time more often than once a month. Height and weight were measured, and body mass index was calculated as weight in kilograms/(height in meters)^2. Medication use was recorded by the interviewer from the containers of drugs the respondent was taking, with or without prescription.

The social network was determined by asking respondents to name all persons aged 18 years and older with whom they maintained an important and regular contact (Cochran, Larner, Riley, Gunnarsson, & Henderson, 1990; Van Tilburg 1994). The total number of persons named constitutes the *social network size*. For a maximum of nine persons with whom contact was most frequent, instrumental support and emotional support were assessed by using one question for each type of support, coded as 0, never; . . . ; 3, often. Both forms of support were summed across network members to a scale with a maximum of 27. The respondents' experience of loneliness was assessed by using the De Jong Gierveld Loneliness scale, which ranges from 0 to 11 (De Jong Gierveld & Kamphuis, 1985).

Social activities included being involved in clubs or organizations, attending meetings, doing volunteer work, doing a sport, doing other leisure activities outside the home, taking a course, and spending time on hobbies (Netherlands Central Bureau of Statistics, 1984; Smits, Van Rijsselt, Jonker, & Deeg, 1995). All activities were coded as 0, no, or 1, yes. Spending time on hobbies was recorded in hours per day.

Personality characteristics assessed were mastery, self-efficacy, and the importance attached to good health. Sense of mastery was measured by using a 5-item version of the Mastery scale (Pearlin & Schooler, 1978). The scale ranges from 5 to 25. Perceived general self-efficacy was assessed by using a 12-item version of the Self-Efficacy scale (Sherer et al., 1982) that was adapted for use in the older population (Bosscher & Smit, 1998). The importance attached to good health was derived from a question in which the respondents were asked to indicate which three out of nine domains of life they felt were most important to them (Gijsberts, 1993). If good health was among the three domains selected, it was coded as 0, important; otherwise it was coded as 1, unimportant.

Mortality

The vital status of each LASA respondent, including date of death, is ascertained periodically through municipal registries. So far, all respondents could be traced, so that ascertainment of both short-term mortality (at 3 years) and longer-term mortality (at 7.5 years) was 100% complete.

Data Analyses

All analyses were stratified by gender. Interrelations between the five SRH concepts were computed with Spearman's rho. The main research question, whether there are gender differences in the relation between SRH concepts and mortality, was addressed in two steps. The first set of analyses established whether there are gender differences per se; the second set examined whether gender-specific associations between SRH and mortality held up after potential confounders that are specific to each SRH concept and each gender had been taken into account. First, initial risk ratios (RRs) and 95% confidence intervals (CIs) for 3-year and 7.5-year mortality were computed for each gender from five separate Cox regression models, with an adjustment only for age (in total, $2 \times 2 \times 5 = 20$ models). Gender differences were considered present when the CI for men did not include the RR for women, and vice versa. Second, to achieve full adjustment for all possible confounders, for each gender, the association of all covariates with each SRH measure and both mortality outcomes was tested, upon which only those covariates with significant, independent associations with either SRH or mortality were retained for further analyses. The level of significance for these preliminary analyses was set at .20 so that important confounders would not be missed.

Results

Subjects With Incomplete Data

There were two reasons for incomplete data (Table 1, column 1): refusal or inability to fill out the self-administered questionnaire, and item nonresponse on some SRH measures. The first (25.9%) was not associated with gender. The second, however, was associated with female gender (men, 12.8%; women, 20.4%), regardless of age. There was a clear difference in mortality when the subsamples with complete and incomplete data were compared (Table 1, column 2). The size of the mortality difference did not differ, however, between men and women. In addition, two of the three SRH measures available in the full baseline sample showed a difference, with subjects with incomplete data rating their health as slightly poorer than subjects with complete data. Again, this difference was of similar size for men and women (the analysis of variance interaction term was not significant).

Table 1. Comparison of Mortality After 7.5 Years and Baseline SRH

Sample	*n*	% Died: 7.5 Years	SRH Measure: General	SRH Measure: Age Peers	SRH Measure: 10 Years Ago
Total sample					
Data complete	1917	21.3	2.3	2.6	3.4
Data incomplete	1190	36.7**	2.4**	2.5	3.5**
Men					
Data complete	982	27.1	2.3	2.5	3.4
Data incomplete	524	47.5**	2.4**	2.4	3.5*
Women					
Data complete	935	15.3	2.3	2.6	3.3
Data incomplete	666	28.2**	2.5**	2.6	3.5*

Notes: Comparison is between subjects with complete and incomplete data. SRH = self-rated health.
*Difference is significant at $p < .05$; **difference is significant at $p < .001$.

Baseline Characteristics

A description of the baseline sample (Table 2) shows no gender differences in age, atherosclerosis, diabetes, cognitive impairments, days limited in activity, receipt of help with personal care, use of medications, leisure activities outside the home, hours spent on hobbies, social network size, and instrumental support. Compared with men, women had a lower level of education, were more often widowed and living alone, and more often had cancer, arthritis, difficulty seeing, and depressive symptoms, whereas men more often had respiratory and heart diseases, stroke, and difficulty hearing. Women also reported more functional limitations than men but had a better score on the physical performance test. Women received less help with housekeeping tasks. Furthermore, men drank more alcohol and more often were past or current smokers than women. Women had a greater body mass index than men, but men had a greater waist circumference. The sense of mastery and perceived self-efficacy were lower in women than in men. Finally, men more often stated that good health was unimportant to them. In short, men had (or had had) a less healthy lifestyle; women had more morbidity and poorer psychosocial status. The distribution of the variables shows that despite the sample attrition, the analytic sample still had sufficient variation on a wide range of characteristics.

Inspection of the means of the five SRH measures (Table 3) shows very slight differences between men and women: women reported poorer general health and health compared with age peers, and men reported slightly poorer future health. The comparatively high mean of health compared with 10 years ago shows the normative decline of health with aging. The correlations between the five measures were moderate to substantial and did not show gender differences. The general health question showed high correlations with all other measures; the highest correlation was with current health ($\rho = .53$). Health compared with 10 years ago showed relatively low correlations; the lowest was with health compared with age peers ($\rho = .13$ and .16 for men and women, respectively).

Association With Mortality

After 3 years, 12.4% of the men and 6.6% of the women had died. After 7.5 years, these percentages were 27.1 and 15.3, respectively (Table 4).

The age-adjusted mortality risks of SRH showed marked differences between men and women. In men, the mortality risks of all concepts were significantly elevated, with increases in risk per SRH scale point ranging from a just-significant 17% (health compared with 10 years ago at 7.5 years) to a highly significant 69% (current health at 3 years). In contrast, in women no mortality risks were significantly elevated at 3 years, whereas at 7.5 years, three of the five SRH measures reached significance: general health, health compared with age peers, and current health. For these three measures, the associated increases in risk per SRH scale point were considerably lower in women than in men, ranging from 28% to 31% in women versus from 48% to 56% in men. The risk ratios for women were lower than the lower confidence limits for men for most measures, except for health compared with age peers at 3 years and health compared with 10 years ago at 7.5 years. These findings confirm the gender differences in risks for these variables.

Table 2. Baseline Sample Description: Selected Covariates by Gender

Covariate	Men		Women	
	%	Mean (*SD*)	%	Mean (*SD*)
Age		69.0 (8.6)		68.2 (8.4)
≤ Elementary education	26.5		46.5**	
Widowed	12.4		33.3**	
Living alone	15.5		37.8**	
Respiratory diseases	12.9		9.2*	
Heart diseases	23.5		13.6**	
Atherosclerosis	9.9		8.1	
Diabetes	5.7		6.1	
Stroke	6.3		3.4*	
Arthritis	24.6		44.9**	
Cancer	6.3		11.2**	
Cognitive impairments		27.5 (2.4)		27.4 (2.5)
Depressive symptoms		6.3 (6.6)		8.7 (7.9)**
Difficulty seeing	27.0		27.7*	
Difficulty hearing	33.6		24.7*	
Performance test score		10.1 (3.4)		9.2 (3.5)**
Functional limitations		0.50 (0.86)		0.75 (1.02)**
Days limited in activity	11.9		13.3	
Help w/ personal care	5.0		4.6	
Help w/ housekeeping tasks	52.6		48.1*	
Use of medications	62.6		64.7	
Alcohol use				
moderate	79.1		72.2	
heavy	8.1		2.0**	
Smoking				
former	60.1		33.0	
current	30.3		17.7**	
Body mass index		26.0 (3.2)		27.4 (4.5)**
Waist circumference		98.9 (9.8)		95.0 (12.1)**
Volunteer in clubs/orgs.	28.3		22.6*	
Leisure activities outside home	95.0		95.1	
Hours spent on hobbies		2.7 (2.0)		2.7 (1.9)
Social network size		14.3 (8.4)		14.8 (8.4)
Instrumental support		14.2 (6.7)		14.4 (6.7)
Mastery		17.7 (3.2)		17.2 (3.3)*
General self-efficacy		42.9 (5.4)		41.6 (5.2)**
Health unimportant	24.7		20.9*	

*$p < .05$; **$p < .001$.

In the fully adjusted models (Table 5), the mortality risks were lower, so that fewer reached significance. In men, only current health perceptions predicted 3-year mortality, with an associated increase in risk of 33%. At 7.5 years, mortality in men was predicted by health compared with age peers and again by current health perceptions. Associated increases in risk were 23% and 25%, respectively. In women, no SRH concept predicted either 3-year or 7.5-year mortality. In these fully adjusted models, the CIs for men included the RRs for women for general health and health compared with 10 years ago for both lengths of follow-up, and for health compared with age peers at 3 years but not at 7.5 years. The RRs for women were lower than the lower confidence limits for men for current and future health, for both lengths of follow-up.

Relatively few covariates remained significant predictors of mortality in the fully adjusted models (Appendix B). Moreover, the significant covariates showed few differences across the models for different SRH concepts. However, there were differences between the predictors for men and women, and for the short- and longer-term follow-up. For men, significant covariates at both 3 years and 7.5 years were higher age, medication use, and help with personal care. At 3 years, additional predictors for men were lower education, diabetes, cancer, and no volunteering activities. At 7.5 years, these were atherosclerosis, cognitive impairment, lower body mass index, greater waist circumference, receiving instrumental support, and institutionalization. For women, significant covariates both at 3 years and at 7.5 years were diabetes, physical performance, and

Table 3. Baseline Correlations (Spearman's rho) and Means of SRH Measures by Gender

Gender	SRH Measure				Mean (*SD*)
	Age Peers	10 Years Ago	Current	Future	
Men ($n = 982$)					
General	0.44	0.31	0.53	0.42	2.3 (0.9)
Age peers		0.13	0.23	0.20	2.4 (0.9)
10 years ago			0.27	0.28	3.4 (0.9)
Current				0.54	2.1 (0.9)
Future					2.5 (0.8)
Women ($n = 935$)					
General	0.39	0.38	0.53	0.38	2.4 (0.9)*
Age peers		0.16	0.27	0.25	2.6 (0.9)*
10 years ago			0.27	0.26	3.3 (1.0)
Current				0.56	2.1 (0.9)
Future					2.4 (0.8)*

Notes: All correlations are significant ($p < .01$). SRH = self-rated health.
*Mean is significantly different between men and women ($p < .01$).

no leisure activities outside the home. At 3 years, additional predictors for women were never having been married, cognitive impairment, and medication use. At 7.5 years, these were higher age and needing help with housekeeping tasks.

Discussion

This study examined possible gender differences in the predictive ability of SRH for mortality by distinguishing several concepts of SRH and by introducing a short- and a longer-term time perspective. Generally, SRH was a better predictor of mortality in older men than in older women. This was especially true for short-term mortality, where in the models adjusting only for age all of the SRH concepts were predictive in men, but none of the SRH concepts were predictive in women.

The SRH concepts showed differential associations with mortality. One difference was related to the time perspective. In men, health compared with 10 years ago and future health predicted short-term mortality only and lost their predictive ability in the fully adjusted model. Thus, it appears that time-related concepts of SRH, whether relating to time in a backward or a forward manner, do not have predictive ability for mortality beyond a window of 3 years. This conclusion is supported by the relatively short duration of health problems, once started, in men as compared with women (Deeg et al., 2002). Moreover, the information used by older men to assess changes in their health appears to be covered by the covariates included.

As opposed to SRH with a backward or forward time perspective, SRH with a current time perspective proved to have consistent predictive ability for mortality in men. In the adjusted models, current health perceptions, as measured by the RAND General Health Perceptions Questionnaire, constituted the only SRH concept that was predictive of male mortality regardless of the time window, and it

Table 4. Mortality Risk From Age-Adjusted Cox Regression Models: RRs

Length of Follow-Up	% Died	SRH Measure				
		General	Age Peers	10 Years Ago	Current	Future
3 Years						
Men	12.4	1.54* (1.28–1.85)	1.47* (1.22–1.78)	1.28* (1.02–1.60)	1.69* (1.41–2.04)	1.54* (1.25–1.90)
Women	6.6	1.14 (0.88–1.48)	1.30 (0.98–1.72)	0.98 (0.76–1.27)	1.18 (0.90–1.55)	1.08 (0.80–1.44)
7.5 Years						
Men	27.1	1.48* (1.31–1.68)	1.49* (1.31–1.70)	1.17* (1.01–1.36)	1.56* (1.36–1.77)	1.45* (1.25–1.68)
Women	15.3	1.31* (1.10–1.55)	1.28* (1.07–1.54)	1.14 (0.95–1.36)	1.30* (1.09–1.56)	1.10 (0.91–1.34)

Notes: RR = risk ratio; 95% confidence intervals are given parenthetically.
*RR is significant at $p < .05$.

Table 5. Mortality Risk From Fully Adjusted Cox Regression Models: RRs

Length of Follow-Up	SRH Measure				
	General	Age Peers	10 Years Ago	Current	Future
3 Years					
Men	1.09 (0.86–1.36)	1.06 (0.86–1.30)	1.00 (0.80–1.25)	1.33* (1.07–1.65)	1.23 (0.97–1.56)
Women	0.86 (0.60–1.22)	0.90 (0.62–1.29)	0.92 (0.69–1.23)	0.96 (0.68–1.34)	0.90 (0.63–1.28)
7.5 Years					
Men	1.14 (0.97–1.33)	1.23* (1.06–1.42)	0.98 (0.84–1.15)	1.25* (1.07–1.48)	1.10 (0.93–1.30)
Women	1.02 (0.83–1.25)	0.89 (0.71–1.11)	0.99 0.81–1.19)	1.02 (0.83–1.26)	0.93 (0.75–1.15)

Notes: Mortality risk is at short- and longer-term follow-up. Only those covariates with significant, independent associations with mortality were retained for the final analyses (see Appendix B). RR = risk ratio.

*RR significant at $p < .05$.

kept its predictive ability after full adjustment for confounders. In women, current health was predictive only for short-term mortality, and it lost its predictive ability in the fully adjusted model.

The gender difference was greatest in longer-term mortality risk for the comparison with age peers concept of SRH. Interestingly, this gender difference emerged only in the model predicting longer-term mortality. Possibly, the predictive ability of the age peers comparison in men is more durable. This finding suggests two possible explanations. First, men may obtain information about their health status based on a comparison with their age peers that is more accurate than the comparison women make, as the mortality risk was greater for men than for women. Second, from their comparison with age peers, men may obtain pertinent information that is different from the information that women obtain from their comparison, as the male mortality risk was still significant after adjustment for a very broad array of possible confounders. These same explanations apply to current health perceptions.

Before pursuing these explanations further, we first examine if the available baseline data are informative. Inspection of the baseline associations of both current SRH and SRH compared with age peers with covariates available in this study suggests only few gender differences (data not shown). First, these baseline associations show that men's SRH had a somewhat broader basis in lifestyle and psychosocial factors than women's SRH. However, these covariates did not explain the additional, unique predictive ability of two SRH concepts for mortality in men. Second, compared with men's SRH, women's SRH was somewhat more strongly linked with nonfatal diseases such as arthritis and less strongly with fatal diseases such as cancer. This supports the explanation that men's self-rating of health tends to take the fatality of diseases into account, as opposed to women's, which tends to be more geared to the disability associated with diseases.

We return to the question of why the gender difference in predictive ability was most notable in the age peers comparison of health. The predictive ability of health compared with age peers for long-term survival was also shown in a men-only study in two cultures (Appels et al., 1996). A further explanation may be based on the different health distribution in same-sex age peers for men and for women. Because relatively many older men are in good health, as long as they are alive, men are more likely to compare themselves with healthy age peers. In contrast, relatively many older women have health problems, so that a woman comparing her health to that of her age peers is more likely to make the comparison with sick age peers, other things being equal. Indeed, women have been shown to be more likely to seek out sick age peers than men (Van der Zee, Buunk, & Sanderman, 1995). An example of how this may work is as follows. As nonfatal diseases such as arthritis are widely prevalent in women (Table 2), woman A who has a potentially fatal disease may compare herself with woman B who had arthritis and who is more disabled than woman A. Woman A may then rate her health as better than woman B. By consequence, women's self-ratings of health compared with age peers may be less accurate with respect to mortality than men's, to the detriment of the predictive ability of the age peers concept of SRH for mortality in women. This tentative explanation rests on two elements: Women tend to compare themselves with sick age peers, and they tend to attach more importance to disability than to fatality. Both elements must be examined further in future research.

For the question of why men and women choose healthy or sick age peers with which to compare themselves, psychological mechanisms have been proposed, such as pessimistic or optimistic explanatory

style (Appels et al., 1996; Peterson & Seligman, 1987). An empirical evaluation of gender differences in these mechanisms in relation to self-ratings of health may aid the explanation of gender differences in the predictive ability of SRH for mortality.

Future studies addressing the specific information that is contained in self-ratings of health (cf. Björner & Kristensen, 1999) should be gender specific. Studies focusing on men will also be useful, as the information contained in men's self-ratings in this study was not fully captured in a broad array of physical and mental health and social indicators. Possible contributing factors may be related to the environment and to genetics. A recent study, however, provides evidence that the gender difference in SRH cannot be attributed to genetic factors (Svedberg, Lichtensein, & Pedersen, 2001). Another possibility is that recent changes in lifestyle or social involvement that are not reflected in the baseline measures available in this study form part of the information that contributes to gender differences in SRH.

One limitation of this study is the attrition from the original sample, which is partly caused by refusal or inability to fill out the self-administered questionnaire, and partly caused by incomplete data. It was shown that participants with incomplete data had greater mortality and poorer SRH. However, these associations were not larger or smaller in women than in men, implying that the bias introduced into the results does not differ between men and women and thus does not affect the findings pertaining to the main issue addressed in this study.

The predictive ability of the future health measure may have been limited because of its borderline reliability (Cronbach's alpha was .63). In a Dutch study in the general adult population, its reliability was better (Kriegsman et al., 1995). Questions about the future may be difficult to handle for older persons and thus may be liable to measurement error.

Another limitation of this study is the self-reported nature of the chronic disease information. More detailed, objective data on diseases might explain some additional effect of SRH on mortality. For instance, a difference in predictive ability of SRH was shown for people with younger versus older onset of diabetes (Dasbach, Klein, Klein, & Moss, 1994), and for cancer versus other diseases (Pijls, Feskens, & Kromhout, 1993; Tsuji et al., 1994).

Although all covariates were introduced as potential confounders, they may differ with respect to the causal pathway between SRH and mortality. For some covariates, their position in the pathway is clear: For example, the presence of a chronic disease affects SRH, but SRH does not affect the presence or absence of a chronic disease. For others, their position in the causal pathway is more ambiguous. For example, disability may affect the self-rating of health, but SRH may also affect the difficulty experienced with activities of daily living and thus disability. In the latter case, disability is not a confounder, but an explanatory variable. However, for none of the covariates is it absolutely clear that its position is in the pathway between SRH and mortality only. Thus, some covariates included were pure confounders, whereas others were part confounder, part explanatory variable. In the fully adjusted models, then, the value observed for the risk of SRH for mortality can be considered a minimum, a maximum being provided by the models that include age only. However, this does not affect our conclusions about the gender differences in the predictive ability of SRH for mortality, because those SRH concepts that in the unadjusted models predicted mortality in women had RRs with values lower than the lower limits of the CIs for men.

This study contributes to the evidence on the relation between SRH and mortality by showing the importance of distinguishing between concepts of SRH, and by considering a time perspective. In this sample of Dutch older persons, a persistent gender difference in the SRH–mortality association was found, in particular with respect to the current health and comparison with age peers concepts of SRH. These concepts have in common that they are based in the present. Interestingly, the general health measure did not predict mortality in the fully adjusted models. Taken together, these findings suggest, at least in men, that present perceptions hold the best prediction of future mortality.

Finally, the findings from this study have some implications for the utility of SRH as a proxy for clinical assessment (Maddox, 1999). The greater predictive ability of SRH for mortality in men highlights the importance for health professionals to pay attention to men's self-ratings of health, because they can be considered as a marker of potentially life-threatening conditions. Moreover, estimates by health professionals of male patients' mortality risks may be aided by simply asking their current health rating. For women, the practical use of self-ratings of health is not absent despite their lack of association with mortality. Rather, more pronouncedly than in men, SRH in women is likely to be indicative of quality of life, including non-life-threatening conditions.

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Appendix A

Items Selected From the RAND General Health Perceptions Questionnaire

Current health

1. I am somewhat ill. (R)
2. I am as healthy as anybody I know.
3. My health is excellent.
4. I have been feeling bad lately. (R)

Health outlook or future health

1. I will probably be sick a lot in the future. (R)
2. I think my health will be worse in the future than it is now. (R)
3. I expect to have a very healthy life.

Note: (R) = codes are reversed.

Appendix B

Covariates With Significant, Independent Associations With Mortality in the Final Models

	Model With SRH Measure				
Covariate	General	Age Peers	10 Years Ago	Current	Future
3 Years, men					
Age	s	s	s	s	s
Education	s		s	s	s
Diabetes	s		s	s	s
Cancer		s	s	s	s
Medication use		s	s		
Volunteering activities				s	s
Help w/ personal care	s	s	s	s	s
3 Years, women					
Never married			s		
Diabetes		s	s		
Cognitive impairment	s	s	s	s	s
Medication use	s			s	s
Physical performance	s			s	s
Leisure activities outside home			s		
7.5 years, men					
Age	s	s	s	s	s
Atherosclerosis	s	s	s		s
Cognitive impairment	s	s	s	s	s
Body mass index	s	s	s	s	s
Waist circumference	s	s	s	s	s
Medication use	s	s	s	s	s
Instrumental support	s	s	s	s	s
Help w/ personal care	s	s		s	s
Institutionalization	s	s	s	s	s
7.5 Years, women					
Age	s	s	s	s	s
Diabetes	s	s	s	s	s
Physical performance	s	s	s	s	s
Leisure activities outside home			s		
Help w/ housekeeping tasks	s	s	s	s	s

Note: s = significant at $p < .05$.