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What does age-comparative self-rated health measure? – A cross-sectional study from the Northern Sweden MONICA Project

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Abstract

Aims: Self-rated health accounts comprehensively for many health domains. Using self-ratings and knowledge of associations to health domains might help personnel in the health care sector to understand complaints of ill health. The aim of this paper was to investigate associations between age-comparative self-rated health and disease, risk factors, emotions and psychosocial factors in a general population. **Methods:** Population based cross sectional surveys performed in 1999, 2004 and 2009 in Northern Sweden. Participants were aged 25–74, and 5,314 out of 7500 invited completed the survey. Comparative self-rated health was measured on a three grade ordinal scale by the question: “How would you assess your general health condition compared to persons of your own age?” with the alternatives “better/worse/similar”. Independent variables were sex; age; blood pressure; cholesterol; body mass index; self-reported myocardial infarction, stroke, diabetes, physical activity smoking, risk of unemployment, satisfaction with economy, anxiety, depressive emotions, education and Karasek scale of working conditions. Odds ratios using ordinal regression were calculated. **Results:** Age, sex, stroke, myocardial infarction, diabetes, body mass index, physical activity, economic satisfaction, anxiety and depressive emotions associated to comparative self-rated health. Risk of unemployment, a tense working-situation and educational level also associated although considerably weaker when adjusted for the other variables. Anxiety, depressive emotions, low economic satisfaction and a tense working situation were common in the population. **Conclusions:** Emotions and economic satisfaction were important associations to comparative self-rated health besides medical variables. How to utilise knowledge of these associations in health care should be further investigated.

Key Words

Cardiovascular disease, comparative self-rated health, diabetes, emotions, ordinal regression analysis, population based study, psychosocial factors, risk factors.

Introduction

“What is health, other than a labile system of equilibrium with a bad prognosis” [1]? People seek health-care to maintain this equilibrium. Health is at the crossroads between an almost innumerable set of medical, socio-economic, relational and emotional factors [2]. Personnel in the health-care system need to assess the individual patient’s health complaint not only in relation to defined diseases but also to social determinants of health and the patient’s actual circumstances in life [3]. Medical records include information about diseases, medication, laboratory tests, x-ray imaging etc. Information on habits such as physical activity, eating, sleeping, smoking and the like are with the patient. The patient can also give information on functional abilities and symptoms. But what about the rest? Important information on psycho-social wellbeing, working conditions, feelings of anxiety, low spirits or problems with personal economy is at risk being less considered among the multitude of information being processed in a clinical encounter. The epidemiologists’ tool of self-rated health has the ability to comprehensively account for many different domains important for health [2]. In epidemiology, a general question of self-rated health is most used. A question of age-comparative health, where respondents compare their health with people their own age is also an option.

A study on a population based sample showed that physical functioning, was more strongly associated to general self-rated health than mental health and social functioning [4]. The study did not however use comparative self rated health. There are some studies comparing general and age comparative questions regarding self-rated health. One of these found that questions of general or age-comparative self-rated health mainly represented parallel assessments with strongest associations to functional and physical health [5]. Two other studies comparing general and age-comparative self-rated health used ordered logistic/multinomial regression and concluded that the two measures of self-rated health cannot be used interchangeably as they displayed different association to determining factors [6, 7].

A manual search in reference lists and a Pub Med search produced one paper where functional and cognitive impairment was associated to comparative self-rated health in a study using ordinal regression [8]. No further studies

on associations between comparative self-rated health and health-factors in representative samples of a whole population could be retrieved.

When comparing the two measures of self-rated health from a semantic perspective it was concluded that the comparative self-rated health is semantically clearer [9]. In a clinical setting, the comparative question is dialogue enhancing, puts the patient in a context and is deemed well suited for clinical encounters [10]. A comparison with others might be an important factor of health [11].

We therefore used comparative self-rated health to establish associations between factors important for assessments in clinical encounters. We used ordinal regression as a method for analysis.

The aim of this study was to assess the association between age-comparative self-rated health and diagnoses of stroke, myocardial infarction or diabetes; biological risk-factors for those diseases; self-reported social- and life-style factors; and self-reported occurrence of depressive emotions or anxiety.

Methods

Study design

Data were analysed from independent, repeated cross-sectional samples from the same population of the Northern Sweden MONICA Project (Multinational Monitoring of Trends and Determinants in Cardiovascular Disease) in 1999, 2004 and 2009. Participants were aged 25-74 years and randomly selected from the population register in the two northern-most counties in Sweden. Participants were stratified for age and sex [12, 13].

Measurements

The investigation included measurements of systolic and diastolic blood pressure, weight, height and cholesterol. Questions were asked concerning hospitalisation for verified heart infarction, having suffered a stroke or being diagnosed with diabetes. Data regarding smoking habits, physical activity and education were also collected. Smoking habits were assessed by the question: "Do you smoke cigarettes at present?" with the answer alternatives "Yes, regularly 1 cigarette or more per day" or "No" or "Less than a cigarette per day" and "Have you ever smoked a pipe?" with the answer alternatives "Yes, at present, regularly"; "No"; "I smoke pipe less than once daily"; "Formerly, but not now." Answer "yes" was coded as "smoking" other answers as "non-smoking". Physical activity was measured by a Likert scale

using the question “How much have you exercised or performed strenuous activity in your leisure time the last year?” Answer alternatives were: not at all; mostly been sitting, sometimes taking a walk; light exercise at least 2 hours a week; more strenuous physical activity 1–2 hours per week; more strenuous activity at least 3 hours per week, hard physical training or competition regularly and several times a week. Economic satisfaction was measured with a 7-grade Likert scale with the instruction “Mark on the scale your satisfaction with your situation”, with a scale ranging from “very bad” to “excellent, could not be better”. Risk of unemployment was assessed by the answers yes/no to the question “Do you think there is a risk you may lose your job in the near future?” Educational level was classified according to highest attained level of education. Nine years at compulsory school was classified as low, 12 years of school as medium, postsecondary education as high education. Anxiety and depressive emotions were assessed by yes/no answers to the questions “During the last month, have you had emotions of nervousness, anxiety or uneasiness?” and “During the last month, have you often felt in a bad mood, depressed or felt that the future looking gloomy?” Job-strain was measured using the demand-control model elaborated by Theorell & Karasek using the Swedish questionnaire containing five questions on psychological demands and six on decision latitude [14]. From the answers, respondents’ working situation was characterised as active, relaxed, passive or tense.

Outcomes

Comparative self-rated health was measured on a three-grade ordinal scale by the question “How would you assess your general health condition compared to persons of your own age?” with the alternatives “better/worse/similar”.

Statistical analyses

The variables were analysed in relation to the categories of comparative self-rated health according to table I and tested with χ^2 -test. The statistical analyses were performed as ordinal regression analyses with the support of the statistical package SPSS18. The reference value for the determinants is set as the anticipated most favourable situation. The multiple ordinal regressions models were made in three blocks, model 1 containing factors often asked for in medical practice, model 2 containing psycho-social factors and a model 3 combining model 1 and 2 with exclusion of the variables “risk of unemployment” and “Karasek”.

The Northern Sweden MONICA Project has been approved by the regional ethical committee of Umeå, Sweden.

Results

Study population

The participation rate was 73% with 5,457 persons completing the survey. Participation rates were in 1999, 2004 and 2009; 72.9%, 76.2% and 69.2% respectively. As 143 persons had missing answers on comparative self-rated health, this left 5,314 persons for analysis, 51% women, 49% men. Age distribution was according to table 1. There were no statistically significant differences in ratings of self-rated health between the samples from 1999, 2004 and 2009.

Findings

Table I shows that most respondents assessed their comparative self-rated health as “similar” and that it improved with increasing age. Table I also displays the percentage of respondents and the distribution of answers in each ordinal category of comparative self-rated health.

Table II gives crude bivariate OR of determinants. Being a woman increased the OR of assessing lower comparative self-rated health. Neither blood pressure $>140/\geq 90$ nor cholesterol had any significant correlation with comparative self-rated health. Body mass index and physical activity were associated with comparative self-rated health. Having had myocardial infarction, diabetes or stroke or answering yes to questions concerning anxiety or depressive emotions all gave crude OR of order 2-4. Economic satisfaction was also significantly associated with comparative self-rated health as was risk of unemployment. In table III, model 1 shows that smoking lost its statistically significant association to comparative self-rated health, model 2 shows attenuation of most factors where risk of unemployment, “Karasek active” and “Karasek passive” lost their statistically significant associations. If the Karasek variable and/or “risk of unemployment” variable are inserted in model 3, confidence intervals for diabetes, stroke and myocardial infarctions widen considerably (data not shown) and myocardial infarction loses its statistically significant association to comparative self-rated health. Model 3 (table III) shows how educational level lose statistically significant associations. Age, sex stroke, myocardial infarction, diabetes, body mass index, physical activity, economic satisfaction, anxiety and depressive emotions retain their statistically significant association.

Discussion

Self-ratings of health are comprehensive and show associations to several domains important for health. Self-ratings have thus potential to clinical utility. To qualify for this use, associations of self-ratings to possible determining factors have to be known. This paper presents how age, sex, myocardial infarction, diabetes, stroke, body mass index, physical activity, economic satisfaction, anxiety and depressive emotions show significant associations to comparative self-rated health. Risk of unemployment and the Karasek scale of working situation also associate. These variables are based on 3310 and 3294 answers respectively. If these variables are inserted with myocardial infarction, a variable with 5274 answers, the multiple regression system loses statistical power to the extent of myocardial infarction losing its significant association to comparative self-rated health. This is not a plausible finding. In order to retain statistical power we thus excluded the “risk of unemployment” and “Karasek” variable from model 3.

It is not implausible that education loses its association to comparative self-rated health when the educational level in the population is generally high and differences in income are low, as in the Swedish context. This puts in question the use of education as a proxy of social class, status and economic situation.

This study is based on the protocol of the International WHO-study MONICA [12]. The layout of the study was the same during all the years studied. Participation rates were fairly high [13]. Ordinal regression is a variant of logistic regression which uses an ordinal scale of outcomes instead of only two possible outcomes as in logistic regression analysis. The odds ratio (OR) represents a change in odds when moving to the next category in an independent category/factor (such as having had a myocardial infarction or not) or when changing one step in an independent scale/covariate (such as a Likert scale). The use of ordinal regression is motivated by the structure of the dependent variable with its ordinal categories. This is an advantage compared with linear regression of ordinal dependent outcomes.

There is no generally agreed method for measuring economic satisfaction. Economic satisfaction contains several interwoven aspects, actual financial situation with income, fortune and expenditures. There is also a subjective part of the measure including e.g. comparisons to others, subjective needs and ability to comply to actual financial situation. Economic satisfaction has been shown highly related to self-rated health. It has been measured e.g. as a yes answer to the questions “[Can you] live comfortably/cope on present income (1)” or [Do you find it] difficult/very difficult living on present

income (o)?" [15], or rating of "Satisfaction with economic situation of household" on a 10 grade Likert scale, dissatisfied as 1 and satisfied as 10 [16]. The question put in the MONICA questionnaire since the start in 1986; "Mark on the scale your satisfaction with your situation" is not formally validated but used by its face value. We have found no other ways of measuring economic satisfaction with a validated scale. Irrespective of exact wording of the question and lack of validation, the same association is apparent, economic satisfaction is highly related to self-ratings of health.

The intention in using the questions on anxiety and depressive emotions was not to indicate anxiety disorders or depressive disorders but to indicate emotions, which are hard to validate. These questions are not validated. These questions have however been used for many years by the Public Health Agency of Sweden [17]. The generalisability of the findings can be discussed. The surveys are performed in northern Sweden, an area with medium-sized towns (50,000-110,000 inhabitants) and rural areas. The findings of the distributions of emotions and self-rated health in the population are comparable as to those reported on a nationwide scale by the Public Health Agency of Sweden. Self-rated health is however dependent of language and context, and the populations' living conditions are not the same in different countries [2]. The application of the magnitude of our OR to other settings has thus to be made with consideration.

The literature on emotions as determinants of self-rated health (general or comparative) is sparse, although 34 % of people in Sweden and 31% in the US have reported troublesome nervousness, uneasiness and anxiety [17, 18]. Similar associations to emotions have been reported in other studies, mostly in the US, but study populations were small or selected [19, 20]. Our findings underscore that not only anxiety disorders or depressive disorders but also such emotions should be considered, when trying to interpret self-rated health.

Based on data from two large cohort studies, the British Whitehall and the French Gazel, Singh-Manoux et al concluded that measures of mental and physical health status contribute most to the self-rated health construct [21]. Measures of mental health were "minor psychiatric morbidity" (Whitehall), and "emotional reactions" as part of psychosocial factors (Gazel). The studies included employees aged 33-55 years, 71% of whom were men. This is in somewhat contrast to the population based study by Mavaddat et al where functional ability had the strongest association [3]. Our use of ordinal regression analyses does not allow for an analysis of variances and the aim is not to determine what factors are the most influential. What surprised us was the high prevalence in the northern Swedish population of feelings of

anxiety, depression and low economic satisfaction, all with strong associations to comparative self-rated health.

In a cohort study from Northern Sweden, Waernerlund et al. demonstrated that job insecurity, low cash margin and, to some extent, high job strain were contributing factors for suboptimal self-rated health in temporary employees [22]. These employees more often reported emotions such as anxiety, panic, nervous problems, restlessness or concentration problems during the previous year. The findings are in line with our results, as are also the associations on the Karasek-scale. Job insecurity, in our study indicated by the answer yes to the question of risk of unemployment, also showed an association with comparative self-rated health.

Self-rated health is a comprehensive measure of factors influencing health. It is however unspecific [2]. Knowledge of common associations and non-associations might help exploring factors behind low self-rated health. This might aid personnel in the health care sector to focus on areas important to health which otherwise risk being out of focus.

In health care, complex comorbidities, multifaceted situations in patients' life and a web of causal pathways are more the rule than the exception. Rather than focusing on single disease-outcomes, focus should be on attaining highest possible health [23]. Asking patients about their comparative self-rated health and combining the answers with knowledge of common associations has thus potential for clinical utility, helping to focus on the patient's own goals for health and function. This paper highlights the need for further research of the rationale for using education as a proxy for social class, income and status. This use should be revisited in a fresh sample from a Swedish population. Further research is needed with the purpose of taking use of self-rated health not only as an instrument in public health research and surveillance but also as a tool in the health care sector.

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Declaration of Conflicting Interests

Non declared.

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Table I. Distribution of variables according to comparative self-rated health categories.				
Data from Northern Sweden MONICA Project 1999–2009.				
Participants from population register, aged 25–74.				
Variable	Comparative self-rated health			p-value (χ^2)
	Worse	Similar	Better	
	n (percent)			
	n=731	n=3343	n=1240	
Age 65–74	128 (10.9)	686 (58.5)	358 (30.5)	
Age 45–64	340 (15.2)	1339 (60.0)	552 (24.7)	
Age 25–44	263 (13.8)	1318 (69.0)	330 (17.3)	<0.001
Women	427 (15.8)	1752 (64.6)	531 (19.6)	
Men	304 (11.7)	1591 (61.1)	709 (27.2)	<0.001
Blood pressure >140/=>90	239 (14.6)	1002 (61.1)	398 (24.3)	
Blood pressure normal	492 (13.4)	2341 (63.7)	842 (22.9)	0.194
Chol. >7 mmol/l	85 (12.1)	446 (63.4)	172 (24.5)	
Chol. 6-7 mmol/l	173 (13.0)	825 (62.1)	330 (24.8)	
Chol. <6 mmol/l	471 (14.4)	2059 (63.1)	734 (22.5)	0.209
Body mass index >30	258 (24.9)	633 (61.1)	145 (14.0)	
Body mass index 25-30	253 (11.5)	1405 (64.1)	534 (24.4)	
Body mass index <25	214 (10.4)	1284 (62.4)	559 (27.2)	<0.001
Smoking	136 (18.3)	467 (62.7)	142 (19.1)	
No smoking	595 (13.0)	2876 (62.9)	1098 (24.0)	<0.001
Myocardial infarction	53 (33.1)	82 (51.2)	25 (15.6)	
No myocardial infarction	670 (13.1)	3240 (63.4)	1204 (23.5)	<0.001
Diabetes	70 (30.0)	131 (56.2)	32 (13.7)	
No diabetes	656 (13.0)	3204 (63.3)	1203 (23.8)	<0.001
Stroke	43 (37.4)	55 (47.8)	17 (14.8)	
No stroke	677(13.1)	3268 (63.4)	1212 (23.5)	<0.001
Physically inactive (step 1–2)	254 (25.0)	635 (62.4)	128 (12.6)	
Physically active (step 3-6)	467 (11.0)	2669 (63)	1098 (25.9)	<0.001
Economic satisfaction (step 1–3)	168 (25.5)	406 (61.6)	85 (12.9)	
Economic satisfaction (step 4-7)	557 (12.2)	2889 (63.0)	1138 (24.8)	<0.001
Risk of unemployment	86 (14.0)	416 (67.8)	112 (18.2)	
No risk of unemployment	281 (10.4)	1767 (65.5)	646 (24.0)	0.001
Low education	181 (14.6)	760 (61.1)	302 (24.3)	
Medium education	395 (14.8)	1708 (63.9)	571 (21.4)	
High education	147 (10.8)	857 (63.1)	355 (26.1)	<0.001
Anxiety	331 (23.5)	851 (60.4)	228 (16.2)	
No anxiety	392 (10.2)	2462 (63.9)	1001 (26.0)	<0.001
Depressive emotions	276 (33.8)	441 (54)	99 (12.1)	
No depressive emotions	446 (10.0)	2881 (64.7)	1126 (25.3)	<0.001
Karasek 1 Tense	172(13.3)	873 (67.3)	253 (19.5)	
Karasek 2 Active	47 (13.7)	212 (62.0)	83 (24.3)	
Karasek 3 Passive	70 (9.4)	507 (68.4)	164 (22.1)	
Karasek 4 Relaxed	74 (8.1)	588 (64.4)	251 (27.5)	<0.001

Table II. Crude odds ratios (OR) for assessing comparative self-rated health.		
Data from Northern Sweden MONICA Project 1999–2009.		
Participants from population register, aged 25–74.		
Values >1 indicate worse self-rated health compared to reference category.		
	Comparative self-rated health	
	OR	CI 95%
Age 65–74	0.57***	0.50–0.67
Age 45–64	0.81**	0.71–0.92
Age 25–44	1.00	
Female (ref=male)	1.49***	1.34–1.66
Blood pressure >140/≥90	0.99 ns	0.88–1.11
Chol. >7 mmol/l	0.87 ns	0.74–1.02
Chol. 6–7 mmol/l	0.88 ns	0.77–1.00
Chol. <6 mmol/l	1.00	
Body mass index >30	2.61***	2.23–3.05
Body mass index 25–30	1.15*	1.01–1.29
Body mass index <25	1.00	
Smoking (ref=no)	1.41***	1.20–1.65
Myocardial infarction (ref=no)	2.67***	1.95–3.67
Diabetes (ref=no)	2.55***	1.96–3.33
Stroke (ref=no)	3.22***	2.23–4.65
Physical activity (6-step scale)	1.68***	1.59–1.76
Economic satisfaction (7-step scale)	1.34***	1.29–1.40
Risk of unemployment (ref=no)	1.28*	1.02–1.60
Low education	1.20*	1.02–1.40
Medium education	1.34***	1.17–1.53
High education	1.00	
Anxiety (ref=no)	2.22***	1.96–2.53
Depressive emotions (ref=no)	3.77***	3.22–4.41
Karasek 1 Tense	1.61***	1.35–1.92
Karasek 2 Active	1.36*	1.05–1.76
Karasek 3 Passive	1.28*	1.05–1.56
Karasek 4 Relaxed	1.00	
*p<0.05; **p<0.01; ***p<0.001; ns=non-significant		

Table III. Odds ratios for assessing comparative self-rated health. Multiple ordinal regression.						
Data from northern Sweden MONICA Project 1999–2009.						
Participants from population register, aged 25–74.						
Values >1 indicate worse self-rated health compared to reference category.						
	Comparative self-rated health					
	Model 1		Model 2		Model 3	
		CI 95%		CI 95%		CI 95%
Age	0.97***	0.96–0.97	0.98***	0.98–0.99	0.98***	0.97–0.98
Sex (ref=man)	1.50***	1.34–1.68	1.35***	1.16–1.57	1.36***	1.21–1.54
Blood pressure >140/≥90	1.07 ns	0.93–1.23			1.09 ns	0.95–1.26
Cholesterol	1.00 ns	0.95–1.06			1.01 ns	0.95–1.06
Body mass index	1.07***	1.06–1.09			1.07***	1.06–1.09
Smoking (ref=no)	1.15 ns	0.97–1.36			1.10 ns	0.93–1.31
Myocardial infarction (ref=no)	3.10 ***	2.17–4.42			2.67***	1.85–3.86
Diabetes (ref=no)	2.27***	1.69–3.05			2.33***	1.71–3.18
Stroke (ref=no)	3.25 ***	2.17–4.89			2.92***	1.90–4.49
Physical activity (6-step scale)	1.67***	1.58–1.76			1.61***	1.52–1.70
Low education (ref=high edu.)			1.37*	1.05–1.78	1.15 ns	0.96–1.38
Medium education (ref=high edu.)			1.26**	1.06–1.50	1.11 ns	0.96–1.28
Economic satisfaction (7-step scale)			1.15***	1.08–1.23	1.16***	1.11–1.22
Anxiety (ref=no)			1.50***	1.25–1.80	1.48***	1.28–1.72
Depressive emotions (ref=no)			2,28***	1.78–2.89	2.28***	1.89–2.74
Risk of unemployment (ref=no)			1.11 ns	0.92–1.35		
Karasek 1 Tense (ref=relaxed)			1.27*	1.05–1.54		
Karasek 2 Active (ref=relaxed)			1.03 ns	0.84–1.25		
Karasek 3 Passive (ref=relaxed)			1.03 ns	0.79–1.34		
*p<0.05; **p<0.01; ***p<0.001; ns=non-significant						

