

Self-Rated Health and Survival: A Seven-Years Follow-up

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The association between self-rated health and mortality has been well documented, but not completely understood. The purpose of this study was to search for the components of self-rated health among the elderly, drawing on the framework recently proposed by Jylhä (2009) and the degree to which these predict survival. 535 seniors were interviewed, of whom 121 passed away during the seven years that followed. Self-rated health was significantly related to a variety of health and social indicators, which appeared to be represented by five health and three social characteristics: chronic conditions, physical functioning, the ability to perform daily activity, mental health, body pain, economic state, expected future health, and peers' health. Contrary to Jylhä's (2009) suggestion, formal signs of illness and diagnosed life threatening conditions were not related to self-rated health. Self-rated health was related to mortality along with age, sex, physical and cognitive functioning, and systolic blood pressure. Only physical functioning predicted both mortality and self-rated health. It appears that self-rated health is comprised of health information that is not directly related to mortality.

Keywords: Self-Rated Health, Components of Self-Rated Health, Survival, Health Measures

Introduction

Over the past three decades, evidence of the importance of self-rated health in predicting mortality has been accumulating (Mossey & Shapiro, 1982; Idler & Benyamini, 1997; Benyamini & Idler, 1999; Jylhä, 2009). In some studies subjective health evaluation was found as a predictor of mortality even after clinical, "objective", medical characteristics were controlled for. Such observations were reported in community samples (e.g. Farkas, Nabb, Zalete-Krageli et al., 2009; af Sillén, Nilsson, Månsson et al., 2005), as well as among patients in specific health conditions (e.g. Thong, Kaptein, Benyamini et al., 2008), and, although with differential predictive value—among men and women (Deeg & Kriegsman, 2003; Dowd & Zajacova, 2007; Huisman, Van Lenthe, & Mackenbach, 2007), younger as well as among older individuals (Benyamini, Blumstein, Lusky et al., 2003), persons of advantaged and disadvantaged social position (Franks, Gold, & Fiscella, 2003; Redigor, Guallar-Castillón, Gutiérrez-Fisac et al., 2010).

While the self-rated health—mortality association has been quite consistently documented in different cultures and social groups, it is not yet fully understood (Bailis, Segall, & Chipperfield, 2004; Benjamins, Hummer, Eberstein, & Nam, 2004; Jylhä, Volpato, & Guralnik, 2006; Jylhä, 2009). Recently, Jylhä (2009) suggested that in order to understand self-rated health, the cognitive process by which individuals come to evaluate their own health has to be understood. She proposed that this process involves the collection of information, that is, selecting what is culturally perceived as relevant data, then summarizing, interpreting and weighing it.

According to Jylhä (2009), the information considered relevant to the evaluation of health includes medical diagnosis, formal signs of health conditions such as prescribed medications, experienced bodily sensations, health risks such as health behaviour. These data are evaluated on the bases of past health and future health expectations, one's age and the perceived health of peers.

Past research largely supported the notion that individuals

apply the above information when evaluating their health. Thus, self-rated health was found to be associated with haemoglobin levels and white blood cells count (Jylhä, Volpato, & Guralnik, 2006), health problems and limitations of daily functioning (Murata, Kondo, Tamakoshi et al., 2006; Bath, 2003). Health behaviour, and the possibility of changing current health behaviour, were related to self-rated health in a Canadian sample (Bailis, Seppälä, & Chipperfield, 2003). Empirical support to the role of past health, health expectations and health of peers in evaluation one's health can be found in an eight-year follow-up study in California (Wang & Satariano, 2007).

Huisman & Deeg (2010), however, argued that the cognitive process of selecting and evaluating health-related information is unlikely to be a rational, conscious, action of decision making. Rather, health evaluation is an ongoing process, affected, distorted, and modified by internal and external factors. Indeed, several studies provided evidence suggesting that mental health, such as depressive symptoms, moral, and life satisfaction, were important for the way persons rated their health status (Nunley, Hall, & Rowles, 2000; Bath, 2003; Murata et al., 2006).

Moreover, perceived social isolation and lack of social support seemed to lead to poor self-rated health (Bailis et al., 2003; Murata et al., 2006). Franks et al. (2010) reported that socio-economic position have also been found to influence the way individuals rate their own health status, yet with a differential relationships with survival: self-rated health was a stronger predictor of mortality among whites and better educated respondents. Similarly, self-rated health differentially predicted mortality in different age-sex groups (Benyamini et al., 2003; Franks et al., 2010).

At the same time, all these physical, psychological, social support, and demographic characteristics were found to be related to mortality risk in past research (Berkman & Syme, 1979; Cambois, Robine, & Brouard, 1998; Grémy & Cambois, 2000; Boyle, Barnes, Buchman et al., 2009). The present study seeks to add to this body of knowledge by first, test for Jylhä's (2009) suggestion regarding the variables related to one's self-rated health and second, by exploring which of the variables that construct self-rated health are independently related to survival.

Finally, we shall examine whether self-rated health contributes to the explanation of seven-years survival among a sample of elderly men and women after controlling for the variables with which it is directly related.

Method

The Sample

A sample of 750 elderly, aged 70 to 85 was drawn from three sources, to cover, as much as possible, the diverse population of the Beer-Sheva area, a city of about 200,000 in the South of Israel: members of the General Sick Fund, which covers 81% of the aged in the region; public sheltered housing (whose two important admission criteria are independent daily functioning and the absence of privately owned residence); and day clubs for the aged. Criteria for inclusion in the study were age and willingness to participate. Criteria for exclusion were dementia (known or indicated by preliminary Mini-Mental State Exam (18, 19) and a severe systemic disease such as actively treated malignancy, past stroke, cardiovascular conditions (unstable ischemic heart disease, arrhythmia, clinically significant valvular disease), liver and renal diseases, and Parkinson's. These criteria were used to enable us to explore the research question net of life threatening conditions.

Of the 750 sampled seniors, 535 (157 men and 378 women) completed the interview. The major reasons for exclusion were death, younger or older than the age indicated in the records, incorrect address, major disease, and inability to complete the interview. The age and sex distribution of respondents and non-respondents was similar.

Six years later, a follow-up study was conducted. Using the ministry of interior population register, 330 survivors were identified and date of death was recorded for 121 deceased. Twenty four subjects were lost to follow-up.

The Instrument

A structured questionnaire was constructed, including the following measures:

1) Socio-demographic characteristics: age, sex, educational level, subjective measure of economic state, marital status, country of birth, and age at immigration;

2) Health status: self reported chronic conditions; cardiovascular risks; the SF-36 (McHorney, Ware, & Raczek, 1993) which measures four dimensions of physical health: physical functioning (PF), limited role performance as a result of physical health (RP), body pain (BP), general health attitudes (GH); three dimensions of psychological well being: limited role performance as a result of emotional difficulties (RE), mental health (MH), vitality (VT), and social functioning (SF). In the current study, Chronbach's alpha = 0.94 was observed at baseline for the whole scale after using standardized items.

3) Health behaviour: respondents were asked whether or not they kept a certain diet, performed physical activity, and consumed tobacco or alcohol.

4) Cognitive functioning: the Mini-Mental State Examination was administered (Folstein, Folstein, & McHugh, 1975; Folstein, Antony, & Parhad, 1985).

5) Cardio-vascular risk: blood pressure, overweight, and the presence of diabetes were used as objective health risk factors.

Procedure

The first contact with the respondent was a short telephone

conversation, performed by trained interviewers. Interviewers insisted on speaking with the potential participant, and subjects who were not able to speak on the phone because of chronic health problem or cognitive status, were excluded from the study. The purpose and the procedure of the study were then explained, and respondents were invited to participate. Subjects willing to participate were briefly interviewed to assess exclusion criteria, and if eligible a time for a home visit was set.

On the average, each interview lasted for 40 minutes. Nurses and paramedics were specially trained for the study. Interviewers presented the purpose of the study and asked the subject to sign the informed consent form. At both times the study was approved by the ethics committee.

Data Analysis

Self-rated health was categorized into a dichotomy of "excellent or good" and "fair or poor". Bivariate statistics was used to assess the association between self-rated health and demographic characteristics, health, cognitive functioning, and health behaviour. Cox proportional hazards regression was employed to explore the relationships between these variables and length of survival.

Results

The mean age at baseline was 76.4 ± 3.6 years (Table 1). Less than one third of the participants were men, half were married. Some half had less than high school, and, on the average, respondents evaluated their economic state as intermediate.

About a half of the sample evaluated their health as excellent or good. The mean cognitive functioning score was somewhat below the accepted cut-off point for mild impairment (24). The distribution of the variables suggested by Jylhä (2009) is presented in Table 1.

We now turn to explore what are the variables which predict self rated health. Following the model suggested by Jylhä (2009), we started by analysing the relevant components of health (Table 2). With few exceptions, all the variables proposed were related to self-rated health in the expected direction. Persons evaluating their health more favourably, on the average, reported fewer chronic conditions, fewer limitation on daily activity, fewer formal signs of ill-health better cognitive abilities and somewhat better health behaviour. Yet, the exceptions should be noted. Diagnosed diabetes did not affect self-rated health, and those with higher blood-pressure perceive their health to be better. Accepted preferred health behaviour, that is, watching one's diet and exercising, were associated with better self-rated health. However, risky behaviour—being overweight, the consumption of tobacco and alcohol—did not affect self-rated health.

In the next stage of the analysis we set out to examine which of the health variables independently contributes to favourable self-rated health. The results of logistic regression analysis showed that just five health variables play a statistically significant role in defining one's health as excellent or good: the reported number of chronic conditions ($\text{Exp}^B = 0.56$, $p < 0.001$); physical functioning or disability ($\text{Exp}^B = 0.91$, $p < 0.001$); the ability to perform daily activity (role performance, $\text{Exp}^B = 1.16$, $p < 0.05$); good mental health ($\text{Exp}^B = 1.09$, $p < 0.01$); and body pain ($\text{Exp}^B = 0.87$, $p < 0.01$). Note that none of the formal signs of illness and risks and strengths had statistically significant contribution to self-rated health after controlling for these five variables.

Table 1. Baseline characteristics (percent, means and standard deviations).

Variable	Sample	Range
<i>Socio-demographic</i>		
Age	76.4 (3.6)	70 - 85
Sex (men)	29.2%	
Education (highschool or higher)	53.3%	
Marital status (married)	46.2%	
Economic state	5.5 (1.4)	2 = poor; 8 = good
<i>Health</i>		
Self rated heath (good, excellent)	52.1%	
compared to others your age (good, excellent)	59.8%	
Number of chronic conditions	1.5 (1.4)	
Of these: % with condition		
Respiratory	9.4%	
Heart	27.0%	
CVA	1.9%	
Cancer	1.5%	
Physical functioning	20.0 (6.1)	2 = disabled; 30 = not disabled
Mental health	21.3 (5.2)	6 = poor; 30 = good
Role performance	9.9 (2.1)	6 = poor; 12 = good
Energy	4.8 (2.6)	2 = low; 12 = high
Pain	7.3 (2.8)	2 = severe; 12 = none
Vitality	7.6 (2.4)	2 = low; 12 = high
Social activity	7.8 (2.3)	2 = low; 10 = active
Health attitudes	17.2 (3.3)	4 = negative; 28 = positive
Medicines taken regularly (% none)	44.5%	
Hospitalization past year (% none)	78.0%	
<i>Cognitive functioning</i>		
MMSE	22.4 (4.3)	0 = poor; 30 = good
<i>Health Behavior</i>		
Diet (keeping)	57.4%	
Smoking	25.7%	
Alcohol (consuming)	7.5%	
Physical activity (yes)	31.2%	
<i>Cardiovascular risk</i>		
Diabetes	12.5%	
Systolic blood pressure	141.9 (20.6)	
Overweight	2.9%	

Examining the social characteristics, we observed that the probability of an excellent or good self-rated health was greater for men than for women; for the better than for the lesser educated; for married than for unmarried persons; and for those who experienced fewer economic strains (Table 3). Moreover, the ability to be socially active also increased the tendency to feel healthy. As may have been expected, respondents evaluated their health relative the health of peers and their expecta-

Table 2. Self-rated health and health characteristics (percents, means, and standard deviations).

Variable	Excellent-good	Faire-poor	Statistics
<i>Current Health</i>			
Number of chronic conditions	0.9 (1.0)	2.0 (1.5)	$t = 10.0^{***}$
Physical functioning ¹	23.3 (5.2)	17.4 (5.5)	$t = 12.5^{***}$
Mental health ¹	23.4 (4.7)	18.9 (5.1)	$t = 10.2^{***}$
Role performance ¹	10.9 (1.7)	9.0 (2.2)	$t = 10.8^{***}$
<i>Body sensations</i>			
Energy ¹	5.8 (2.6)	3.9 (2.3)	$t = 8.7^{***}$
Pain ¹	8.6 (2.5)	6.1 (2.6)	$t = 10.8^{***}$
Vitality ¹	8.5 (2.0)	6.9 (2.4)	$t = 8.3^{***}$
<i>Formal signs of illness</i>			
Medications taken regularly (1 or more)	46.0%	71.3%	$\chi^2 = 33.3^{***}$
Hospitalized past year (1 or more)	16.9%	27.9%	$\chi^2 = 8.7^{**}$
Respiratory disease (yes)	4.2%	14.3%	$\chi^2 = 14.8^{***}$
Heart condition (yes)	15.6%	37.4%	$\chi^2 = 29.9^{***}$
CVA	0.4%	3.4%	$\chi^2 = 5.7^*$
Diabetes (yes)	14.7%	9.7%	$\chi^2 = 3.0$
Systolic blood pressure	143.8 (21.2)	139.4 (19.7)	$t = 2.5^*$
<i>Cognitive functioning</i>			
MMSE ¹	23.3 (4.0)	21.6 (4.4)	$t = 4.5^{***}$
<i>Risks and strengths</i>			
Diet (keeping)	64.2%	50.2%	$\chi^2 = 10.4^{**}$
Smoking (yes)	25.6%	21.7%	$\chi^2 = 0.1$
Alcohol (consuming)	8.5%	6.5%	$\chi^2 = 0.7$
Physical activity (yes)	43.3%	20.1%	$\chi^2 = 33.1^{***}$
Overweight (yes)	3.2%	2.4%	$\chi^2 = 0.3$

¹Higher score indicates better economic state and better health. *p < 0.05; **p < 0.01; ***p < 0.001.

tions for future health.

Nevertheless, the results of logistic regression analysis showed that only three variables independently contribute to positive self-rated health: better economic state ($Exp^B = 1.37$, $p < 0.01$); positive perception of future health ($Exp^B = 1.59$, $p < 0.001$); and rating one's health positively compared to peer¹ ($Exp^B = 12.98$, $p < 0.001$).

To assess the degree to which self-rated health independently predicted the length of survival during the follow-up period, stepwise Cox proportional hazard regression was performed. Variables were entered to the equation in blocks: first health variables, second than cognitive functioning, risks and strengths, and last social characteristics. At each stage the variables which had no statistically significant contribution to the explanation of survival since baseline were excluded from the equation. Self-rated health was added to the equation after this procedure. The final model is presented at Table 4.

Of the health variables, only disability decreased the odds of

¹It should be noted that the correlation between self-rated health and comparing one's health with that of peers was $r = 0.64$.

Table 3.
Self-rated health and social characteristics (percents, means, and standard deviations).

Variable	Excellent-good	Faire-poor	Statistics
<i>Socio-demographic</i>			
Age	76.7 (3.7)	76.0 (3.5)	$t = -2.1$
Sex			
men	59.0%	41.0%	$\chi^2 = 13.1^{***}$
women	41.7%	58.3%	
Education			
less than highschool	37.7%	62.3%	$\chi^2 = 15.7^{***}$
highschool or higher	53.3%	44.7%	
Marital status			
married	54.1%	45.9%	$\chi^2 = 9.3^{**}$
not married	40.8%	59.2%	
Economic state ¹	6.0 (1.3)	5.0 (1.3)	$t = -9.1^{***}$
Social activity ¹	8.8 (1.7)	6.9 (2.4)	$t = 10.0^{***}$
<i>Future health</i>			
Health attitudes ^{1,2}	19.8 (2.8)	14.8 (3.1)	$t = 18.7^{***}$
<i>Own health compared with others (excellent, good)</i>			
	73.8%	8.3%	$\chi^2 = 208.4^{***}$

¹Higher score indicates better economic state, social activity, and positive health attitudes; ²Taken from the SF-36; *p < 0.05; **p < 0.01; ***p < 0.001.

survival. Of the formal signs of illness, blood pressure alone was associated with shorter survival. Of the social characteristics—older age and being a man increased the risk of dying during follow-up. Self-rated health had statistically significant addition to the explanation of mortality. Note that none of the variables that predicted self-rated health predicted the likelihood to die during the seven years follow-up.

Discussion

In this study we explored part of Marija Jylhä's (2009) proposed process of health evaluation. Namely, our research question focussed on the data which is relevant to self-rated health. We sought for the health and social variables a sample of elderly individuals took into account when coming to rate their own health as excellent-good or faire-poor. Second, we examined which of these information items predicted seven-years survival among seniors. For this purpose, 535 men and women 70 to 85 years of age were interviewed in 1999-2000, of whom 121 passed away during the seven year follow-up period. Date of death was taken from the national vital statistics records.

As suggested by Jylhä's (2009) and documented in previous reports, a plethora of health indicators were related to self-rated health: medically diagnosed conditions and formal signs of illness along with chronic health problems, disability and mental health, cognitive functioning, social involvement and watching over what one eats. Yet, only few of these had a unique, independent, contribution to self-rated health. It appeared that all "relevant health information" in Jylhä's (2009) terminology, were compressed into five components: the number of chronic conditions, disability and difficulties in performing daily roles and tasks, mental health and body pain. Note

Table 4.
Proportional hazard ratios for seven-year mortality (Cox regressions coefficients).

Variable	B	Hazard ratio	95% CI	Wald
<i>Health</i>				
Physical functioning ¹	-0.51	0.95	0.92 - 0.98	10.54***
<i>Formal signs of disease</i>				
Systolic blood pressure	0.01	1.01	1.00 - 1.02	7.83**
<i>Body sensations</i>				
ns				
<i>Cognitive functioning</i>				
MMSE ¹	-0.04	0.96	0.93 - 0.99	6.68**
<i>Risks and strengths</i>				
ns				
<i>Social characteristic</i>				
Age	0.08	1.08	1.04 - 1.13	13.27***
Sex (men)	0.83	2.23	1.65 - 3.16	25.0***
Self evaluation of health (excellent/good)				
	-0.49	0.62	0.44 - 0.86	7.92**

¹Higher score indicates better health; *p < 0.05; **p < 0.01; ***p < 0.001.

that none of the formal signs of illness or diagnosed health conditions were included in the final model. Not only the number of medications taken regularly and diagnosed health risks, such as diabetes and hypertension, factors were excluded, but also what is often considered as life threatening conditions such as cardio-vascular disease.

We would like to propose that these findings can be explained in light of Huisman and Deeg's (2010) criticism on Jylhä's model. As mention in the introduction, they argued that health evaluation is not necessarily a rational, deductive and/or inductive, cognitive process of collecting and weighing data. According to them, people rate their health, modify and refine their evaluation, continuously throughout life, as a result of internal as well as external experiences. Thus, diagnosed health problems and other formal signs of ill-health, healthy or risky behaviour, seem to be less important than the accumulation of chronic conditions, even if minor and not life threatening, negative bodily or mental sensations, and the ability or increasing difficulties in being active according to one's expectations and desire.

In accordance with this approach and shown by past research, social roles and positions, social life and experiences are also taken into account when evaluating health. Thus, one's age and sex, marital status and economic state appeared as relevant to health evaluation along with social activity, health attitudes and perceived health of peers. However, multi-variate analysis showed that of these just three independently construct self-rated health: economic state, expected future health, and the perception of the health of peers. Note that age and gender were not related to self-rated health in the multivariate analysis in this sample, probably because of the limited age range. Moreover, gender differences, almost universally observed in past research, fell below the level statistical significance once these three variables were taken into account. This finding can be the result of gender gradient mortality which is reflected in the large proportion of women at this age.

In this sample, as in many others, self-rated health was associated with survival net of health and social characteristics. Advanced age, being a men, higher blood pressure, and poorer cognitive capability predicted shorter survival, though none of

these predicted self-rated health. The only variable which was independently associated with both self-rated health and the risk of death physical functioning, or the level of disability.

It is plausible that self-rated health predicts mortality above and beyond physical (age, sex) and medical statuses (cognitive functioning and blood pressure) precisely because it is comprised of information generally not considered by scientific medicine. It may reflect one's feeling if life is worth living, given one's ability to conduct the way and the quality of life he/she would like to have. Looking at one's social environment and at peers may bring about the feeling that the time has come similar to the effect of special days in one's own life or holidays (see for example, Anson & Anson, 2000, 2001). Health professionals should be aware of the importance of self-rated health and take it into considerations when making medical evaluation and treatment plans.

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