Determinants of Self-rated Health and Self-rated Physical Fitness in Middle and Old Age

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Abstract

Self-rated health (SRH) correlates with psychological factors, mortality and functional capacity. Self-rated physical fitness (SRF) has been examined less, and the relationship between SRH and SRF has remained unclear. The aim of this study was to explore the determinants, differences and similarities of these concepts in middle and old age. In total, 2 000 persons at the mean age of 50.6 years were examined at baseline in, and 1449 were re-examined when they were aged between 65 and 79 years. On both occasions, the participants underwent a comprehensive clinical examination and health status/habit assessment. We found a strong correlation between SRH and SRF. In midlife, low income, hopelessness, active use of health care services, physical inactivity, history of angina pectoris, arthropathy, and elevated blood pressure were associated with both poor SRH and SRF. In old age, high income, alcohol abstinence, physical inactivity, hopelessness, difficulties in activities of daily living, history of angina pectoris, asthma, rheumatoid arthritis and musculoskeletal disease of the back, and (in men) urinary tract infection were associated with poor SRH and SRF. Income, hopelessness, physical activity and angina pectoris correlated with both instruments

in both age groups. In general, a wider range of variables was associated with SRH than with SRF. The determinants of SRH and SRF were relatively similar in the younger and older age groups. However, SRH appeared to be more multi-dimensional instrument than SRF. SRH and SRF are considered reliable indicators of mental and physical health status, and should be accorded more importance when evaluating health among middle aged and older people.

Key words: cross-sectional study, self-rated health, self-rated fitness, self-perception

Introduction

The concept of self-rated health (SRH) has been studied previously and found to be a good predictor of all-cause mortality (DeSalvo et al. 2006) and functional status (Lee, 2000). SRH has been shown to be influenced by physical health and physician-diagnosed diseases (Kivinen et al. 1998), and to correspond closely with perceived need and utilization of health care services (DeSalvo et al. 2005). SRH has also been found to correlate with various clinical and psychosocial symptoms and medical conditions, e.g. hypertension (Froom et al. 2004), stroke (Jylha et al. 2006), diabetes mellitus (Froom et al. 2004; Jylha et al. 2006), depression (Kivinen et al. 1998; Molarius & Janson, 2002), cancer (Molarius & Janson, 2002) and locomotor disorders (Kanagae et al. 2006) and with some socio-demographic and lifestyle-related factors, e.g. education and socio-economic status (Laaksonen et al. 2005), dissatisfaction with life (Borglin et al. 2005), body mass index (Kanagae et al. 2006), physical activity (Kanagae et al. 2006), smoking (Oka et al. 1999) and alcohol drinking (Stranges et al. 2006). Also some biomarkers, e.g. circulating cytokines (Lekander et al. 2004), blood haemoglobin level (Jylha et al. 2006), ratio of total to HDL cholesterol (Goldman et al. 2004), genetic factors (Goldman et al. 2004) and white cell count (Jylha et al. 2006) have been found to be associated with SRH.

Determinants of Self-rated Health and Self-rated Physical Fitness in Middle and Old Age

Self-rated physical fitness (SRF) has been investigated less than SRH, and it has been almost entirely ignored in studies conducted among older people. Previous studies have mainly focused on the possible effects of physical activity and objective fitness on SRF (Drummond, 1996; Ferrer et al. 1999; Lamb & Morris, 1993). SRF has been found to be associated with perceived cardiovascular endurance (Delignieres et al. 1994), level and type of physical activity (Drummond, 1996; Lamb & Morris, 1993), objective fitness measures (Ferrer et al. 1999) and also emotional well-being (Oka et al. 1999). It also predicts adverse health outcomes, such as cognitive decline (Kulmala et al. 2014). In addition, previous studies have suggested that self-reported functional disability correlates with performance-based functional limitations (van den Brink et al. 2003).

The results concerning the effect of age on SRH have remained unclear. It has been suggested that older people, especially the oldest old, take their own age group as the reference point when evaluating their own health status and consequently tend to perceive their health in more positive terms (i.e. give overestimates rather than underestimates of their health status compared to objective measurements) (Pinquart, 2001). Similarly, the results concerning the effect of gender on SRH has remained controversial in previous studies, although it has been suggested that women tend to report poorer health than men (Laaksonen et al. 2005).

Health comprises not only physical, but also psychological and social components, and therefore it is important to take self-rated measurements into consideration when evaluating health status. SRH and SRF are both self-evaluations of health, yet the relationship between these two concepts has not previously been studied. It is possible that these concepts are independently associated with psychological wellbeing, physical health, functional capacity

and the ability to take care of oneself. The aim of this study was to explore the relationship between SRH and SRF and the factors associated with each of these concepts at midlife and in old age.

Methods

Subjects

The individuals participating in the Cardiovascular Risk Factors, Aging and Dementia (CAIDE) study were the survivors of four separate, independent, population-based random samples first examined within the North Karelia Project and the FINMONICA study. The study design has been described in detail elsewhere (Vartiainen et al. 1994). The subjects were first studied at midlife either in 1972, 1977, 1982 or 1987. Participation rates in the midlife surveys ranged from 82% to 90%. On average 21 years later, a random sample of 2 000 persons aged 65-79 years by the end of the year 1997 and living in the area of Kuopio or Joensuu was invited to a re-examination, and 1 449 (72.6%) persons agreed to participate (Figure 1). At baseline, the gender distribution of the participants was 1 250 (62.5%) women and 750 (37.5%) men, and at re-examination it was 900 (62.1%) women and 549 (37.9%) men. The study was approved by the local ethics committee, and written informed consent was obtained from all participants.

[Figure 1 here.]

Methods

The survey methods used at midlife were carefully standardised and complied with international recommendations. They also followed the World Health Organization MONICA protocol (WHO 1988) in 1982 and 1987 and were comparable with the methods used in 1972

and 1977. The methods used in the re-examination (old age) followed those used in the previous surveys in all aspects. The surveys included a self-administered questionnaire on health behaviour, health status, and medical history.

SRH and SRF were assessed with a questionnaire. SRH was measured with the question: What is your opinion about your present health status? The response options were 1) good, 2) fairly good, 3) moderate, 4) fairly poor, and 5) very poor. Validity of SRH has been demonstrated in many previous studies. SRH has exceptional predictive validity especially with respect to mortality and other adverse health events, and the validity of SRH has been shown to increase over time for example due to increased educational level and better cognitive ability (Schnittker & Bacak, 2014). Further, the study by Lundberg & Manderbacka (1996) reported the good overall reliability of SRH, but the reliablity of SRH seems to be worse for disadvantaged sociodemographic groups (Zajacova & Dowd, 2011).

SRF was measured with the question: What is your opinion about your present physical fitness? The response options were the same as those for SRH: 1) good, 2) fairly good, 3) moderate, 4) fairly poor, and 5) very poor. SRF correlates strongly with objectively measured physical fitness and also similarly predicts adverse health events (Ortega et al. 2013; Kulmala et al. 2014).

The answers to the SRH and SRF questions were dichotomised as in previous population-based studies (Heidrich et al. 2002; Jylha et al. 2006): the three highest categories (good, fairly good, moderate) were combined (=good SRH/SRF), and the two lowest (fairly poor and very poor) were combined (=poor SRH/SRF).

Determinants of Self-rated Health and Self-rated Physical Fitness in Middle and Old Age

The questionnaire was used to assess factors possibly related to SRH and SRF. Marital status was dichotomised into: 1) living with someone, and 2) living alone. Education was measured in years and the main occupation was categorised into: 1) farming and forestry, 2) industry, 3) office work and services, 4) housewives, and 5) others. Yearly household income was divided into three groups: high, medium and low. An indicator of the ability to perform daily activities (ADL) was calculated using six questions assessing participants' ability to manage the following activities: bathing, dressing, climbing stairs, walking 500 meters without a rest, short distance running (100 meters) and long distance running (over 500 meters). The answers were categorized as follows: 1) not at all (1 point); 2) yes, but with difficulties (2 points); and 3) yes, without difficulties (3 points). The sum score was used as the indicator of ADL (higher score indicating better performance). Hopelessness was assessed using the following statement: "I feel hopeless for the future and I do not believe that the things can change any better". The participants were asked to choose one of the following response options: 0) absolutely agree, 1) partly agree 2) do not know 3) partly disagree or 4) absolutely disagree. The responses were re-categorized into following three groups: 1) agree (response options 0 and 1); 2) do not know (response option 3), and 3) disagree (response options 3 and 4). Self-reported history of cerebro- and cardiovascular events and other chronic diseases (yes/no) was elicited. According to recommendations (Haskell et al. 2007; Pate et al. 1995), leisure-time physical activity was categorized into: 1) sedentary (=physical activity a few times per year or less), 2) low (=physical activity 2-4 times per month), 3) moderate (=physical activity 2-4 times per week), and 4) active (=physical activity daily). Current alcohol drinking (not at all; less than once a month; at least once a month) was assessed. The participants were also categorised into non-smokers, ex-smokers, and current smokers according to their smoking habits at the time of the survey.

The participants also underwent a clinical examination. Blood pressure was measured and body mass index (BMI, weight divided by height in meters squared) was calculated. A venous blood sample was taken to determine serum cholesterol concentrations. Dementia was assessed at the re-examination with a three-step diagnostic procedure, and the final diagnoses were assessed according to NINCDS-ADRDA (McKhann et al. 1984) and NINCDS-AIREN (Roman et al. 1993) criteria.

[Table 1 here]

Statistical methods

Descriptive statistics are reported as frequencies and percentage distributions, and statistical differences between men and women were tested with X^2 tests. Logistic regression analyses were used to examine the association between SRH/SRF and the socio-demographic, psychological, clinical, and lifestyle variables. First, all the variables (Table 1) were introduced simultaneously into separate models for SRH and SRF. All the variables that were non-significantly associated with the outcomes were excluded from the model one at a time, starting with the most non-significant. Additionally, all models were adjusted for age, sex, and education. Possible interactions between the factors were analysed by introducing an interaction term into the fully adjusted model. To compare the similarities between the concepts of SRH and SRF, the predicted values for belonging to the poor SRH and SRF group were calculated using logistic regression models. The Spearman correlation coefficients were calculated using the predicted values. Statistical analyses were conducted with SPSS for Windows.

Results

Determinants of Self-rated Health and Self-rated Physical Fitness in Middle and Old Age

At baseline, the mean age of the participants was 50.6 (SD 6.0) years, and mean length of education 8.3 (SD 3.5) years. Altogether, 12.5 % of the participants reported poor SRH, and there were no differences between men and women (11.9 % vs. 12.9 %, p=0.51). Overall, 13.0 % of the middle-aged persons (12.4 % of men and 13.3 % of women, p=0.61) reported poor SRF status. In middle age, 8.6 % reported both poor SRH and poor SRF (7.9 % of men and 9.0 % of women, p=0.85).

At the re-examination (1998), the mean age of the participants was 71.3 (SD 4.0) years, and their mean ADL index was 14.8 (SD 2.4). Altogether, 13.9 % (16.9 % of men and 11.9 % of women, p=0.01) reported poor SRH, while 14.3 % of the participants (16.8 % of men and 12.6 % of women, p=0.03) rated their SRF as poor. Only 10.3 % of the subjects considered themselves as having both poor SRH and poor SRF (13.1 % of men and 8.5 % of women, p=0.05). The percentages of participants in each SRH/SRF subgroup in middle and old age are presented in Figure 2.

[Figure 2 here]

Tables 2 and 3 present the variables that were significantly associated with SRH and/or SRF in middle and old age. Neither age nor education was found to be significantly associated with either SRH or SRF. Men had about two times higher odds for poor SRH and SRF compared to women, although this association was found only in old age. Higher household income was associated with poor SRH and SRF in old age, while in midlife, high income reduced the odds for poor SRH and SRF. Income, leisure time physical activity, hopelessness and history of angina pectoris were associated with both concepts in both age groups.

Determinants of Self-rated Health and Self-rated Physical Fitness in Middle and Old Age

In midlife, a history of angina pectoris and arthropathy, elevated blood pressure and active use of health care services were associated with increased odds for poor SRH and SRF. Living with a partner, and cerebrovascular disease, pulmonary emphysema, asthma or spondylosis were associated only with poor SRH. Moderate leisure-time physical activity (2-4 times per week) reduced the odds for poor SRH and SRF. High level of serum HDL cholesterol decreased the odds for poor SRH, while being a non-smoker decreased the odds for poor SRF.

In old age, hopelessness, history of angina pectoris, asthma, rheumatoid arthritis and a musculoskeletal disease of the back increased the odds for both poor SRH and SRF. Additionally, a high ADL index score, a moderate to high level of leisure-time physical activity (at least 2 times per week) and alcohol drinking were found to be associated with decreased odds for poor SRH and SRF. Diagnosis of dementia and history of cancer and cerebrovascular disease were associated only with poor SRH, whereas a history of diabetes mellitus was associated only with poor SRF. The only significant interaction was found between gender and a urinary tract infection or nephritis; men with a urinary tract infection or nephritis had higher odds for poor SRH and SRF compared to women.

The effect of almost all the studied factors was relatively similar for SRH and SRF. However, the effects of rheumatoid arthritis and the interaction between gender and urinary tract infection or nephritis on the odds for SRH were approximately two times higher than their effect on SRF.

[Tables 2 and 3 here]

The Spearman correlation coefficients, using the predicted values for membership of the poor SRH and SRF group, showed that in old age R^2 between SRH and SRF was 0.925 (p<0.001) among all participants, 0.920 (p<0.001) among men and 0.932 (p<0.001) among women. After dividing the predicted values for poor SRH into three groups, (≤ 0.3, > 0.3 but < 0.7 and ≥ 0.7), most of the participants (86.9%) were in the lowest group. The correlation between SRH and SRF was found to be strongest in the lowest group (R^2=0.893, p<0.001), moderate in the middle group (R^2=0.468, p<0.001) and strong again in the highest group (R^2=0.641, p<0.001). In midlife, the overall correlation between the concepts was found to be somewhat lower (R^2=0.850, p<0.001).

A decrease in SRH from midlife until the late life examination was reported by 407 (28.6%) persons, whilst 270 (19.0%) reported an increase and 746 (52.4%) reported no change. The corresponding numbers for SRF were 337 (24.1%), 337 (24.1%) and 723 (51.8%), respectively. Unfortunately the unavailability of intermediate time-points did not allow us to further investigate the health/fitness trajectories or other age group differences during the twenty-year follow-up.

Discussion

We found that SRH and SRF are multidimensional concepts influenced by several chronic diseases and life-style, socioeconomic and psychosocial factors. Somewhat different factors were associated with these concepts, indicating that there might be some differences between the bases of the two concepts. It seems that SRH is a broader concept influenced by more factors. The determinants of SRH and SRF seem to be relatively similar at younger and older ages.

Determinants of Self-rated Health and Self-rated Physical Fitness in Middle and Old Age

Leisure-time physical activity and the ability to perform daily activities were associated with both SRH and SRF. This indicates that both concepts have a physical aspect. Therefore, both of them can be considered as reflections of physical health and functional capacity. A moderate to high level of leisure-time physical activity as well as being a non-smoker and moderate alcohol drinking were associated with better ratings of SRH and SRF, suggesting that healthy lifestyle may protect against poor self-ratings of health and physical fitness. Moderate alcohol use has been linked to several health benefits, especially for the cardiovascular system (Huang et al. 2014), which may explain the found association. However, it should be noted that our measure of alcohol consumption was very crude and therefore we were not able to investigate the association between excessive drinking and SRH/SRF, which may have resulted in inverse findings. In previous studies physical activity (Kanagae et al. 2006) and moderate alcohol drinking (Stranges et al. 2006) have been found to be beneficial, while smoking (Ho et al. 2003) has been indicated to be hazardous for SRH. It seems that unfavourable life-style factors play an important role in perceptions of poor SRH and SRF. In addition to the physical aspects, hopelessness was strongly associated with poor SRH and SRF in both mid- and late life. A sense of hopelessness reflects a negative view of the future and hopelessness is considered as a determinant of depression and vice versa (Han et al. 2013). Therefore both SRH and SRF seem to be strongly associated with not only with physical health, but also with mental and psychological wellbeing.

We found some differences between the two concepts in the younger and older age groups. In midlife both SRH and SRF were found to be influenced more by lifestyle and cardiovascular risk factors, e.g. blood pressure, cholesterol, use of health care services, marital status and income, whereas in old age these factors had been overtaken by more severe diseases and

medical/clinical conditions, e.g. cancer, dementia, lower ADL index. These findings have clinical relevance, since it seems that poor SRH or SRF reflects more severe stages of underlying diseases and increased risk for developing a disease. In old age, especially, poor SRH or SRF may reflect the presence of non-diagnosed chronic conditions. In midlife poor SRH and SRF correlated particularly strongly with well established risk factors for cardiovascular and other chronic diseases. Therefore a single question on perceived health or fitness may act as a screening tool for identifying persons in midlife who might benefit from preventive interventions.

We found that higher household income was associated with poor SRH and SRF in old age, whereas it was associated with better SRH and SRF at midlife. The effect of income was significant at both ages, but the point estimate from the analysis at the older age was fairly low, suggesting that the effect of income might not have high clinical relevance later in life. Also, our results concerning the effect of education conflicted with those of previous studies in which higher education has been associated with better SRH (Laaksonen et al. 2005). In this study, we could not confirm this association, since no association between education and SRH or SRF was found. The lack of an effect of education on SRH and SRF, and the homogeneity in income of the older participants, support the assumption that physical factors most likely make a larger contribution than socio-economic factors to SRH and SRF in midlife and that this is even more pronounced in old age.

In the present study, a higher percentage of men rated their health and fitness as poor compared to women. Previously, the independent effect of gender on self-rated health has shown conflicting results (Heidrich et al., 2002; Laaksonen et al., 2005), although SRH has consistently been suggested to better predict mortality among men than women (Heidrich et

al., 2002). It is possible that there are significant differences in the variables associated with SRH and SRF among men and women, and that this may explain the inconsistency found in the results for gender. Men's self-rated health has been proposed to reflect mainly severe and life-threatening diseases, whereas the range of factors affecting women's self-rated health are thought to be broader.

The strong correlation between the predicted values of SRH and SRF support the hypothesis that these concepts measure overall health perceptions, and are also relatively similar in quality. The only previous study to focus on the possible association between self-perceived health and self-perceived fitness reported a positive correlation between the two concepts (Lamb, 1992). It is likely that when a person's ratings of his/her health or fitness are at the extremes of the continuum (good or poor), the two measures agree, whereas in-between ratings show greater conceptual mismatch. This correlation pattern also seemed to be very similar for both men and women. In midlife, SRH and SRF seem to differ somewhat more than they do in later life. SRH is influenced by a wider range of symptoms and diseases, which also affect physical well-being, e.g. stroke, pulmonary emphysema, bronchitis, asthma, and spondylosis. However, these strong physical components were not associated with SRF at midlife. This indicates that SRH and SRF have at least a partially different basis. It is possible that SRH is more useful than SRF especially in midlife when aiming to evaluate physical health, as it may be more sensitive in capturing the persons with non-diagnosed diseases. On the other hand, poor physical fitness in midlife was strongly associated with unfavorable life-style habits, including smoking. Also in old age, the negative association between poor self-rated fitness and physical activity was more pronounced than the association between SRH and physical activity. The results indicate that self-rated health could more beneficial when aiming to detect physical illnesses, while self-rated physical fitness could be more useful tool

to evaluate the need for lifestyle interventions. Future studies in different populations and different age groups are needed to gain a better understanding of the relationship between SRH and SRF and also about the factors affecting them independently. Also future prospective studies could provide new insights into the predictive value of these both self-rated measures.

The study has a few limitations that need to be addressed. Although the response rates in mid- and late life examinations were very high, it is possible that persons with poorer health or fitness dropped out of the study and therefore persons with good SRH and SRF may be overrepresented in the study sample. The non-participants of this study were older and more often women. They were also likely to have poorer health and fitness and also an unhealthier lifestyle than the participants, which might have affected the results. However, if non-participation was related to worse outlook concerning the factors related to SRH and SRF, this is more likely to mean underestimation rather than overestimation of the associations. Additionally, a self-administered questionnaire was used to elicit information about the participants' health status and life-style factors. Even if self-reports do not necessarily provide wholly accurate information about the factors of interest, they can be used to categorize participants, as was done in this study. However, the reliability of responses related to self-rated health has been found to be good when compared with objective health assessments (Kivinen et al. 1998; Pinquart, 2001).

SRH and SRF appear to be influenced by rather similar factors, suggesting that these two concepts might overlap and partially reflect the same phenomena. Both concepts are influenced by chronic diseases, life-style and psychosocial factors and socioeconomic status, but some differences also exist between the concepts. A single question asking about SRH or

SRF seems to be a good way to obtain important information about a person's overall health and functional status and may be used as screening tool when aiming to identify persons in need of preventive interventions.

Figure legends:

Figure 1. Procedure for selection of the study population

Figure 2. Self-rated health and self-rated physical fitness in middle and old age

Table legends:

Table 1. Variables analyzed in the study

Table 2. Determinants of poor self-rated health and poor self-rated fitness in middle age

Table 3. Determinants of poor self-rated health and poor self-rated fitness in old age

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STUDY POPULATION IN MIDDLE AGE (n=2000)			
Random sample examined in 1972	Random sample examined in 1977	Random sample examined in 1982	Random sample examined in 1987

A random sample of 2000 survivors were invited for a re-examination in 1998

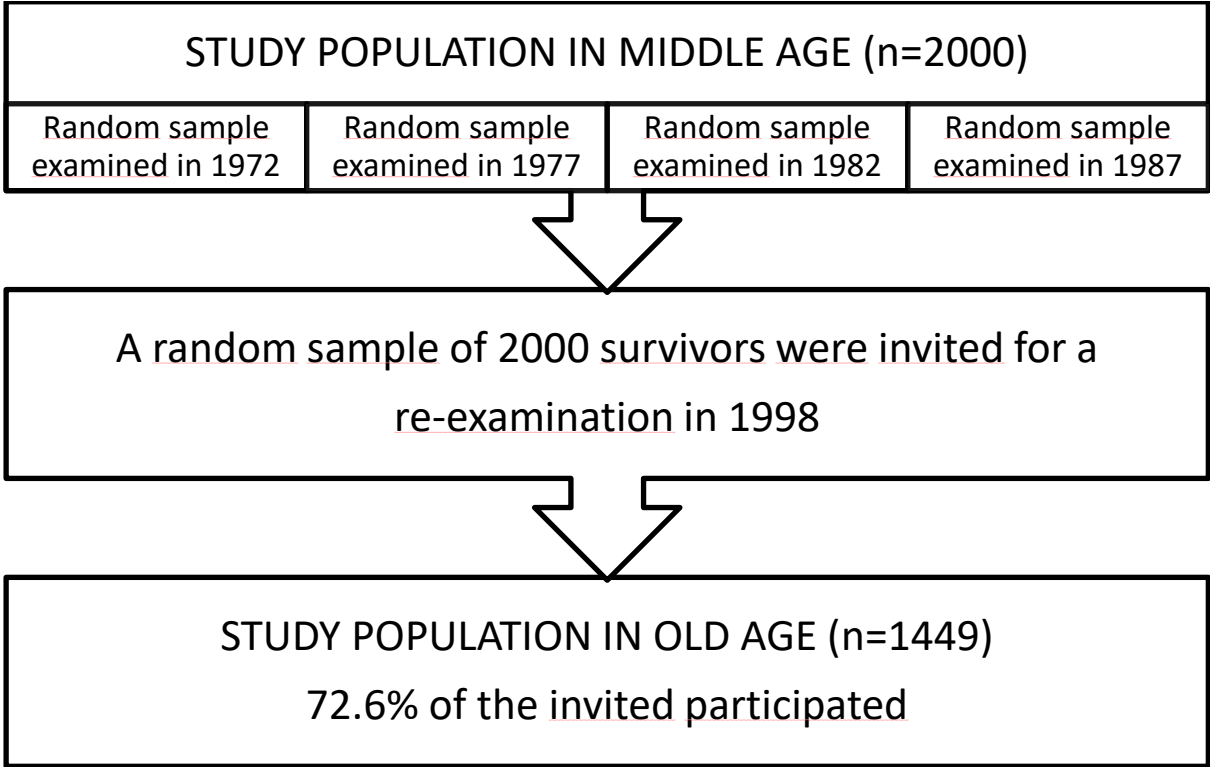STUDY POPULATION IN OLD AGE (n=1449)

72.6% of the invited participated

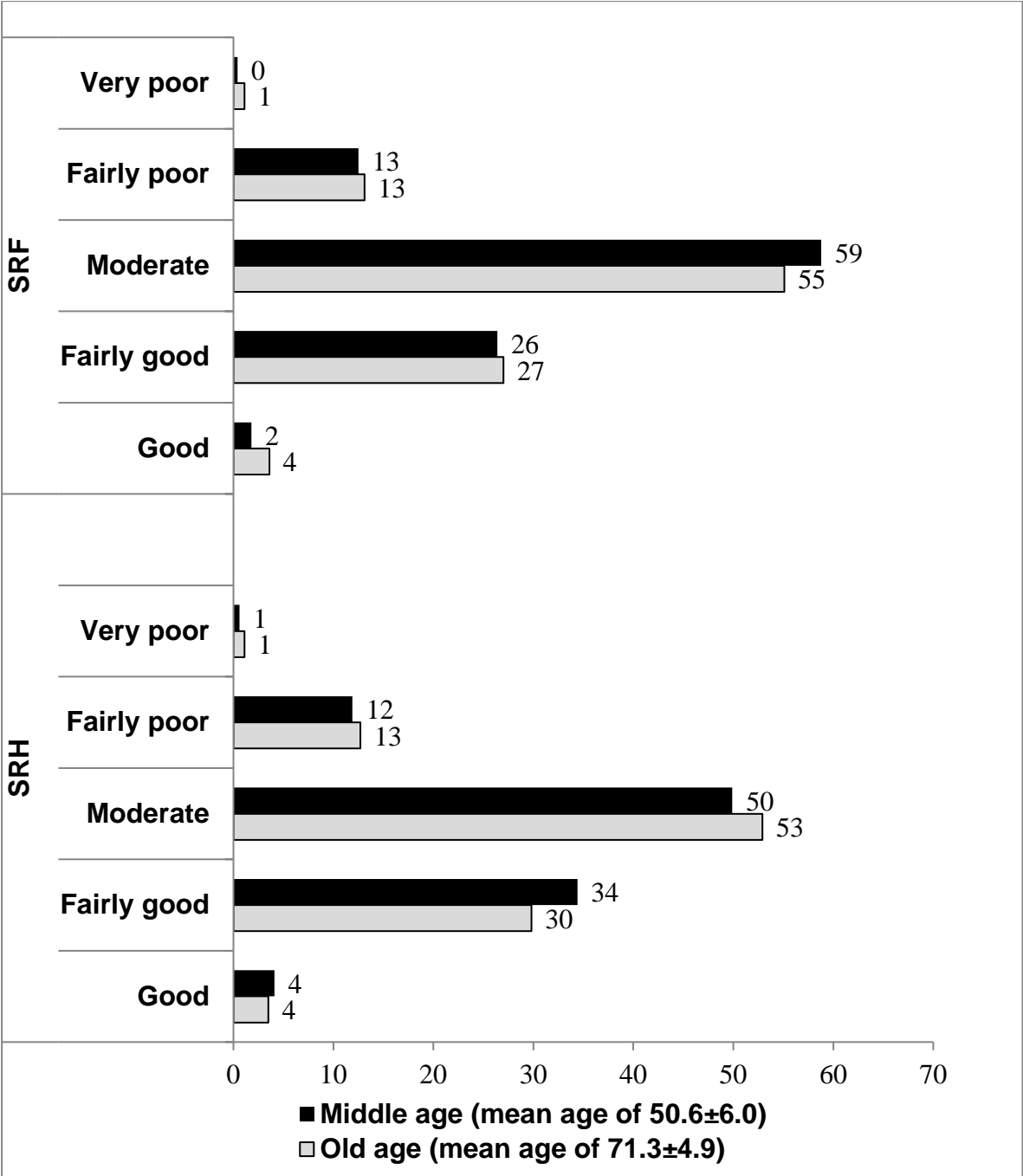Figure 1. Procedure for selection of the study population.

Figure 2. Self-rated health and self-rated physical fitness in middle and old age (percentages of distributions).

Table 1. Variables analyzed in the study

Socioeconomic and psychological variables

  Municipality
  Marital status
  Education
  Household income
  Main lifetime occupation
  Hopelessness

Biological and physical variables

  Age
  Gender
  ADL index
  Accidents

Diseases

  Dementia
  Cardiac infarction
  Cerebral hemorrage/infarction
  High blood pressure
  Angina pectoris
  Cancer
  Asthma
  Lung diseases
  Gallstones/cholecystitis
  Rheumatoid arthritis
  Other arthropathy
  Musculoskelatel disease of the back
  Urinary tract infection/nephritis
  Cerebrovascular disease
  Diabetes

Lifestyle variables

  Physical activity
  Systolic blood pressure
  Diastolic blood pressure
  Cholesterol levels
  Body mass index
  Alcohol drinking
  Smoking
  Use of health services (doctor)

Table 2. Determinants of poor self-rated health (SRH) and poor self-rated fitness (SRF) in middle age.

Variables	Poor SRH OR (95% CI)	Poor SRF OR (95% CI)
Income		
Low	1	1
Medium	0.49 (0.29-0.8)	NS
High	0.15 (0.08-0.30)	0.44 (0.27-0.71)
Marital status		
Living alone	1	1
Living with someone	2.15 (1.27-3.63)	NS
Hopelessness	3.12 (1.86-5.22)	3.37 (2.02-5.63)
Angina pectoris	4.35 (2.22-8.51)	3.54 (1.84-6.80)
Arthropathy	2.96 (1.78-4.91)	2.48 (1.53-4.01)
Cerebrovascular disease	5.05 (1.48-17.2)	NS
Asthma	5.63 (2.05-15.5)	NS
Spondylosis	2.14 (1.39-3.30)	NS
Pulmonary emphysema	2.74 (1.39-5.39)	NS
Elevated blood pressure	1.83 (1.19-2.79)	2.12 (1.43-3.13)
High HDL cholesterol	0.64 (0.45-0.91)	NS
Use of healthcare services	1.18 (1.11-1.25)	1.17 (1.11-1.24)
Smoking (non-smokers)	NS	0.44 (0.27-0.72)
Physical activity		
Sedentary	1	1
Low activity	NS	NS
Moderate activity	0.40 (0.25-0.63)	0.47 (0.32-0.71)
Active	NS	NS

NS=statistically non-significant association
*Additional adjustment for age, gender and education

Table 3. Determinants of poor self-rated health (SRH) and poor self-rated fitness (SRF) in old age.

Variables	Poor SRH OR (95% CI)	Poor SRF OR (95% CI)
Gender		
Women	1	1
Men	2.11 (1.28-3.48)	1.70 (1.06-2.74)
High income	1.20 (1.01-1.41)	1.31 (1.12-1.53)
Hopelessness	3.05 (2.06-4.50)	3.06 (2.08-4.52)
High ADL-index	0.68 (0.62-0.75)	0.66 (0.60-0.73)
Dementia	4.15 (1.62-10.6)	NS
Angina pectoris	1.90 (1.20-3.00)	2.00 (1.29-3.08)
Cancer	3.30 (1.35-8.08)	NS
Asthma	2.52 (1.44-4.41)	2.23 (1.30-3.81)
Rheumatoid arthritis	6.51 (3.23-13.1)	2.73 (1.32-5.65)
Musculoskeletal disease of the back	1.58 (1.02-2.45)	1.59 (1.04-2.42)
Cerebrovascular disease	2.90 (1.55-5.43)	NS
Diabetes	NS	2.02 (1.03-3.98)
Physical activity		
Sedentary	1	1
Low activity	NS	NS
Moderate activity	0.36 (0.19-0.66)	0.28 (0.15-0.49)
Active	0.33 (0.18-0.63)	0.25 (0.14-0.46)
Alcohol drinking		
Not at all	1	1
Less than once a month	0.44 (0.26-0.77)	NS
At least once a month	0.48 (0.28-0.83)	0.51 (0.29-0.88)
Gender combined with urinary tract infection or nephritis		
Women with infection	1	1
Men with infection	14.4 (4.10-50.6)	7.80 (2.33-26.1)

NS=Statistically non-significant association

*Additional adjustment for age, gender and education