Perceived Health and Cause-Specific Mortality among Finnish Men and Women Aged 30 and over

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Abstract

Perceived health is strongly associated with subsequent mortality, but the causes of this association are not known. The purpose of the paper is to analyze the association between perceived health and mortality after controlling for sociodemographic characteristics, and to estimate whether the association varies by cause of death. The study analyzed data from the Mini-Finland Health Survey, a nationally representative sample of 7,217 adults aged 30 and over in 1978–1980. A 12-year mortality follow-up was established by record linkage to death certificates at Statistics Finland. The study showed that perceived health was very strongly associated with mortality after sociodemographic adjustments; men reporting fairly poor or poor health had a 2.41 (95% confidence interval 1.96–2.96) times higher adjusted mortality than men reporting fairly good or good health. Among women, the corresponding relative risk was 1.71 (95% confidence interval 1.37–2.15). The strength of the association varied by cause of death. Future attempts to better understand the association between perceived health and mortality should begin at the cause-specific level. The explanations for the association are likely to vary for different diseases and causes of death.

Keywords: cause of death, mortality, perceived health

Introduction

In health surveys and often in clinical studies, assessments of the level of general health and the presence of chronic conditions derive from personal interview information. In a measurement of perceived general health, the respondents are asked to describe their health on a scale ranging from good to poor. This global question correlates fairly well with other indices of health status, functional limitations, disability and assessments made by a physician (Johnson and Wolinsky 1993; Jylhä et al. 1986; Maddox and Douglas 1973; Tissue 1972). Perceived health is believed to summarize a broad range of medical and other health status information available to the individual, ranging from knowledge of existing diseases to cognitive and affective psychosocial characteristics of individuals and their personalities (Idler and Angel 1990; Tissue 1972).

In health research, the public health relevance of perceived health is partly based on its widespread use as an instrument in monitoring population health. Furthermore, perceived health has been found to predict health care use (Fylkesnes 1993; Hulka and Wheat 1985; Krakau 1991; Roos and Shapiro 1981) and mortality (Appels et al. 1996; Idler 1992; Idler, Kasl and Lemke 1990; Kaplan and Camacho 1983; Kaplan et al. 1996). To understand its nature, usefulness and limitations as a health measure, it is important to analyze its association with other health indicators, including mortality.

According to several studies, total mortality is much higher among persons reporting poor health than among those reporting good health (Appels et al. 1996; Idler 1992; Idler et al. 1990; Kaplan and Camacho 1983; Kaplan et al. 1996). Since both perceived health and mortality may be related to a wide range of sociodemographic and personal characteristics as well as chronic conditions, the association between perceived health and mortality could be mainly a reflection of such relationships. However, several previous studies suggest that this association remains after controlling for sociodemographic confounders, medically confirmed diagnoses and psychosocial factors (Idler and Benyamini 1997). A recent exception is a study by Kaplan and colleagues (Kaplan et al. 1996), who argue on the basis of data on middle-aged men in Eastern Finland that the association is to a great extent a reflection of underlying disease.

This paper attempts to shed more light on the association of perceived health and mortality by looking at two questions. First, we analyze the association of perceived health with subsequent mortality after controlling for sociodemographic characteristics. Second, we estimate whether the association varies by cause of death.

Material and Methods

Population sample

A national sample of 8,000 adults was studied in the Mini-Finland Health Survey carried out in 1978–1980; altogether 3,637 men and 4,363 women. The two-stage random sample was drawn from population registers to represent Finnish adults aged 30 and over. The subjects were invited to attend a personal health interview and a two-phase health examination (Aromaa et al. 1989). Altogether, 7,703 persons (96%) were interviewed by public health nurses in their homes or in the place where they were under permanent care. The Social Insurance Institution's Mobile Clinic Unit carried out the first phase of a two-phase health examination 1–6 weeks after the personal interview, and 7,217 persons (90%) participated. In the second phase, further examinations were carried out on those with histories of major chronic conditions or symptoms or signs suggestive of such conditions. The current analyses are based on the 7,217 persons attending the first phase of the health examination.

Measurement

The baseline personal interview included questions about sociodemographic characteristics, chronic conditions, disability and various other measures of health status. The invitation to the health examination included a self-administered questionnaire, which provided further information on e.g. health status, chronic conditions and their treatment, job and job characteristics. At the beginning of the health examination the nurses checked the questionnaires, which had been filled out at home. Further interviews, tests and examinations followed and have been described more fully elsewhere. (Aromaa et al. 1989; Heliövaara et al. 1993.)

The questionnaire that was filled out before the medical examination included a question about perceived health. The question read: "How would you assess your current health?" The response alternatives were good, fairly good, intermediate, fairly poor and poor. The test-retest reliability of perceived health has been shown to be fair or good for both men and women (Lundberg and Manderbacka 1996; Martikainen et al. 1998). Reliability analyses from this data show that unweighed agreement of the 'good-intermediate-poor' categorization of perceived health was around 70% and unweighed Kappa values were around 0.5. Only among the over 74-year-olds did reliability decline below these levels.

Age at interview was classified into 5-year age groups: 30–34, 35–39,…, 75–79, and 80+. Marital status was classified into five categories: married, single, cohabiting, divorced, and widowed. Five ordinal educational categories were distinguished on the basis of the highest completed certificate or degree. These were primary, basic, lower intermediate, higher intermediate and higher education. The

regional classification was based on the five social insurance regions: North, West, East, Southwest and South of Finland. Furthermore, we distinguished between the institutionalized and the noninstitutionalized population.

Mortality and causes of death

Information on date of death and cause of death was obtained from the national registers on population and cause of death by record linkage using the personal identification number. Mortality follow-up was for 12 years from recruitment. Altogether, the study population lived 78,762 person-years during follow-up (35,315 person-years among men and 43,447 among women). Classification of cause of death was based on the three-digit codes of the Finnish version of the International Classification of Diseases (ICD 8) (Lääkintöhallitus 1969). For the purposes of this study, the causes were grouped into broad categories as follows: All causes, malignant neoplasms (ICD 140–209), diseases of the circulatory organs (ICD 390–459), all other diseases, and accidents and violence (E800–E999). 761 and 630 deaths occurred among men and women respectively.

Missing data

Missing data was observed for three of the explanatory variables studied. Those with missing information were classified into the largest single category of that variable. Only 0.1% of subjects had missing information for perceived health in the questionnaire. An equally small proportion had missing data on marital status, and information on education was missing for 20 subjects (0.3%)

Statistical methods

The analysis of the association between perceived health and mortality was carried out by means of Cox proportional hazards models (Clayton and Hills 1993). The person-years at risk were calculated on a daily basis. The STATA (Stata Reference Manual 1992) statistical package was used in fitting the models and performing likelihood-ratio tests between two models.

The results of the Cox models were presented as relative mortality risks (hazard ratios). The first category of each explanatory variable was the reference group, with a relative risk of one. We added sociodemographic background factors to the regression model in the time order that their values are most likely to have been determined (i.e. age first and institutionalization last).

Results

Perceived health and total mortality by duration of follow-up

Table 1 presents person-years, number of deaths and relative mortality risks for the variables used in these analyses. Age-adjusted mortality for men reporting intermediate health was 42% (relative risk 1.42, 95% confidence interval 1.17–1.72) higher than for men reporting good or fairly good health in the 12-year follow-up period (Table 2). Similarly, men reporting fairly poor or poor health had 153% higher age-adjusted mortality. Controlling for education, marital status, region of residence and institutionalization had little bearing on these relative risks: after all adjustments, excess mortality was 39% among men reporting intermediate health and 141% among men reporting fairly poor or poor health.

The association between perceived health and mortality was similar among both women and men. Among women, however, the association was somewhat weaker. Age-adjusted mortality for women reporting intermediate health was 36% higher than for women reporting good or fairly good health. Those women reporting fairly poor or poor health had 84% higher age-adjusted mortality. Among women as among men, controlling for other potential sociodemographic confounders than age had only a very limited impact on the association.

Perceived health and mortality by cause of death

The strength of the association between perceived health and mortality differed by cause of death (Table 3). Among men, the association was most marked for the group of other diseases (diseases other than malignant neoplasms and circulatory diseases): mortality was 102% and 326% higher for those reporting intermediate and fairly poor or poor health than it was for those reporting good or fairly good health respectively. The association was somewhat weaker for accidents and violence (49 deaths) and for circulatory diseases (about the same level as all causes of death combined). The smallest excess mortality was observed for malignant neoplasms. The excess cancer mortality of men reporting fairly poor or poor health was 64%. The ranking of causes of death was similar when looking at the excess mortality of men reporting intermediate as well as fairly poor or poor health.

Judging by the excess mortality of women reporting fairly poor or poor health, the association between perceived health and mortality was largest for other diseases and circulatory diseases. Differentials were smaller for malignant neoplasms and accidents and violence. Overall, the pattern of cause-specific excess mortality by perceived health was similar, but the association was weaker among women than men. However, women reporting intermediate health had excess mortality of around 45–50% for all causes except malignant neoplasms; for malignant neoplasms the

Table 1. Person-years, number of deaths, age-adjusted relative mortality risks and age-adjusted prevalence of poor or fairly poor health according to selected variables. Men and women aged 30 and over.

	MEN					WOMEN				
	Person-years (%)	Number of deaths	Relative mortality risk	95 % CI	Poor or fairly poor health (%)	Person-years (%)	Number of deaths	Relative mortality risk	95 % CI	Poor or fairly poor health (%)
Perceived health in the questionnaire										
Good	17	38	1.00			15	34	1.00		
Fairly good	33	133	1.25	0.87-1.80		34	115	0.87	0.59-1.28	
Intermediate	36	310	1.68	1.19-2.37		38	296	1.22	0.85-1.75	
Fairly poor	12	206	2.86	2.00-4.08		11	130	1.44	0.98-2.12	
Poor	2	74	3.52	2.35-5.25		2	55	2.44	1.57-3.77	
Age[a]										
30-34 years	17	10	1.00		3	14	6	1.00		2
35-39 years	13	18	2.39	1.10-5.18	5	12	9	1.80	0.64-5.05	5
40-44 years	15	29	3.45	1.68-7.09	8	11	11	2.33	0.86-6.31	7
45-49 years	13	48	6.50	3.29-12.85	14	10	21	4.86	1.96-12.06	10
50-54 years	12	64	9.33	4.79-18.17	23	12	27	5.43	2.24-13.16	18
55-59 years	10	87	14.84	7.71-28.56	26	11	35	7.53	3.16-17.90	21
60-64 years	7	107	26.42	13.82-50.54	32	8	55	16.19	6.97-37.60	28
65-69 years	6	131	36.39	19.12-69.25	32	9	108	30.80	13.53-70.09	20
70-74 years	4	131	61.47	32.29-117.01	32	6	133	53.95	23.80-122.30	20
75-79 years	2	73	82.67	42.64-160.26	30	4	138	103.86	45.83-235.37	32
80+ years	1	63	134.90	69.05-263.54	28	2	87	151.83	66.31-347.63	32

Education										
Primary	8	162	1.00		20	9	196	1.00		18
Basic	58	462	0.88	0.73-1.06	18	58	352	0.77	0.64-0.93	14
Lower intermediate	22	100	0.76	0.58-0.98	16	22	63	0.66	0.49-0.89	13
Higher intermediate	5	12	0.40	0.22-0.72	8	5	11	0.55	0.30-1.02	11
Higher	8	25	0.54	0.35-0.83	11	6	8	0.51	0.25-1.04	10
Marital status										
Married	80	523	1.00		15	66	213	1.00		13
Single	11	90	1.75	1.40-2.19	26	10	90	1.30	1.01-1.68	17
Cohabiting	2	16	1.83	1.11-3.01	27	2	7	2.67	1.25-5.70	32
Widowed	2	86	1.44	1.12-1.86	21	16	280	1.22	1.00-1.48	15
Divorced	4	46	2.17	1.60-2.94	32	6	40	1.41	1.00-1.98	18
Region of residence										
Southwest Finland	24	167	1.00		15	24	147	1.00		15
South Finland	33	241	1.17	0.96-1.43	18	34	205	0.96	0.78-1.19	14
East Finland	17	143	1.24	0.99-1.55	19	16	118	1.08	0.85-1.38	16
West Finland	16	121	1.12	0.88-1.41	17	15	103	1.03	0.80-1.32	15
North Finland	11	89	1.16	0.89-1.50	18	11	57	1.02	0.75-1.39	15
Institutionalization										
Not institutionalized	99	728	1.00		17	99	590	1.00		14
Institutionalized	1	33	2.56	1.78-3.68	38	1	40	2.54	1.82-3.54	32
All	100	761			17	100	630			15
All persons	3322					3895				
Person-years	35315					43447				

a: Age-specific relative mortality risks and prevalence (%) of poor or fairly poor health.

excess was only 10%. Adjusting for sociodemographic variables had little effect on the cause-specific relative risks.

Table 2. Relative mortality risks by perceived health (1.00=those reporting good or fairly good health) according to six cumulative models, and 95% confidence intervals (CI). Men and women aged 30 and over.

Perceived health	Model Perceived health	+Age	+Education	+Marital status	+Region of residence	+Institutionali-zation (95 % CI)
Men						
Intermediate	2.57	1.42	1.37	1.38	1.40	1.39 (1.15–1.69)
Poor or fairly poor	5.79	2.53	2.41	2.45	2.45	2.41 (1.96–2.96)
Women						
Intermediate	2.59	1.36	1.31	1.31	1.31	1.32 (1.08–1.62)
Poor or fairly poor	4.62	1.84	1.74	1.74	1.74	1.71 (1.37–2.15)

Discussion

Summary of the results

This study showed that perceived health is very strongly associated with subsequent mortality. In accordance with most other studies, the association existed even after controlling for age, educational attainment, marital status, region of residence and institutionalization.

The association between perceived health and total mortality was somewhat stronger among men than women: the adjusted relative risk of those reporting fairly poor or poor health as opposed to those reporting good or fairly good health was 2.41 among men and 1.71 among women. This sex difference was not due to a difference in the distribution of perceived health – among both men and women, about 50% had good or fairly good health and slightly less than 15% had fairly poor or poor health – but it may reflect the more severe nature of the underlying health problems that contribute to men's health perceptions. The strength of the association varied by cause of death.

Table 3. Age-adjusted relative mortality risks by perceived health (1.00 = those reporting good or fairly good health), 95 % confidence intervals (CI), cause of death. Men and women aged 30 and over.

Perceived health	All causes		Accidents & violence		Malignant neoplasms		Circulatory diseases		Other diseases	
	Relative mortality risk	95 % CI	Relative mortality risk	95 % CI	Relative mortality risk	95 % CI	Relative mortality risk	95 % CI	Relative mortality risk	95 % CI
MEN										
Intermediate	1.42	1.17–1.72	1.66	0.83–3.35	1.08	0.74–1.59	1.43	1.10–1.86	2.02	1.20–3.41
Poor or fairly poor	2.53	2.08–3.09	2.72	1.24–5.98	1.64	1.09–2.47	2.60	1.99–3.40	4.26	2.52–7.23
Number of deaths	761		49		165		419		127	
WOMEN										
Intermediate	1.36	1.12–1.67	1.47	0.64–3.39	1.10	0.74–1.63	1.46	1.11–1.94	1.52	0.92–2.50
Poor or fairly poor	1.84	1.47–2.30	1.06	0.34–3.31	1.26	0.78–2.02	2.04	1.51–2.77	2.43	1.43–4.12
Number of deaths	630		31		140		343		115	

Explanations and mechanisms

The following main explanations for the association between perceived health and mortality can be proposed: (1) perceived health and mortality are related because both are affected by the same sociodemographic characteristics, pre-existing physical health, risk factors or other covariates, (2) perceived health mediates the effects of psychosocial characteristics on mortality, (3) perceived health has an independent effect on mortality. The mechanisms of the possible independent effects of perceived health on mortality are largely unknown. They may be related, for example, to immune 'suppression' and to the functioning of the immune system in general (Rakowski, Mor and Hiris 1991) or are associated with negative self-images that lead to passivity, delay and neglect in protecting one's health (Appels et al. 1996).

It is difficult to disentangle the different explanatory models and mechanisms from the research available so far. Controlling for as many health-related covariates as possible is not necessarily of great explanatory value, especially when the different covariates have been measured – often inadequately – at one point in time, and the causal and temporal relationships between perceived health and these covariates are often unknown. Only when longitudinal data on perceived health and measures of clinical disease and ill-health are available can we discriminate whether the association between perceived health and mortality is due to confounding, independent causation or mediation. However, some tentative observations and guidelines for further research can be made on the basis of the results presented here.

Our study suggests that adjustment for sociodemographic factors is of little relevance; after age is controlled for, education, marital status, region of residence and institutionalization have a relatively minor effect on the excess mortality of those reporting their perceived health below good.

If the association between perceived health and mortality is mainly due to confounding by pre-existing ill-health and known risk-factors, as suggested by Kaplan and colleagues (Kaplan et al. 1996), the association may be assumed to be strongest for chronic diseases. The relatively weak association between perceived health and malignant neoplasm mortality does not, however, support this view. On the other hand, the association between perceived health and circulatory disease mortality was very strong. The discrepancy may be due to e.g. differences in the severity of diseases, the extent that these diseases and their symptoms are considered as contributing to poor perceived health, or because some unknown direct effects of perceived health on mortality are more relevant for circulatory disease.

Confounding may not, however, be the only explanation for the mortality differentials by perceived health. The association between perceived health and accidental

and violent mortality observed in this study (especially among men) indicates that the association may partly reflect psychosocial components of perceived health. Low sense of mastery and low sense of coherence (Lundberg and Nyström-Peck 1994), poor personal relationships, and exposure to strain potentially help us to understand the association between perceived health and accidental and violent mortality. However, current research does not allow us to explicitly assess these possibilities.

Conclusions

This study has shown that perceived health is strongly related to mortality also after sociodemographic adjustments are made. The strength of the association varies by cause of death. Attempts to understand the association between perceived health and mortality should thus begin at the cause-specific level. Medically confirmed diagnoses, life-style and risk factors as well as psychosocial determinants relevant for specific causes of death should be examined in further longitudinal studies on the association of perceived health and cause-specific mortality.

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