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Examining Self-Rated Health in Old Age

A Methodological Study of Survey Questions

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ACADEMIC DISSERTATION
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To my father Urho Astola
(1908–1992)

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Abbreviations

ADL	Activities of Daily Living
BMI	Body Mass Index
CHD	Coronary heart disease
CI	Confidence interval
ELSA	European Studies on Ageing
HDL	High-density lipoprotein
IADL	Instrumental Activities of Daily Living
IPSE	Improving the Planning of Medical and Social Services within Elder Care in St. Petersburg
LDL	Low-density lipoprotein
MOS	Medical Outcomes Study Questionnaire
NHP	Nottingham Health Profile
ns.	non-significant
OR	Odds ratio
RR	Risk ratio
SES	Socioeconomic status
SRH	Self-rated health
TamELSA	The Tampere Longitudinal Study on Ageing

Abstract

The purpose of the study was to examine the characteristics of two self-rated health measures, generally used among older people, and the differences between them. The two measures compared were the global measure without any explicitly expressed reference point and the comparative measure where respondents are asked to compare their health with that of their age peers. First, the associations of age and functional ability with both self-rated health measures were examined. Second, the ways in which global and comparative SRH predict mortality were compared. Third, the self-rated health of older people in St. Petersburg, Russia, and Tampere, Finland, was compared. Finally, the influence of selective loss on the generality of positive health ratings in old age was examined.

The data came from the Tampere Longitudinal Study on Ageing (TamELSA), a research project on which the first structured interview was conducted in 1979. The follow-up rounds were conducted in 1989, 1999, and 2006. The St. Petersburg data for the cross-cultural study was a part of the project "Improving the Planning of Medical and Social Services within Elder care in St. Petersburg" (IPSE) in 2000. The data were collected by face-to-face interviews using structured questionnaire. The questionnaire used in the IPSE-survey was same as in TamELSA.

The study showed that the association of age with SRH was different depending on the measure used. The respondents, especially the oldest ones, tended to rate their health as better than that of their age peers. The association of age with better comparative SRH became stronger after adjustment for other health indicators. When global SRH was used the association of age with good global SRH was weaker, and vanished after adjustments. The association of functional ability was the opposite: good functional ability was associated more strongly with good global SRH than with better comparative SRH. Without adjustment global SRH predicted mortality but comparative SRH did not. After adjustment for age, comparative SRH was associated with increased mortality risk. Both SRH measures predicted mortality even at 20 years of follow-up when they were adjusted for age, sex, occupational class, chronic diseases, and functional ability.

Self-rated health was poorer among the respondents in St. Petersburg than in Tampere measured either by global or comparative SRH, and they also had more, symptoms, chronic diseases and functional disabilities than their age peers in Tampere. Differences in the

factors that were associated with good self-ratings indicate there are differences in those dimensions of health and illness which are important in health ratings. The respondents in St. Petersburg rated their health as poorer even after other health indicators were adjusted for. The results indicate that the differences between the two cities are caused mainly by different ways of evaluating health: objective health status is taken into account differently in health ratings.

This study shows that health ratings in old age are influenced by the complex relationship of age, a person's health status, and the reference group used. In global question, the respondents have more freedom when choosing their reference points whereas the explicit expression of the reference group in comparative question leads the respondents to focus more on the health of other people. The growing number of positive comparative self-ratings in old age implies that the reference group used, "health of the age peers", is understood more and more negatively with increasing age. Comparative SRH proved to be more sensitive to age and does not measure objective health indicators similarly between age groups. It also proved to be more sensitive to selective loss. Therefore, in studies where the age range is wide, and also in clinical settings, the global measure should be preferred. Cultural differences indicate that health comparisons between different cultures should not be made on the basis of health ratings only.

Tiivistelmä

Tutkimuksen tarkoituksena oli selvittää kahden ikääntyneillä yleisesti käytetyn koetun terveyden mittarin ominaisuuksia ja niiden välisiä eroja. Tutkimuksessa verrattiin yleistä koetun terveyden mittaria, jossa tutkittavalle ei anneta selvää eksplisiittistä vertailukohtaa, ja vertailevaa koetun terveyden mittaria, missä terveyttä pyydetään vertaamaan toisten samanikäisten terveyteen. Ensinnäkin tutkittiin sitä, miten ikä ja toimintakyky ovat yhteydessä terveysarvioihin. Toiseksi tarkasteltiin sitä, onko koetun terveyden mittareiden välillä eroa siinä, miten ne ennustavat kuolleisuutta. Kolmanneksi verrattiin käytettyjen kahden mittarin avulla ikääntyneiden koettua terveyttä ja sen taustatekijöitä Tampereella ja Pietarissa. Lopuksi tutkittiin selektiivisen kadon vaikutusta positiivisten terveysarvioiden yleisyyteen ikääntyneillä.

Aineisto oli The Tampere Longitudinal Study on Ageing (TamELSa) -tutkimuksesta, jonka ensimmäinen strukturoitu haastattelut tehtiin v. 1979 60–89-vuotiaiden tamperelaisten keskuudessa. Seuranta-tutkimukset on tehty vuosina 1989, 1999 ja 2006. Kulttuurisessa vertailussa käytetty Pietarin aineisto on Improving the Planning of Medical and Social Services within Elder Care in St. Petersburg (IPSE) -tutkimuksesta, jossa strukturoitu haastattelu kohdistui 60–89-vuotiaisiin pietarilaisiin. IPSE-tutkimuksen haastattelussa käytettiin TamELSA-tutkimuksen haastattelulomaketta.

Tutkimus osoitti, että iän suhde koettuun terveyteen oli erilainen riippuen siitä, kumpaa mittaria käytettiin. Tutkittavilla, ja erityisesti kaikkein vanhimmilla, oli taipumus pitää omaa terveyttään muiden samanikäisten terveyttä parempana. Iän yhteys parempaan vertailevaan terveyteen vahvistui muiden terveydentilan osoittimien vakioinnin jälkeen. Kun koetun terveyden mittarina käytettiin yleistä mittaria, iän yhteys hyvään koettuun terveyteen oli heikompi, ja hävisi kokonaan vakiointien jälkeen. Toimintakyvyn suhteen asia oli päinvastoin. Hyvä toimintakyky oli voimakkaammin yhteydessä hyvään yleiseen koettuun terveyteen kuin parempaan vertailevaan koettuun terveyteen. Ilman vakiointeja yleinen mittari ennusti kuolleisuutta, mutta vertaileva koetun terveyden mittari ei. Ikävakioinnin jälkeen myös huono vertaileva koettu terveys oli yhteydessä lisääntyneeseen kuolleisuusriskiin. Molemmat mittarit ennustivat kuolleisuutta jopa 20 vuoden seurannan jälkeen, kun ne olivat vakioituina iän, sukupuolen, ammattiaseman, kroonisten sairauksien

määrän ja toimintakyvyn suhteen. Valikoivan kadon vaikutuksen selvittämiseksi tehdyt analyysit osoittivat, että vertaileva mittari on herkempi kadon suhteen kun yleinen mittari.

Koettu terveys oli huonompi pietarilaisilla kuin tamperelaisiin molemmilla mittareilla mitattuna, ja heillä oli myös enemmän oireita, kroonisia sairauksia ja toimintakyvyn vajavuuksia kuin tamperelaisilla ikätovereilla. Erot hyvää koettua terveyttä määrittävissä tekijöissä viittaavat siihen, että kaupunkien välillä on eroja niissä terveyden ja sairauden ulottuvuuksissa, jotka ovat tärkeitä terveyttä arvioitaessa. Kuitenkin pietarilaiset kokivat terveytensä huonommaksi kuin tamperelaiset senkin jälkeen, kun muut terveysindikaattorit oli vakioitu. Tulokset viittaavat siihen, että erot johtuvat erilaisista tavoista arvioida terveyttä: objektiivinen terveys otetaan erilailla huomioon valittaessa vastausta annetuista vaihtoehdoista.

Tutkimus osoitti, että terveysarvioihin ovat yhteydessä ikä, terveystekijät sekä myös se referenssiryhmä, johon terveyttä verrataan. Yleistä mittaria käytettäessä tutkittavalla on enemmän vaihtoehtoja referenssiryhmän valinnassa, kun taas vertaileva mittari ohjaa vastaajaa keskittymään enemmän muiden ihmisten terveyteen. Tutkimus osoitti, että ikätovereiden terveys arvioidaan yhä negatiivisemmaksi iän lisääntyessä. Vertaileva koettu terveys osoittautui herkemmäksi iän suhteen, ja se ei mittaa objektiivisia terveystekijöitä samalla lailla eri ikäryhmien kohdalla. Se osoittautui herkemmäksi myös kadon suhteen. Tämän vuoksi tutkimuksissa, joiden ikäjakauma on laaja, sekä myös kliinisissä tutkimuksissa, yleisen mittarin käyttö on suositeltavampaa. Kulttuuristen erojen takia eri maiden ikääntyneiden terveyttä ei voi verrata käyttämällä mittarina ainoastaan koettua terveyttä.

Introduction

We are now living in a world in which the population is ageing. People are living longer and the number of old people is increasing. This phenomenon is worldwide; it affects both developed and developing countries. Although longevity is apparently welcomed there is also concern about the quality of life of older people, and also about challenges that ageing causes to health and social services.

Health is among the very basic elements important to the quality of life of older people. The relationship of health to old age is an important but complicated issue. Diseases and disabilities are more common among older people than younger people and the prevalence of chronic illness and disability increases with advancing age. In addition, it is sometimes difficult to distinguish pathological changes from normal ageing. (Guralnik et al. 1989, Fried and Wallace 1992, Bond and Corner 2004) Ill-health in old age is a source of deep private concern and also a matter of public policy debate. In personal terms ill-health can cause many losses: e.g. the loss of independence and autonomy, the loss of social connections, the loss of dignity and privacy, and it can bring pain and suffering. Public concern with health in old age has presented older people as a problem needing a great deal of health and social services. However, not all older people suffer from chronic illness or disability and many more claim to be in good health in spite of chronic diseases. (Sidell 1995) In this situation there is a growing need for adequate information on the health of older people.

Self-rated health (SRH) is a widely used measure in health and ageing surveys. Self-rated health is one of the health indicators recommended for health monitoring by the World Health Organization (de Bruin et al. 1996). Also the European Union's EuroREVES project conducted for harmonization health monitoring across EU Member States recommended SRH as a health measure (Robine et al. 2003). The complex relationship between age and self-rated health has been demonstrated in many studies. It is usual for older people to assess their health as good in spite of several chronic conditions. Although in population studies self-rated health is usually poorer among old people than among the young or middle-aged, in old age it does not seem to decline at the same rate as health problems increase, but in relation to them, may even improve (Idler 1993, Jylhä et al. 2001, Leinonen et al. 2001). This phenomenon has been explained by declining standards for

health and by changing reference group when people grow old (Tissue 1972, Tornstam 1975). It cannot be excluded, however, that better health ratings towards the oldest age group can result from selective loss. In surveys, it is usual that the older the age group, the more people are excluded from analyses because of the decision to study only home-dwelling people, or because data is missing for reasons of health or refusal to participate.

The operational definition of self-rated health and the wording used in questionnaires varies from one study to another. The questions are suggested to cover the same domains of health in spite of different question wording, but the influence of different wordings on health evaluations has not been empirically studied. It is, however, important to be aware of the possible differences between self-rated health questions because of the increasing use of self-rated health as a measure in surveys and also in clinical settings.

This study is concerned with methodological issues in self-rated health. The focus is on comparability between the different formulation of self-rated health questions, different age groups in old age, and different cultures. Two SRH measures are examined: the global measure without an explicitly stated reference group and the comparative measure with an explicitly stated reference group of age peers.

Health and perceptions of health

Perspectives on health and illness

Health is a complex matter. It is a word all of us use almost every day but it is hard to find shared definition of it. In the literature different ways in which researchers from various disciplines have tried to define health can be found. They include medicine, sociology and psychology.

The medical model of health has traditionally defined health as an absence of disease. Medically defined health relates to the physical body and health is explained in terms of biology, the anatomy of the body and its way of functioning. The normal structure of the body and its normal way of functioning is determined by medicine and deviations from these norms represent pathology or disease. As long as an individual shows no signs of physical abnormality he should be considered as healthy. (Sidell 1995, George 2001, Bowling 2002, Simon 2002)

The medical model cannot alone explain health as a whole. As a phenomenon, health also includes emotional, mental and social aspects that must be taken into account when health is conceptualized. The medical model has been, and continues to be, predominant in western societies, but it has been challenged by social scientists, who have pointed out to its inability to capture all factors pertinent to health status. In medical sociological research health has been considered as a combination of the medical model, individual experiences and social factors due to ill health. (Sidell 1995, George 2001, Bowling 2002) Medical sociologists have made a distinction between the terms “disease”,”illness” and “sickness”. “Disease” refers to the pathology of the body and to diagnoses and treatment by physician. “Illness” refers to the individual experience of disease. “Sickness” is defined as a social condition of people who are ill or diseased. In the presence of disease or illness, a person has a particular role that relieves him or her from daily duties. The person is obliged to seek help from medical professionals and get well as soon as possible. “Sickness” refers to the social status of the individual during the disease and also to the consequences disease or illness causes to society. (Parsons 1958)

In the *functional model* health is defined as an ability to perform the activities which are expected, to fulfill one’s responsibilities. In functional performance the role-

performance, which refers to the participation in a social system, can be distinguished (psychosocial aspects). This aspect is close to the term "sickness". The functional model also includes task-performance which refers to the physical ability to cope with everyday activities (physical aspects). If a person's functional performance is normal, that is, he or she can function adequately, he or she is considered to be healthy in spite of a medically diagnosed disease. On the other hand, failure to perform the necessary activities of daily living means that person is ill, even if he or she is considered medically healthy (Simon 2002).

In the *well-being model* health is considered an ideal state, a maximum state of wellbeing. It is a positive model of health defining health as a subjective state of physical and emotional wellbeing. Health means a subjective experience of physical, mental and social equilibrium. The physical aspect of wellbeing refers to the functioning of the body whereas the mental and social aspects include emotional states, life satisfaction and life stress. In the *adaptive model* health is defined as the ability to adapt, or cope, with health problems. Someone is healthy when he or she is capable of dealing with these problems with his adaptive resources. (Simons 2002)

Some of the models or perspectives see health and illness as polar, discrete opposites, so that a person is either at one or the other end of this continuum. This pathogenic paradigm, as Aron Antonovsky (1984) calls it, leads us to think dichotomously: people are either healthy or diseased. Antonovsky believes that we should to think more salutogenically. He suggests that none of us can be categorized as either healthy or diseased. Instead of that, we can all be located somewhere along a continuum "health-ease-dis-ease". He writes:

> "*We are all somewhere between the imaginary poles of total wellness and total illness. Even the fully robust, energetic, symptom-free, richly functioning person has the mark of mortality. He or she wears glasses, has moments of depression, comes down with the flu, and may well have as yet undetectable malignant cells. Even the terminal patient's brain and emotions may be fully functional."* (Antonovsky 1984, 116)

Cultural and social differences of health

The way people think depends on the culture they belong to. The term culture includes practices, rules, norms and values that are shared by a particular people or a significant group in a society. A wide range of different concepts of health and illness exists in different societies. Biomedicine in Western cultures explains disease in terms of the

internal working of the body whereas in many non-Western cultures the reasons for diseases are explained by external matters, for example by spiritual aspects. (Helman 2007) In addition to intercultural differences, there are also differences in how health and disease are experienced within the culture. Cultural and social factors such as race, ethnicity, gender, socioeconomic factors and age influence how individuals perceive and describe their health status and the processes used in making these assessments. It is often difficult to isolate pure cultural beliefs and behaviour from the social and economic context in which they occur. Therefore to understand health and illness and their meaning to the people one must also look at their economic and social situation. (See Sidell 1995, Silverman et al. 2000, Helman 2007)

Lay accounts of health and illness

In ordinary people's talk health and illness are much more than descriptions of one's physical condition and views about what people should do to avoid disease. Instead, people construct their state of health as a part of their identity in relation to others. Health is something vital to everyday life. People are also making claims about themselves as worthy individuals in the social world. (Radley and Billig 1996)

One of the pioneers in the field of investigating lay beliefs about health is Claudine Herzlich (1973) who interviewed 80 predominantly middle-class people living in Paris and Normandy. Her work was guided by an idea that health, as an idea that an individual holds, is a social representation. The way that individuals perceive and know the world forms part of more extensive systems of knowledge that are shared in society. How people think about their health is not limited to their bodies or individual experiences. Instead, it is affected by the way health is understood as a part of the wider representation of society, and the individual's place in it. Health and illness, individual and society are always associated through various ties.

Herzlich (1973) observed that people do not think of health and illness as simple opposites. Health was seen in many ways: for example, health was sometimes an absence of symptoms, and sometimes a positive feeling of freedom and wellbeing. Illness was also seen to have many forms. The state that many people found most common to them was neither health nor illness; it was an intermediate one in which one was aware of minor troubles, e.g. headache, which means that person is not exactly ill but nor is he or she in the best of health.

Herzlich (1973) pointed to three conceptions of health as being important. *Health-in-a vacuum* refers to the absence of disease, and it is, in a sense, independent of a person. *Reserve of health* is more characteristic of the individual: people have it to either a greater or lesser extent. It is a key feature in resisting illness, and it is something that individuals compare with others. *Equilibrium* is a state that individuals could lose or regain. It refers to positive well-being, happiness, feeling strong and getting on well with people. Unlike the reserve of health which varies in degree, equilibrium is either there or it is not. Illness was categorized in four ways: serious, possibly fatal illnesses, chronic illnesses, trivial illnesses like colds, and childhood illnesses. Herzlich (1973) found three metaphors of illness: 1*) illness as a destroyer* was held by those who saw illness preventing everyday life and social interaction, 2) *illness as occupation* was held by those who accepted illness but who fight against it with all their resources; and 3) *illness as a liberator* provided the opportunity for relief from one's responsibilities.

In the Health and Lifestyle Survey Blaxter (1990) reported nine different lay definitions of health*: health as not ill, health despite disease, health as a reserve, health as a behaviour, health as a physical fitness, health as an energy or a vitality, health a as social relationship, health as a function, and health as a psychosocial well-being.* Most of the respondents offered multiple concepts of health. The definitions varied by gender and life cycle position. Older men in particular thought in terms of function, whereas women more often included social relationships in their definitions of health. On the basis of these definitions, Blaxter (1990) concluded that when people talk and think about health they do not use a single concept. There are various ways of conceiving of good health, and individuals are able to use them in different combinations at different times.

Health in old age

One characteristic of health and illness in older adults is the complexity. This complexity is caused by multiple reasons. First, the prevalence of chronic conditions increases with advancing age and these conditions are often associated with dysfunction and disability. Second, many chronic diseases are associated with high rates of health care utilization, including adverse outcomes, such as institutionalization. Third, co-morbidity is common at older ages. Fourth, it may be difficult to distinguish physiological and psychological changes caused by normal ageing from disease. (Guralnik et al. 1989, Fried and Wallace 1992, Bond and Corner 2004)

The medical explanation of health puts the health of old people in very negative position. Later life is portrayed as a decline of bodily functions and increase in diseases. In this view the prospect of health is difficult to see; decline is the natural consequence of growing old. Old age and ill-health are often presented as synonymous, and old people are often presented to be all the same in spite of differences in gender, class, cultural experiences and also in age. Old people, however, are very heterogeneous group. Some suffer from chronic diseases and disabilities but there are also many who do not. (Sidell 1995, Bond and Corner 2004)

The results of The Health and Lifestyle Survey showed that health can be presented by older people in ways similar to those of Herzlich's respondents. Health was perceived negatively – as an absence of disease, functionally – as an ability to cope with everyday activities, or positively – as fitness or well-being. Those, especially older people who were in poor health were less likely to express health as not ill. They did not refer health to illness or disease but were more likely to see health as a more psychosocial sense of well-being, energy or vitality, and functional ability. The view of health as a psychosocial sense of well-being rather than as an absence of disease was particularly common among older respondents with a chronic disease. (Williams 1983, Blaxter 1990)

Health also has a moral dimension and it can therefore be seen in terms of will power, self-discipline and self-control. Health, bodily being and performance are increasingly important in contemporary western societies. The word health is used not only to defining well-being but also the goodness of individuals and society. Nevertheless, old age legitimizes ill-health but it is now giving way to "healthism", which emphasizes individual responsibility for health and efforts to maintain good health. People who live long without visible signs of old age have been presented as an ideal of positive ageing. This connection between of morality and health can also be seen in the talk of ordinary people. Old age may be an explanation for illness but the individual is still responsible for resisting the adverse effects of illness. (Crawford 1994, Radley 1994, Blaxter 1997, Jolanki 2004)

Recently, studies on the processes underlying self-evaluations of health among older people have included many similar criteria's for health than those studies of Herzlich and Blaxter. In the study by McMullen and Luborsky (2006) old African Americans included in their health definitions independent function, physical condition, control and responsibility for health and overall feeling. Contradictory results to Blaxter's findings have been reported by Silverman et al. (2000): in their study those who labeled themselves "not healthy" explained their appraisals by referring medical and physical health whereas those who considered themselves "healthy" also included psychological, social and behavioural

explanations. They concluded that “healthy” is a multidimensional construct more connected to one’s total life experiences than “not healthy”.

Self-ratings among the old have been found to be generally somewhat more positive than physicians’ ratings (Maddox 1962, LaRue et al. 1979, Ferraro 1980). LaRue et al. (1979) suggested that physicians’ ratings are based on the presence of specific diseases which are prevalent among the elderly population, so that most old people would be classified as having impaired health. The old, however, do not allow this to affect self-ratings in a negative way; they rather contextualize “normal health” and deviations from it with regard to their age.

Social comparison in health appraisals in old age

Social comparison theory

It is now widely accepted that one's self-concept (individuals' feelings of self-worth, their perceived personal characteristics and their evaluations of their abilities, opinions and values) is widely affected by social comparison, that is, one's self-concept is based in part on how one compares himself or herself to other individuals with regard to their traits, opinions and abilities. In social psychology there is the term comparative function of society which refers to the notion that the social group serves as a standard or point of comparison against which people appraise themselves (Suls and Wheeler 2000). In 1954 Leon Festinger introduced the term social comparison whose basic tenet is that humans have a drive to evaluate their opinions and abilities. Festinger (1954) hypothesized that people prefer objective criteria, what he termed physical reality, as standards for self-evaluation. In the absence of adequate physical reality people will seek out social reality, that is, other persons, as a source of information, and people tend to compare themselves to those who are in some respect similar to them.

Festinger suggested that individuals have a preference to compare their performance with that of slightly better others (upward comparison). Since Festinger's work, social comparison theory has undergone numerous transitions and reformulations, and many different approaches have been developed (e.g. Suls and Wheeler 2000). Brickman and Bulman (1977) made an argument that comparison with others who are thought to be better, though potentially informative, can also be threatening and, because of that, is often avoided. Instead, comparisons with others who are thought to be worse off may be sought (downward comparison). Wills (1981) argued that in situations that produce a decrease in well-being, individuals will often compare themselves with others who are thought to be worse off in an effort to improve their own well-being. However, it has been also proposed that upward comparison would play an important role in coping by providing positive role models, and by giving inspiration and hope (Taylor and Lobell 1989, Collins 1996).

It has been suggested that self-assessments of health involve a comparison process but it is not clear what points of reference are used. At least two points of reference are important: one's previous health and the health of age peers. It has been suggested that both women and men use others of the same age as points of reference even not explicitly asked (Tissue1972, Fienberg et al. 1985, Idler 1993, Manderbacka and Lundberg 1996).

Adaptation process

Adaptation to deteriorating health conditions seems to play an important role in old people's health evaluations. Successful adaptation demands coping strategies which improve the ability to maintain a consistent view of the self when health is declining. In old age people may see declining health as a part of normal changes and adjust their standards and expectations of good health according to their age. (Pilpel et al. 1988, Idler 1993) According to Tornstam (1975) the aspiration level regarding health decreases with advancing age and the requirements for good health become more modest. Aspiration level is partly determined by the individual's reference groups. The lowering of the aspiration level helps the individual to perceive his or her health as satisfactory even if it is worse than before.

To achieve a positive image of their health older people compare themselves with a stereotype of a frail elderly person rather than with specific individuals (Suls et al. 1991), and diminish the importance of physical health status by adjusting the base of comparison to the overall higher levels of morbidity among their age peers (Rakowski and Cryan 1990). Instead of medical conditions, older people are more likely to emphasize attitudinal and behavioural factors in assessing their health. Since age-related deterioration is a gradual process, the adaptation process occurs slowly, little by little, and the self-ratings of health do not need to be changed simultaneously. (Borawsky et al. 1996, Hoyemans et al. 1997)

Self-rated health as a measure of health

Measuring health

Just as there are multiple accounts or ways seeing health there are also different ways of measuring health depending on the perception taken (see Bowling 2002). As a complex and multidimensional phenomenon, health cannot be measured directly. Medicine, which has a long tradition in measuring health, is based on the philosophical tradition of positivism and uses mainly quantitative research techniques. It produces data which are considered hard, such as mortality and morbidity statistics, and biochemical data, such as haemoglobin levels. The focus is on organs or diseases, not on the person. According to Sidell (1995), this kind of evidence does not satisfy those whose definition of health is based on a more holistic approach putting the human subject at the centre and also considering more widely their social and physical environment. This enquiry uses humanistic and qualitative methods. It values personal experience and seeks out the meaning behind the social action. The methods used are usually case studies and indepth interview techniques, for example biographical interviews. (See Sidell 1995) Attempts to measure health in a wider sense have broken it into manageable parts, measuring separately physical, mental, social, economic and environmental factors. For example, the report of the joint workshops of the Research Unit of the Royal College of Physicians and the British Geriatric Society endorsed the various domains which the WHO recommended as appropriate to assessing the health of older people. These domains are shown in Figure 1.

The aim of the joint workshop was to recommend standardized scales for measuring each of these domains. Separate scales have been developed to measure the various elements of a holistic explanation of health such as morale, well-being, functional ability and life-satisfaction. According to Bowling (2005), these attempts to combine them has been less successful, and there is a conflict between researchers who are inclined to methods with more holistic view of health and policymakers who desire quantitative, hard data in decisionmaking in relation to the measurement of health.

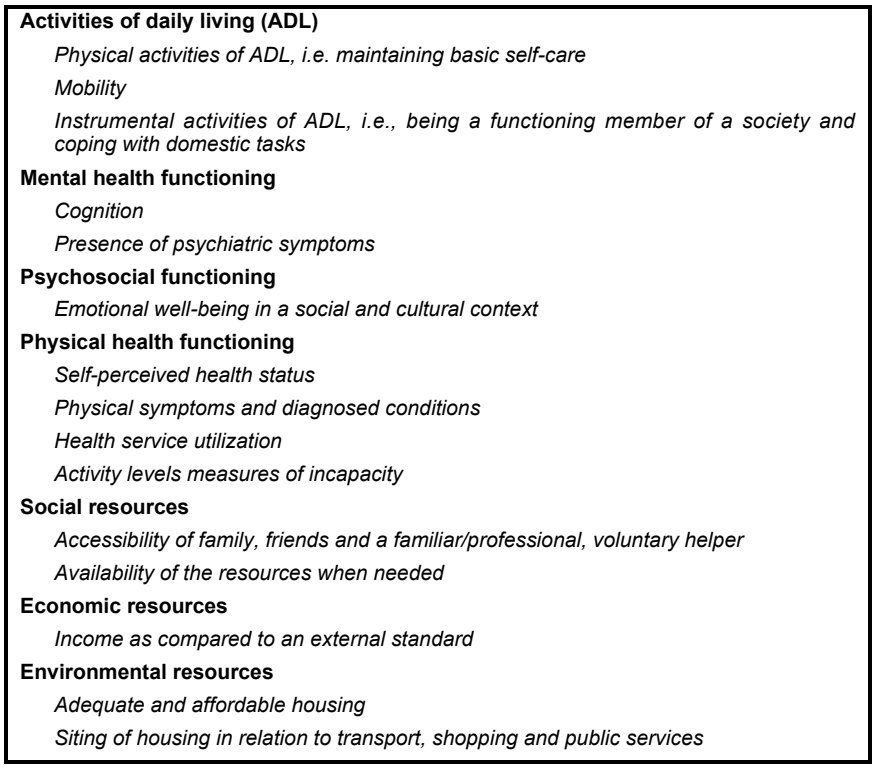

Figure 1. Suitable domains for the assessment of the health of elderly people Standardised Assessment Scales for Elderly People. Royal College of Physicians and British Geriatrics Society 1992. Source Sidell 1995.

When the basic background of measurement is considered, a fundamental distinction is that between subjective and objective indicators. Objective indicators can be understood as those using the medically defined criteria of diseases, and subjective indicators as those based on personal feelings and perceptions. (Jenkinson 1994) The distinction between objective and subjective indicators suggests implicitly that objective indicators are superior or less biased than subjective ones.

The generic, single-item survey measure of self-rated health (SRH) is widely used in health and ageing studies. In many studies it is suggested to be a valid and reliable indicator of overall health status, providing cost-effective means of health assessment (Lundberg and Manderbacka 1996, Ferraro et al. 1997). In 1973, Maddox and Douglas claimed that self-ratings of health "clearly measure something more – and something less – than objective medical ratings" (Maddox and Douglas 1973, 92). Idler and Benymini concluded in 1997, that self-ratings provide very valuable data on health status. According to them, "global self-ratings, which assess a currently unknown array of perceptions and weight them according to equally unknown and varying values and preferences, provide the

respondents' views of global health status in a way nothing else can", and "an individual's health status cannot be assessed without it" (Idler and Benyamini 1997, 34). Hoyemans et al. (1999) proposed, however, that because people adjust their self-ratings of health on the basis of comparisons and expectations, the sensitivity of self-rated health may be too low to monitor trends in the health status of older people. They suggested that studies evaluating health changes in old age also need to include objective measures of health. Manderbacka and Lundberg (1996) argued that although there is inevitably a subjective element in the measure of SRH, there is also evidence that self-perceptions are based on a wide range of medically relevant information.

There are earlier methodological studies about the content validity of self-rated health. The studies in general agree that self-ratings of health are mainly affected by subject's medical health status and functional capabilities (Johnson and Wolinsky 1993). Self-rated health has been observed to correlate with other indicators of health, such as physicians ratings (Friedsam 1963, Fillenbaum 1979, LaRue et al. 1979). Also, it has been compared with more complex, multi-item summary measures of general health suggesting concurrent validity. An association between increasing Nottingham Health Profile (NHP) scores (showing health-related problems) and deteriorating self-rated health has been reported for the global NHP score and for its subdomains, i.e. energy, pain, emotional reactions, sleep, social isolation and physical mobility. A similar association has been reported with the Medical Outcomes Study Questionnaire (MOS) (Rowan 1994). However, Chipperfield (1993) found incongruence between self-rated health and self-reported health problems among the elderly: incongruence was more likely to be in the form of more favorable ratings. The reliability of self-rated health is found to be high, with Kappa estimates ranging from good to excellent (Fylkesnes and Forde 1991, Lundberg and Manderbacka 1996).

Survey questions on self-rated health

Self-rated health has usually been measured by a single-item question using some variation of the standard question "how do you rate your health?" The questions can be classified in three main categories: non-comparative-, age-comparative, and time-comparative self-rated health. Appendix summarizes the way self-rated health questions have been operationalized in various studies. When self-rated health is assessed with a non-comparative question no frame of reference is offered. It is often elicited by asking "In general, how would you rate your present health? Different response scales have been offered, usually from "very good"

to “very poor”. In age-comparative question respondents are asked to compare their health with that of their age peers, and the response scales from “better” to “worse” are offered, sometimes also including the option “cannot say”. In the time-comparative question respondent are asked to assess their health compared what it was some time (e.g. one year) ago. The non-comparative question is most frequently used in the studies of self-rated health. (Idler and Benyamini 1997)

The way in which SRH questions are elicited often differs between Europe and USA. In USA, the response scales are often in the form “excellent-very good-fair-very poor”. This is a part of the Rand Corporation’s health batteries (see Bowling 2005). In Europe, the form of response scale is usually “very good, fairly good, average, fairly poor, poor”. In the UK the age-comparative form is also used frequently. (Crossley and Kennedy 2002)

It has been suggested that the concept of SRH is insensitive to semantic variation in the questions eliciting it (Idler et al. 1990, Idler and Benyamini 1997). Eriksson et al. (2001) compared three measures of SRH with different wording and reported that the differences between SRH measures were only marginal. They concluded that the different measures represented parallel assessments of SRH. Some studies, however, have shown that SRH questions are not entirely comparable. Baron-Epel and Kaplan (2001) found that the agreement between the global question and the age-comparative question differed in specific groups. Respondents in the oldest age group (65–75 years) with no reported diseases and those with fewer than 12 years of education tended to assess their health better than that of their age peers but agreement between the two measures was poor. Among the younger respondents (55–64 years) with no reported diseases the agreement between the two measures was excellent. Heidrich et al. (2002) suggested in their study of men and women aged 35–64 that global self-ratings and health comparisons to others of the same age may measure slightly different dimensions of health.

Self-rated health as a continuum

An interesting question is whether self-rated health forms a continuum from poor to good health determined by the same or different factors. Some studies have examined this topic but the results are contradictory. Smith et al. (1994) suggested that poor self-rated health is primarily related to the presence of ill health, whereas good health relates to socio-demographic and behavioural factors. According to Mackenbach et al. (1994) socio-demographic and behavioural factors mirror self-ratings of health from excellent to poor health

Manderbacka et al. (1998) suggested that self-rated health forms a continuum from poor to good health according to risk factors (BMI, exercise, alcohol consumption) and ill health (longstanding illnesses, functional limitations, short-term disability, somatic and psychological symptoms). In the 10-year follow-up study by Leinonen et al. (2002) where the subjects at baseline were 75 years old, stability in SRH was more common than change. Change and stability in SRH reflected health status, functional performance, and physical and social activity.

Self-rated health as a predictor

Mortality

In the early 1980s, Mossey and Shapiro (1982) showed that elderly Canadians' self-assessments of health were better predictors of 7-year survival than their medical records, or self-report of medical conditions. Since then studies of self-ratings of health as predictors of mortality have flourished and most of them have found a significant, independent association between simple health assessments and mortality which persists when numerous health status indicators and other relevant covariates are included in the analyses.

Appendix summarizes the characteristics of some of these studies. It consists partly of those studies that Idler and Benyamini presented in their summary tables in 1979 and 1999 (Idler and Benyamini 1997, Benyamini and Idler 1999). In addition, there are studies that have been conducted later, between 2002 and 2006. They are presented chronologically, and identified by their national origin, sample size, age range, follow-up period, wording of the question, type of other health status measures considered, other covariates, and findings regarding the independent effect of self-ratings of health on mortality or survival time.

These studies come from all over the world – Canada, USA, United Kingdom, Hong Kong, Lithuania, the Netherlands, Finland, Taiwan, Germany, Sweden, Israel, and Japan. They consider community-dwelling people; the only exception is the study by Leung et al. (1997) among institutionalized people. Study populations consist mainly of older people, but in the studies by Appels et al. (1996), Kaplan et al. (1996), and Heidrich et al. (2002) the study groups are middle-aged. In the studies by Kaplan and Kamacho (1983) the age range is 16–94 years, and in the study by Mackenbach et al. (2002) 15–74 years. Follow-up times range from 2 to 11 years. Survival rates range from 58 to 94 percent.

The question eliciting the self-ratings differs from study to study. Mostly the question ask respondents to rate their health without any reference (global self-rated health) (Mossey and Shapiro 1982, Kaplan and Kamacho 1983, Jagger and Clarke 1988, Rakowski et al. 1993, Kaplan et al. 1996, Jylhä et al. 1998, Mackenbach et al. 2002, Han et al. 2005, Murata et al. 2006). In two studies the respondents are asked to compare their health with that of their age peers (comparative self-rated health) (Ho 1991, Appels et al. 1996). In some studies both global and comparative SRH are used (Idler et al. 1990, Heidrich et al.

2002, Manderbacka et al. 2003, Baron-Epel et al. 2004, Jylhä et al. 2006). In the studies by Idler et al. (1990) and Jylhä et al. (2006) the respondents in Connecticut were asked the global question, and those in Iowa the comparative question. There is also one study which used three versions of SRH questions: a global question, a comparative question, and a question about any discomforts experienced in past months (Leung et al. 1997).

Most of the studies founded independent association between self-rated health and mortality. Some studies found differences in SRH-mortality association between different SRH measures and genders. In the study by Leung et al. (1997) global SRH was associated with increased risk of mortality but comparative SRH was not. Heidrich et al. (2002) found that comparative SRH was a more consistent predictor of all-cause mortality in middle-aged men and women than global SRH. In the study by Manderbacka et al. (2003) global SRH was associated with increased mortality risk among men but not among women whereas comparative SRH were associated with mortality among women but not among men. Baron-Epel et al. (2004) found that both global and comparative SRH were associated with mortality among men but not among women. In the study by Murata et al. (2006) SRH was more strongly associated with mortality among women than men. In the study by Kaplan et al. (1996) SRH was associated with all cause mortality but not with cardio-vascular and myocardial infarction mortality. Han et al. (2005) found that the most recent SRH and decline in SRH were associated with mortality but SRH in the beginning of the follow-up was not.

Other health outcomes

Limitations in physical functioning increase with advancing age, and they are important measure of health in older people. A far smaller number of studies has examined self-rated health as a predictor of subsequent functional ability than of mortality. Other health outcomes than mortality are, however, important because they identify health risks for survivors. These studies have found self-rated health to be significantly predictive of functional ability at follow-up, even when data are adjusted for potential confounders (Grande et al. 1988, Jagger et al. 1993, Kaplan et al. 1993, Idler and Kasl 1995, Atchley and Scala 1998, Idler et al. 2000, Bond et al. 2006, Lee 2006, Hillen et al. 2007).

These studies were conducted among general population, except the study by Hillen et al. (2007) which was conducted among patients who survived three months after a stroke. In the study by Bond et al. (2006) self-rated health was assessed using comparative SRH; in other studies global SRH was used. The follow-up time ranged from 1 year (Hillen

et al. 2007) to 20 years (Idler et al. 2000). In the study by Lee (2006) gender disparity was found: only the older men's assessment of health was significantly predictive. Bond et al. (2006) found that SRH also predicted cognitive impairment.

Ferraro et al. (1997) found that self-assessed health predicted subsequent change in health, suggesting that there is a cycle between health problems and negative health perceptions. Self-rated health has been found to predict use of health services among the older (e.g. Dening et al. 1998, Bath 1999) and middle-age population (Miilunpalo et al. 1997). Bath (1999) found that self-rated health also predicted 4-year and 8-years use of services and medications. In the study of Dening et al. (1998) self-rated health was assessed by comparative SRH, in other studies global SRH was used.

Explanations for the predictive power of self-rated health

Explanations for the ability of self-rated health to predict subsequent health outcomes have been presented in the literature. The association between SRH and mortality has been interpreted in three ways basically. First, it is possible that self-ratings of health measure a wide array of mortality-related physiological and pathological characteristics not captured by covariates included in the analyses. Second, it has been suggested that positive self-ratings reflect general disposition. Third, SRH may measure factors other than health status itself, such as health behaviour, social and psychological resources and family history. (Idler and Benyamini 1997, Benyamini et al. 1999, Van Doorn 1999) Self-rated health is suggested to be "a common feature" which links various adverse psychosocial states such as social isolation, negative life events and depression (Kaplan and Kamacho 1983). The interpretations of Idler and Benyamini (1997) are presented in Figure 2.

Ferraro et al. (1997) evince two reasons for the ability of self-rated health to predict health trajectories. First, they suggest that the respondent has knowledge of bodily symptoms, perhaps preclinical disorders. This is referred to the *validity hypothesis*: self-rated health is a valid indicator of true physiological processes even though the subject may not be aware of the precise physiological mechanisms. Second, it may be the health perception itself or one's health attitude which leads to incident morbidity or disability. Health optimism and pessimism may actually precipitate changes in morbidity and functional ability (see also Borawski et al. 1996). This is called the *psychosomatic hypothesis*: psychological orientation affects health trajectories. According to Ferraro et al. (1997) self-rated health is not just a valid measure of pathogenic processes, but also a determinant, at least in part, of such processes. Health optimism delays health decline

whereas health pessimism increases the likelihood of health decline. However, Mackenbach et al. (2002) did not find support for the explanation that the association between self-rated health and mortality is due to psychosocial factors. They concluded that SRH is a very inclusive measure that reflects health aspects relevant to survival not covered by other health indicators. Jylhä et al. (2006) suggested that self-rated health has a biological basis, and in addition to the health condition that can be externally observed it also covers interoceptive information of the body.

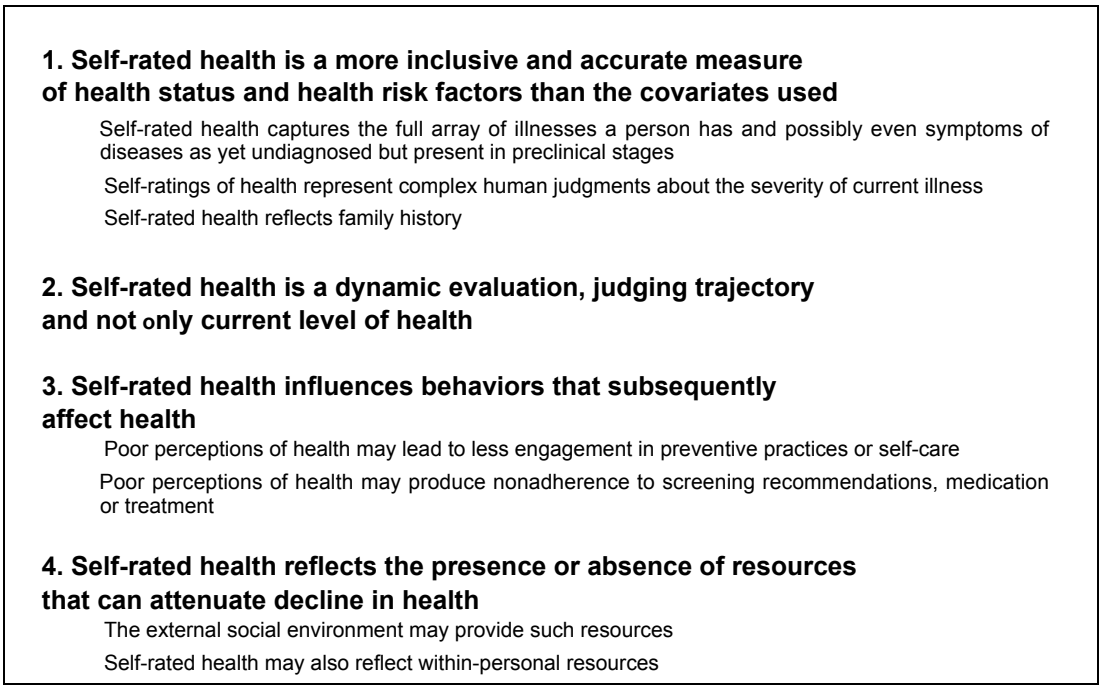

Figure 2. Interpretations for the association between self-rated health and mortality.
Source:Idler and Benyamini 1997

Determinants of self-rated health

Self-rated health has been understood as a summary statement of how the individual perceives various health conditions. It represents the individual's perceptions of multiple facets of health, including medical diagnoses, health conditions, symptoms, functional disabilities and psychosocial problems. (Verbrugge and Jette 1994, Manderbacka 1998) Self-ratings of health are influenced by emotional status, psychological distress (Rakowsky et al. 1993), personality factors, and biographical characteristics (Stoller 1984).

Age

Contradictory results of the association between age and self-rated health can be found in the literature. Subjective health usually shows deterioration with advancing age (Fylkesnes and Forde 1991, Lahelma et al. 1997). This is understandable because the number of chronic diseases and other medical conditions increase with advancing age (Fried and Wallace 1992, Rahkonen et al. 1993). However, in analyses where health indicators and sociodemographic factors have been taken into account the results mainly indicate that older people have better self-ratings than younger ones measured either by global or comparative SRH (Ferraro 1980, Cockerham et al. 1983, Idler 1993, Fletcher and Hirdes 1996, Dening et al. 1998, Jylhä et al. 1998, Damian et. al. 1999, Jylhä et al. 2001, Leinonen et al. 2001, Lee and Shinkai 2003, Murata et al. 2006).

This phenomenon can also be seen inside the older age group. In the study by Damian et al. (1999) there were no significant differences between age groups without adjustment, but after adjustment for social class and medical conditions self-rated health was clearly better among the oldest (80+) age group compared to the youngest (65–74) age group.

It has been suggested that with older age, people are more likely to assess their health as better than that of their age peers. In a 6-year follow-up study respondents in the old-old age group were more likely to rate their health at baseline as very good compared to their age peers than were subjects in the young-old group. In addition, the proportion of subjects in the very good or good group increased significantly during the follow-up. (Dening et al. 1998) In the study by Idler (1993) non-comparative self-rated health improved; the oldest

informants especially rated their health better than was expected and improved their self-ratings over the 6-year follow-up. In the study by Leinonen et al. (2001) objectively measured health status and functional performance declined with increasing age and about half of the respondents reported that their health had become worse during the 5-year follow-up, but the majority of the respondents self-rated their health same or better than before. They concluded that with increasing age elderly people may adapt to their deteriorating state of health up to a certain limit; after which self-rated health also decreases. According to Leinonen et al. (2001), positive health ratings do not mean that older people are unrealistic about their health but that self-rated health seems to be age-adjusted: stability may indicate a decreased level of aspiration as well as comparison of oneself with age peers.

Contradictory results indicating better self-rated health among younger respondents after adjustments have also been reported both in cross-sectional (Murray 1982 et al., Lindgren et al. 1994, Hoyemans et al. 1999) and longitudinal settings. A decline in the proportion of subjects reporting good non-comparative self-rated health was found by Fletcher and Hirdes (1996) in a 7-year follow-up in Canadians aged over 55 years, and by Hoyemans and co-workers (1999) in a 5-year follow-up among men aged 65–85 years at the beginning of the study. According to a meta-analysis conducted by Pinquart (2001) subjective health declines with age, but this decrement is greater in the old-old (75+ years) than in the young-old (60–75) groups.

Reasons against a marked decrease of the level of subjective health in old age have also been presented. First, self-rated health does not only depend on objective health conditions but also on subjective criteria of evaluating one's health (VanDoorn 1999). Second, older adults may attribute some of their physical problems to old age rather than to health problems (Idler 1993). In this case the age-associated increase in health problems may not be associated with a decrease in positive health perceptions. According to Pinquart (2001) older people adapt their criteria of self-rated health to deteriorating objective health so that the age-associated growing number of diseases and disabilities has only limited effect on health perception.

Other sociodemographic factors

In health research, the existence of social inequalities in health has been consistently demonstrated. Socioeconomic status has been associated with health outcomes in many studies, using different indicators, such as education, income, or occupation. The general finding is that the lower the socioeconomic class is, the greater the increase in rates of morbidity and mortality. (Rahkonen et al. 1993, Davey Smih et al. 1997, Mackenbach et al. 1997, Hart et al. 1998, Osler and Klebak 1998, Lahelma et al. 2002)

A relationship between socioeconomic status and the single-item measure of self-rated health has also been reported. Individuals from lower socioeconomic groups assess their health poorer than individuals from higher socioeconomic groups (Hirdes and Forbes 1993, Mackenbach 1993, Schultz et al. 1994, Franks et al. 2003, Martikainen et al. 2004). This relationship has been explained in several ways. One possibility is that socioeconomic differences in the prevalence of health problems account for these differences. In addition, damaging health behaviour (smoking, alcohol consumption, lack of physical exercise, dietary deficiencies) is more frequent in lower social classes and this can also affect self-rated health. Unfavourable material circumstances, stress-related life events and lack of social support have also been suggested to be reasons for poorer SRH in lower social classes. (Mackenbach 1993, Adler et al. 1994)

The evidence concerning the association of gender with self-rated health is contradictory. Some studies suggest that older men more often evaluate their health as good than do women (Schroll et al. 1991, Spiers et al. 1996, Benyamini et al. 2000, Franks et al. 2003), although opposite results have also been reported (Fillenbaum 1979, Ferraro 1980, Stump et al. 1997). Some studies report no gender differences (Moum 1992, Lindgren et al. 1994, Jylhä et al. 1998, Leinonen et al. 1998). According to Benyamini et al. (2000) men's self-assessments of health mainly reflect serious, life-threatening diseases whereas women's self-assessments also reflect non-life threatening diseases and a wider range of non-health-related factors than men's.

Medical conditions and functional ability

Medical health status and its functional consequences have been observed to be an important component of self-rated health (Moum 1992, Johnson and Wolinsky 1993, Kaplan et al. 1996, Shadbolt. 1997, Leinonen et al. 2001) Low number of chronic conditions has been reported to be associated with better self-rated health both in cross-sectional (Cockerham et al. 1983, Jylhä et al. 1986, Pilpel et al. 1988, Damian et al. 1999) and longitudinal studies (Bryant et al. 2000, Leinonen et al. 2001, Goldberg et al. 2006). Self-rated health has been presented to have a stronger association with chronic conditions than acute illnesses (Fylkesnes and Forde 1991, Shadbolt 1997, Damian et al. 1999). Molarius and Janson (2002) found that among 65–79 year old men neurological disease and cancer made a large contribution to self-rated health, and in women renal disease, rheumatoid arthritis, and cancer.

In the studies by Jylhä et al. (1986), Manderbacka (1998) and Leinonen (2002) a large number of physical and psychological symptoms was found to be associated with decline in self-rated health. In the Tromso Study Fylkesnes and Forde (1991) observed that somatic symptoms, mainly those connected to the musculoskeletal system were most strongly associated with poor subjective health. Molarus and Janson (2002) found that feelings of tiredness and weakness were related to self-rated health independent of chronic diseases and other symptoms. In addition, use of medication was reported to be associated with poor self-rated health (Schultz et al. 1994) and with a decline in self-rated health (Rodin and McAway 1992). Jylhä et al. (1986) found differences between age groups concerning the effect of chronic diseases and symptoms on self-rated health. In their study, self-rated health was best explained by symptoms and mental well-being in middle-aged (51–55) men, and by chronic diseases in elderly (71–77) men.

Recently some studies have examined the relation of biomarkers with self-rated health. In the study by Goldman et al. (2004) among 54 year old or older people living in Taiwan, BMI, total cholesterol and HDL cholesterol, and APOE e4allele were significantly associated with self-rated health after controlling for several health indicators and social and socioeconomic variables. In the study by Jylhä et al. (2006) haemoglobin and white cell account, showed a graded association with self-rated health after adjustments.

Especially in old age, people tend to evaluate their health through their functional abilities. Relation of functional ability with self-rated health has been reported using both the index of activities of daily living (ADL) (Johnson and Wolinsky 1993, Kempen et al. 1998, Damian et al. 1999, Leinonen 2002) and performance-based measures (Jylhä et al.

2001, Leinonen 2002). A relation has been reported in both cross-sectional (Kempen et al. 1998, Damian et al. 1999) and longitudinal studies and shows that better baseline functional ability is associated with better follow-up self-rated health (Atchley 1998, Bryant et al. 2000). In a study with disabled women Jylhä and colleagues (2001) reported that, after adjusting for age and several self-reported and objectively measured indicators of health and functional performance, subjects with slower walking speed had an increased probability of poor or fair self-rated health

Psychosocial factors

Psychosocial well-being and social relations have been reported to be related to self-rated health. Longitudinal studies among older people have shown that low distress (Farmer and Ferraro 1997) and better satisfaction with life (Hirdes and Forbes 1993) are associated with better self-ratings of health. In the study by Schneider et al. (2004) life-satisfaction, anxiety, depression and the sense of coherence correlated with self-evaluation of health among people aged 60 and older. Depression was also an important determinant of self-rated health in the study by Bryant et al. (2000) among community-dwelling people aged 60 and over. A small decrease in depressive symptoms was associated with improvement in self-rated health and decreased risk of having decline in self-rated health among disabled community-dwelling older adults (Han and Jylhä 2006).

Cultural factors

Some studies reported differences in self-assessments of health between ethnic groups. Ferraro et al. (1997) found in their 15-year longitudinal study in USA, that black people had poorer self-assessment than their white age peers. In the study by Krause and Jay (1994) whites used general physical functioning as a basis of their health assessments whereas non-whites thought about health problems more. Silverman et al. (2000) concluded that social and cultural factors such as race, ethnicity or health experiences may influence how individuals perceive and describe their health status and the processes used in making these assessments.

A few studies have concentrated on cross-cultural comparability of self-rated health in old age. In these studies the level of self-rated health was different but the correlational

structure of self-rated health was similar between cultures (Jylhä et al. 1998, Lee and Shinkai 2003, Bardage et al. 2005). In addition, a cultural difference in the association between SRH and mortality has been reported (Appels et al. 1996).

Some studies have compared self-rated health between Russia and Western populations. Bobak et al. (2004) compared self-rated health and physical disability among middle-aged and elderly people in Russia and Sweden. Their results showed similar levels of self-rated health and physical functioning in the two countries up to the age 45, but after that the decline in both outcomes was much faster in Russia than in Sweden. In the comparative survey carried out in 1991 in Helsinki and Moscow among 18–64 year-old people, the Muscovites reported poorer self-rated health compared to the people of Helsinki. In Helsinki poor self-rated health increased by age only among those with a long-standing illness whereas in Moscow self-rated health deteriorated both among the healthy and the sick with advancing age. (Palosuo et al. 1998)

Aims of the study

This study is concerned with methodological issues of self-rated health. Two self-rated health measures are compared, a global measure without an explicitly expressed reference group, and a comparative or age-referential measure when respondents are asked to compare their health with that of their age peers. The focus is on differences between the two SRH measures, especially the influence of age and functional ability on how older people assess their health. Also, the comparability of SRH measures between cultures is of interest. Finally, the possible effect of selective loss on the positive health ratings in old age is examined.

The research questions are:

1. To what extent do age and functional ability influence the ways in which old people assess their health and the references they use in their assessments, and are there differences between global SRH and comparative SRH in these references? (Studies I, III)
2. Are there differences between global and comparative SRH in their power to predict mortality? (Study II)
3. What are the cultural differences of SRH and the associated factors between Tampere and St. Petersburg, and are these differences similar in both global and comparative SRH? (Study IV)
4. To what extent can positive health ratings with older ages be explained by selective loss? (Studies I, III)

Subjects and methods

Study populations

This study is based on TamELSA – The Tampere Longitudinal Study on Ageing research program, which is a population-based study of living conditions, health and functioning, lifestyles and use of services among older people. TamELSA was a part of a larger ELSA (European Longitudinal Studies on Ageing) research program. The baseline survey was carried out in 1979. The main results of the ELSA program were reported in the WHO publications (Heikkinen et al. 1981, Heikkinen et al. 1983). The follow-up phases were conducted in 1989, 1999, and 2006. The data were collected by face-to-face interviews using standard questionnaire except in 2006 when the data were collected by telephone interview.

In the baseline study of 1979 subjects were drawn from the Population Register Centre of the city of Tampere. The same number of men and women were selected from each age cohort (born 1890–94, 1895–99, 1900–04, 1905–09, 1910–14, 1915–19) using systematic sampling. The sample included 1,494 people. A total of 1,059 people were interviewed, 528 were men and 531 women. The response rate was 71%.

In the first follow-up of 1989 the sample consisted of the

a) 518 people who were interviewed in 1979 and who according to the data of the Population Register Centre were alive on 1 February 1989

and

b) two new five-year cohorts: men and women born 1920–24 and those born 1925–29, 130 people in each group, altogether 520 people. The total sample included 1038 people of whom 830, 80% of the sample was interviewed.

In the second follow-up of 1999 the total sample consisted of the 429 people who were interviewed also in 1979 and/or 1989. Altogether 398 people were interviewed. The response rate was 92%.

In all waves, both community-dwelling and institutionalized people were included. A proxy informant was used whenever subjects themselves, for physical or mental reasons, were unable to answer the questions. Global SRH was not elicited in the cases of proxy

informants. Comparative SRH was not elicited if a proxy informant was used and if respondent was living in an institution. (Heikkinen et al. 1981, Jylhä et al. 1992)

In 2000, a project was carried out to improve the health and social services of old people in St. Petersburg (Improving the Planning of Medical and Social Services within Elder Care in St. Petersburg), and as a part of this IPSE project a survey was conducted. The data were collected by face-to-face interviews using the same questionnaire as in the ELSA studies, with minor modification. In 1979, the questionnaire was formulated in English first, and translated into Finnish for the interviews conducted in Tampere, and into Russian for interviews conducted in Kiev, Georgia. After that, different individuals translated the questionnaires back into English. (Heikkinen et al. 1983) The questionnaire used in Kiev was used in the interviews conducted in St. Petersburg in 2000. Since there were no up-to-date registers available in St. Petersburg the sample was collected by searching appropriate people from door-to-door. The original sample frame included a regional list of possible respondents representing the age and sex structure of St. Petersburg, and consisted of 1393 home-dwelling individuals aged 60–89 years of whom 1216 were interviewed. The response rate was 87%. (Pietilä et al. 2002)

Study I

The sample consisted of 80–89 year-old people from the years 1979 and 1989.

In 1979 the sample consisted of 407 people aged 80–89 years of whom 322 were interviewed. The response rate was 79%. In 1989 the sample consisted of 182 people aged 80–89 years of whom 152 were interviewed. The response rate was 83%. Altogether, 472 persons were interviewed. Because the comparative SRH was not elicited if the respondent was living in an institution or a proxy informant was used, the final sample consisted of 367 people. 11 respondents (3%) did not answer the comparative SRH question. Of the final sample 242 (68%) were interviewed in 1979 and 114 (32%) in 1989.

Study II

The data comes from the baseline study in 1979. A total of 1,059 people aged 60–89 were interviewed. The response rate was 71%. Mortality was examined according to global and comparative self-rated health. Global self-rated health was not elicited in cases where proxy

informants were needed, and comparative self-rated health was not elicited of those living in institutions and those with proxy informants. Only those who answered both questions were included; the number was 944, 477 men and 467 women.

Study III

The data used here comes from the second round of the study in 1989. The sample consisted of 1,038 people aged 60–99 years. The response rate was 80%, and a total of 830 people were interviewed. Comparative SRH was not elicited if the interviewee was living in an institution (n= 67; 8% of the sample) or in cases where a proxy informant was used for a home-dwelling interviewee (n=11; 1% of the sample). Data on comparative SRH were also missing in 2 other cases (0.2%). Global SRH was not elicited in cases with a proxy informant (n=42; 5%); and data were missing for 1 person (0.1%). The final sample consisted of those 750 people for whom information on both SRH questions was available; 47% were men and 53% were women.

Study IV

The Tampere data comes from 1989. Global self-rated health was not elicited in cases with a proxy informant, and the data were missing for 2 more people. Comparative SRH was not elicited if the interviewee was living in an institution (n=67, 8% of the sample) or in cases where a proxy informant was used for a home-dwelling interviewee (n=11, 1% of the sample). Data on comparative SRH were also missing in 2 other (0.2%) cases. In addition, people aged 90 and over were excluded to make the sample equivalent with the St. Petersburg sample. The final sample consisted of 737 people aged 60–89, 349 (47%) were men and 388 (53%) were women.

The St. Petersburg data included 1,216 interviewed home-dwelling people. Self-rated health questions was not elicited in cases where proxy informant were used (n=48, 3.9% of the sample). The final sample consisted of 1,168 people aged 60–89, 390 (33%) were men and 778 (67%) were women.

Measures

Self-rated health measures

Global self-rated health was assessed by asking "In general, how would you describe your health, is it very good, fairly good, average, fairly poor or poor. For logistic regression analyses (IV) it was categorized as good (very good and fairly good), and other (average, fairly poor and poor). For mortality analyses (II) and for multinomial regression analyses (III) it was categorized as good (very good and fairly good), average, and poor (fairly poor and poor).

Comparative self-rated health was assessed by asking “How would you describe your health compared to that of your age peers; is it better, about the same or worse”. The option “cannot say” was also available. For logistic regression analyses (I, IV) it was categorized as better, and other (about the same, worse and cannot say).

Sociodemographic variables

Age was used as continuous variable in Studies I, II, and IV. For cross-tabulations, logistic regression and multinomial logistic regression analyses it was categorized into two age groups, 80–84 and 85–89, in the Study I, and as three age groups, 60–69, 70–79, and 80–99, in the Study III. Occupational class was coded as non-manual, and others (I); non-manual, manual, farmers, housewives, and others (II); non-manual, manual, farmers, housewives (III); and non-manual, manual, farmers, and others (IV). Sex was included in all studies.

Health indicators

Functional ability was assessed with a set of 13 questions dealing with basic activities (ADL) and instrumental activities (IADL) of daily living. ADL activities were: eating, using the bathroom, washing and bathing, dressing and undressing, getting in and out of

bed, walking between rooms. IADL activities were: doing one's own cooking, doing easy housework, going out, cutting one's own toe-nails, walking at least 400 meters, using stairs, and carrying a heavy load. The respondents were asked if they were able to do the tasks without difficulty, with difficulty but without help, or not at all. No difficulty in any of the 13 tasks was classified as good, difficulty in one or more IADL but not in any ADL was classified as moderate, and any difficulty in ADL was classified as poor functional ability (I, II, III). In Study IV variable functional ability was categorized as 1) no difficulty in ADL and IADL activities, 2) only IADL difficulties, and 3) ADL difficulties.

Respondents were asked which chronic diseases they had that, according to the respondents, had been diagnosed by a physician. These were encoded in the following categories: cardiovascular, musculoskeletal, nervous system, endocrine, gastrointestinal, infectious, respiratory, urinary, diseases of skin, cancers, and other (ICD-9). For the analyses they were categorized as 0-1 and 2 or more (I); 0–1, 2–4 and 5 or more (II), and 0–1, 2–3, and 4 or more (III, IV) chronic diseases.

The subjects were asked whether they had experienced the following symptoms during the previous two weeks occasionally, often, almost constantly or not at all: headache, stomach pain, lack of appetite, deteriorating of memory, sense of giddiness, tiredness or feelings of faintness, palpitation of the heart, tremor in the hands, excessive sweating without physical effort, difficulties in falling asleep, difficulties in breathing or shortness of breath without physical effort, unwillingness to do things or lack of energy, nervousness, irritability or bursts of anger, low spirits or depression, and aching or pain in the joints or back trouble. The number of symptoms experienced often or constantly was categorized as 0, 1–3, and 4 or more (IV).

Social participation and life satisfaction

The respondents were asked how many times they had visited the following places or taken part in the following events during the past 12 months: a) family occasions, such as weddings, funerals, birthdays, etc., b) theatre, movies, c) meetings or events arranged by different organizations, d) the library, e) sports competitions, either as a participant or as a spectator, f) religious events, g) domestic travel, at least 60 miles, and h) foreign travel. Respondents were categorized as active it they had attended at least two family occasions or at least one other activity. For each activity the respondent received one point, and the points were added together. Social participation was categorized as low (score 0–1),

moderate (score 2–3) and high (score 4 and over) (I, II). Life satisfaction was categorized as satisfied and not satisfied in Study I.

Lifestyle factors

The respondents were asked if they practice physical exercise. Physical exercise was categorized as yes or now (I).

Mortality

The vital status and dates of death were provided by the National Population Register Center. The mortality within the sample was followed up until 2000. Time from the date of interview to date of death was measured, censored at 5, 10 and 20 years, respectively.

Statistical analyses

Study I

The association of comparative SRH with age and other determinants was studied by cross-tabulations and tested by χ^2-test. The independent association between better comparative SRH and determinants was examined using logistic regression analyses with not better comparative SRH as a reference group. The determinants were age, sex, occupational class, functional ability, number of chronic diseases, social participation, life satisfaction, exercise, and year of interview. First, the analyses were adjusted for age and the year of the interview. After that fully adjusted analysis was performed, including age, sex, occupational class, functional ability, number of chronic diseases, social participation, life satisfaction, physical exercise and year of interview. Differences between categories of comparative SRH by determinants were studied using multinomial regression analysis; worse comparative SRH was a reference group. The determinants in the fully adjusted analysis were age, sex, occupational class, functional ability, number of chronic diseases, social participation, life satisfaction, physical exercise, and year of interview.

To examine the possible effect of selective loss on better comparative health ratings with advancing age two logistic regression analyses were performed. First, those who were living in institutions and those with a proxy informant were excluded (N=356) (Model 1). In the second analysis the sample also included those who were living in the institutions or for whom a proxy informant was used (N= 461) (Model 2). They were categorized into the "not better"-group in the dichotomous variable "better-not better". Analyses were again adjusted for age, sex, occupational class, functional ability, number of chronic diseases, social participation and year of interview.

Study II

The association between mortality and SRH was analysed using Cox proportional hazard models. Analyses were performed separately for global and comparative SRH so that their predictive validity of mortality could be compared. The analyses proceeded in a series of steps. First, crude associations of poor/worse SRH with mortality were studied, and after that the control variables were included in the analyses step by step, in the order 1) age, 2) sex and occupational class, 3) number of chronic diseases, 4) functional ability, and 5) social participation.

Because of the reported differences in the association of SRH mortality between men and women analyses were also conducted separately for both genders. The gender-specific associations were studied at 10-year follow-up.

Study III

The relation between comparative and global SRH was analysed by cross-tabulation, and by using Spearman's rho. The associations of both SRH measures with age and functional ability were first analysed by cross-tabulations and tested by the χ^2-test. Multinomial regression analyses were used to identify independent association with age and functional ability. First, the unadjusted association of age and functional ability with SRH measures was examined. After that, age and functional ability appeared simultaneously in the analyses. Finally, sex, occupational class and number of chronic diseases were added to the models.

Next, two different ways were used to examine whether the results indicating better comparative SRH with increasing age could be caused by selective loss. First, the separate category "missing" was added to both comparative and global SRH variables, including those 80 people for whom observations were missing so that responses to either of the SRH questions were missing. Second, the "missing" values were included respectively in the category "worse" for comparative SRH, and in the category "poor" for global measure. The associations of age and functional ability with both SRH measures were then analysed using cross-tabulations and multinomial regression analyses.

Study IV

First the analyses were performed separately for St. Petersburg and Tampere. The differences of the frequencies in categorical variables were tested by the χ^2-test. The level of symptoms, chronic diseases and functional abilities at every level of SRH were examined by cross-tabulations and tested by the χ^2-test. Logistic regression analyses were performed to find out the association between self-rated health and determinants. After that, the data were pooled together and site was used as one determinant. All the logistic analyses were adjusted for age, occupational class, symptoms, chronic diseases and functional ability, and they were conducted separately for men and women.

Results

The association of age and other determinants with comparative SRH in very old people (Study I)

The aim of this study was to find an explanation for better comparative health ratings with advancing age. This study concerned 80–89 year-old people.

The distribution of comparative SRH by age groups among 80–89 year-old people is presented in Table 1. The percentage of those who rated their health better than that of their age peers was 51 in the age group 80–84, and 61 in the age group 85–89. In the whole sample the percentage of better comparative SRH was 54. The number of those who could not say when comparative SRH was elicited was quite large, 21% of the whole sample.

The results of the cross-tabulations showed that occupational class ($p<0.05$), functional ability ($p<0.001$), number of chronic diseases ($p<0.001$), life satisfaction ($p<0.001$) and exercise ($p<0.001$) were associated with comparative SRH. In the logistic regression analyses that were adjusted for age and year of interview (Table 2) age, non-manual occupational class, moderate and good functional ability, moderate and high social participation, life satisfaction and exercise were associated with better comparative SRH. The association of age was even stronger in the fully adjusted model, where other significant determinants were functional ability, number of chronic diseases, social participation, and life satisfaction. (Table 2)

Table 1. Frequency of comparative SRH by age groups.

Comparative SRH	80–84		85–89		All	
	N	%	N	%	N	%
Better	128	51	63	61	191	54
About the same	51	20	12	12	63	18
Worse	23	9	4	4	27	7
Cannot say	51	20	24	23	75	21
All	253	100	103	100	356	100

Table 2. Associations of determinants with better comparative SRH. Results of logistic regression analyses. Model 1 adjusted for age and year of interview. Model 2 adjusted for all determinants and year of interview.

Determinant		Model 1		Model 2	
	%	OR	95% CI	OR	95CI
Age		**1.11**	**1.02–1.20**	**1.19**	**1.08–1.31**
Sex					
Female	55	1		1	
Male	45	1.45	0.45–2.28	1.1	0.60–1.69
Occupational class					
Others	68	1		1	
Non-manual	32	**1.63**	**1.04–2.55**	1.39	0.81–2.36
Functional ability					
Poor	40	1		1	
Moderate	41	**2.72**	**1.50–4.92**	**2.1**	**1.11–3.98**
Good	19	**9.85**	**4.88–19.89**	**3.86**	**1.66–9.00**
Chronic diseases					
2 or more	44	1		1	
0–1	65	**3.76**	**2.46–5.75**	**2.48**	**1.50–4.10**
Social participation					
Low	53	1		1	
Moderate	28	**4.29**	**2.59–-.09**	**3.11**	**1.75–5.51**
High	19	**5.04**	**4.64-16.28**	**3.16**	**1.54–6.48**
Life satisfaction					
Not satisfied	27	1		1	
Satisfied	73	**3.85**	**2.24–6.61**	**2.42**	**1.29–4.53**
Exercise					
No	56	1		1	
Yes	44	**3.85**	**2.24–6.61**	1.36	0.82–2.24

Next, multinomial regression analysis was conducted where those in then “better”, “about the same” and “cannot say” categories were compared to those in the “worse” category. The objective was to examine how those who answered “cannot say” differed from those who answered “worse”. The difference between “better” and “worse” category was explained by older age, good and moderate functional ability, small number of chronic diseases and high and moderate social participation. Those who answered “about the same” differed from those in the “worse” category in the number of chronic diseases. The determinants of the “cannot say” category did not differ essentially from the determinants of the “worse” category. (Table 3)

Table 3. Differences in the categories of comparative SRH by determinants. Results of multinomial regression analysis, worse comparative SRH is a reference group.

Determinant	Better		About the same		Cannot say	
	OR	95% CI	OR	95% CI	OR	95% CI
Age	**1.39**	**1.10–1.59**	1.11	0.92–1.36	1.19	0.19–1.44
Sex						
Female	1		1		1	
Male	0.97	0.32–2.54	1.24	0.45–3.40	0.99	0.37–2.62
Occupational class						
Others	1		1		1	
Non-manual	2.89	0.85–9.74	2.67	0.75–9.46	1.91	0.55–6.65
Functional ability						
Poor	1		1		1	
Moderate	**4.13**	**1.40–12.16**	2.87	0.93–8.89	2.07	0.70–6.07
Good	**13.66**	**1.40–133.1**	7.4	0.71–77.0	2.54	0.24–27.0
Chronic diseases						
2 or more	1		1		1	
0–1	**5.04**	**1.70–14.93**	**3.17**	**1.02–9.90**	2.05	0.67–6.28
Social participation						
Low	1		1		1	
Moderate	**4.19**	**1.24–14.13**	1.59	0.42–5.90	2.25	0.67–7.83
High	**5.22**	**0.58–46.59**	3.9	0.41–36.74	1.48	0.18–18.06
Life satisfaction						
Not satisfied	1		1		1	
Satisfied	1.44	0.52–3.95	0.64	0.23–1.79	0.66	0.24–1.77
Exercise						
No	1		1		1	
Yes	2.31	0.73–7.18	0.73	0.21–2.54	2.48	0.78–7.90

Associations of age and functional ability with comparative and global SRH (Study III)

Earlier studies have suggested that functional ability is a major determinant of self-rated health. The impact of age has proved to be more complicated. In this study the possible differences between comparative and global SRH in their associations with age and functional ability were examined. Table 4 shows the distributions of global and comparative SRH according to age groups and functional ability. In the whole sample people rated their health more often as “fairly poor” of “poor” (n=174, 23%) than as

"worse" (n=105, 14%). In the oldest age group, people rated their health as "better" (59%) more often than as "fairly good" or "good" (42%). Those whose functional ability was poor rated their health as "better" (22%) more often than as "fairly good" or "very good" (13%).

Cross-tabulation between the two SRH measures indicated that health can be rated "better" even if it is not "good": 13% of those who rated their health as fairly poor and 10% of those who rated it as poor assessed their health as better than that of their age peers. (Table 5)

Table 4. Distribution of comparative and global SRH according to age groups and functional ability (%).

	Age groups			Functional ability				
SRH	**60-69** (n=395)	**70-79** n=234)	**80-99** n=121)	**Good** (n=337	**Moderate** (n=323)	**Poor** (n=90)	**All**	**No.**
	%	%	%	%	%	%	%	
Comparative								
Better	41	35	59	55	34	22	42	314
About the same	32	28	14	30	30	17	28	212
Worse	15	17	7	5	18	32	14	105
Cannot say	12	20	20	10	18	29	16	119
All	100	100	100	100	100	100	100	750
Global								
Very good	8	4	13	12	5	2	8	57
Fairly good	36	25	29	46	22	11	31	237
Average	39	39	29	37	42	22	38	282
Fairly poor	14	24	22	4	26	39	18	134
Poor	3	8	7	1	5	26	5	40
All	100	100	100	100	100	100	100	750

Table 5. Relation between comparative and global self-rated health (SRH) (%)

	Comparative SRH					
	Better	About the same	Worse	Cannot say	All	n
Global SRH						
Very good	88	7	0	5	100	57
Fairly good	63	24	2	11	100	237
Average	33	40	12	15	100	282
Fairly poor	13	25	34	28	100	134
Poor	10	12	53	25	100	40
	(n=314)	(n=212	(n=105)	(n=119)		750

$p<0.001$ tested by χ^2

Next the associations of age and functional ability with comparative and global SRH were examined by multinomial regression analyses (Table 6). There were differences in the associations of age with SRH between global and comparative measure. The age group 80–99 was significantly associated with better comparative SRH. When the global measure was considered, the association of the age group 80–99 with good SRH was inverse. When age and functional ability appeared simultaneously in the analysis, the association between the oldest age group and comparative SRH was even stronger than in the unadjusted analysis, and the 80–99 year age group had a significant positive association with good global SRH. When age, functional ability, sex, occupational class and chronic diseases were all included in the analysis the association of age group 80–99 with better comparative SRH was highly significant, but the association between the oldest age group and good global SRH was not significant.

Good and moderate functional ability were both significantly associated with both better comparative and good global SRH, and these associations remained highly significant in the fully adjusted models. It seemed that age and functional ability influenced each other in their association with comparative and global SRH. Adjustment for functional ability increased the likelihood of better comparative SRH or good global SRH in high age, and adjustment for age increased the association of good functional ability with positive SRH. However, when tested using an interaction term, the interaction between age group and functional ability was not significant for either comparative ($p=0.39$) of global ($p=0.71$) self-rated health.

The results showed that comparative SRH may be more influenced by age than global SRH. Therefore, comparative SRH may not be a valid measure of health status in samples where the age range is wide, or in comparisons between different age groups.

Table 6. Associations of age and functional ability with comparative and global SRH. Results of multinomial regression analyses. Fully adjusted models include sex, occupational class and chronic diseases. Worse comparative SRH and poor global SRH are reference groups.

	Comparative self-rated health						Global self-rated health			
	Better		About the same		Cannot say		Good		Average	
Age	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
60-69	1		1		1	1	1		1	
70-79	0.73	0.45-1.19	0.75	0.45-1.25	1.42	0.80-2.53	**0.32**	**0.20-0.51**	**0.50**	**0.32-0.76**
80-99	**3.17**	**1.44-6.98**	0.95	0.39-2.34	**3.76**	**1.55-9.08**	**0.53**	**0.32-0.89**	**0.51**	**0.24-0.71**
Functional ability										
Poor	1		1		1	1	1		1	
Moderate	**2.75**	**1.43-5.28**	**3.21**	**1.60-6.53**	1.11	0.58-2.12	**4.29**	**2.16-8.52**	**3.98**	**2.25-7.04**
Good	**14.82**	**7.01-31.30**	**10.74**	**4.82-23.91**	2.16	0.99-4.71	**55.15**	**24.90-122.14**	**21.48**	**10.48-44.04**
Age and functional ability										
Age										
60-69	1		1		1	1	1		1	
70-79	1.22	0.71-2.10	1.03	0.60-1.76	1.73	0.95-3.13	**0.49**	**0.29-0.91**	0.63	0.40-1.00
80-99	**12.37**	**5.13-29.80**	2.25	0.87-5.82	**5.85**	**2.29-14.84**	**2.21**	**1.19-4.13**	0.97	0.52-1.78
Functional ability										
Poor	1		1		1	1	1		1	
Moderate	**4.74**	**2.27-9.82**	**3.63**	**1.77-7.47**	1.48	0.75-2.92	**5.66**	**2.75-11.67**	**4.17**	**2.32-7.49**
Good	**36.63**	**16.96-90.62**	**12.87**	**5.57-29.69**	**3.75**	**1.62-8.67**	**80.70**	**34.14-190.73**	**21.36**	**10.11-45.12**
Fully adjusted model										
Age										
60-69	1		1		1	1	1		1	
70-79	1.32	0.76-2.30	2.57	0.92-7.12	1.80	0.98-3.28	0.51	0.30-0.87	0.65	0.41-1.05
80-99	**12.03**	**4.63-31.22**	1.10	0.64-1.90	**5.65**	**2.04-15.62**	1.59	0.80-3.18	0.86	0.45-1.66
Functional ability										
Poor	1		1		1	1	1		1	
Moderate	**4.00**	**1.85-8.65**	**3.49**	**1.65-7.38**	1.38	0.68-2.81	**4.93**	**2.18-11.15**	**3.64**	**1.97-6.70**
Good	**23.44**	**9.85-60.15**	**9.32**	**3.91-22.50**	**3.04**	**1.26-7.29**	**54.20**	**21.20-139.31**	**16.97**	**7.81-36.83**

Comparative and global SRH as predictors of mortality (Study II)

The aim of this study was to examine if there are differences between comparative SRH and global SRH in their power to predict mortality

The number of deaths was 243 (26%) after 5 years, 442 (47%) after 10 years, and 802 (85%) after 20 years of follow-up.

The results showed that, whatever way it is elicited, SRH predicts subsequent mortality even after 20 years of follow-up when several social and health indicators are controlled for. However, to some extent comparative and global SRH behave differently.

Table 7 shows the risk ratios for mortality according to comparative SRH. At the first step, comparative self-rated health was alone in the model. Individuals reporting worse comparative health did not have a significantly higher risk of mortality than those reporting better comparative health after any follow-up. Adjusted for age, the risk became statistically significant after 5, 10 and 20 years, the respective RR's being 2.09 (95% CI 1.43–3.03), 2.02 (95% CI 1.52–2.69) and 1.77 (95% CI 1.42–2.16). When sex and occupational class were included in the analysis, the mortality risk increased slightly after 5, 10 and 20 years. After 10 years those who assessed their health as about the same or who did not know also had increased mortality risk.

When chronic diseases were added into the analysis the association between increased mortality and worse reported SRH diminished slightly but the risk was still over twofold at 5 and 10 year follow-up and almost twofold at 20 years of follow-up. The relation between worse comparative SRH and mortality decreased further after additional adjustment for functional ability but the risks were still statistically significant after 5, 10 and 20 years. When social participation was added to the model the relationship between worse comparative SRH and mortality was still significant at 10 and 20 year follow-up, but not at 5 year follow-up.

Table 8 shows the risk ratios for mortality according to global SRH. Poor global self-rated health alone was associated with increased mortality risk: those who rated their health as poor or fairly poor were over one and a half times more likely to die after 5, 10 and 20 years compared to those who rated their health as very good. Age-adjustment increased the risk ratios slightly after all follow-ups. When sex and occupational class were included in the analysis the relations of poor self-rated health with mortality became stronger after 5, 10 and 20 years. Additional adjustment for chronic diseases did not essentially reduce the risks but when functional ability was added to the model the risk decreased, being statistically significant after 10 and 20 years of follow-up. When social participation was included in the analysis the mortality risk was still significant after 10 and 20 years.

Table 7. Association of comparative self-rated health with mortality

	N= 944		Adjusted for									
	Alive		Unadjusted		Age		+sex, occupational class		chronic diseases		+ functional ability		+ social participation	
Follow-up	%		RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI
5 years	74	Better	1		1		1		1		1		1	
		About the same	0.95	0.74-1.20	1.37	0.95-1.84	1.33	0.96-1.86	1.32	0.94-1.85	1.15	0.81-1.62	1.11	0.79-1-57
		Worse	1.21	0.92-1.60	**2.09**	**1.43-3.03**	**2.28**	**1.56-3.33**	**2.20**	**1.48-3.27**	**1.62**	**1.05-2.50**	1.47	0.95-2.27
		Don't know	**1.30**	**1.00-1.69**	1.28	0.90-1.85	1.29	0.90-1.85	1.27	0.88-1.84	1.04	0.71-1.53	0.94	0.64-1.39
10 years	53	Better	1		1		1		1		1		1	
		About the same	0.95	0.75-1.20	**1.30**	**1.02-1.69**	1.30	1.02-1.66	1.29	1.01-1.65	1.16	0.90-1.49	1.14	0.88-1.47
		Worse	1.21	0.92-1.88	**2.02**	**1.52-2.69**	**2.14**	**1.62-2.90**	**2.09**	**1.55-2.84**	**1.63**	**1.17-2.27**	**1.54**	**1.10-2.15**
		Don't know	**1.30**	**1.00-1.69**	**1.41**	**1.08-1.83**	**1.45**	**1.11-1.88**	**1.43**	**1.09-1.87**	1.21	0.91-1.61	1.15	0.86-1.53
20 years	15	Better	1		1		1		1		1		1	
		About the same	0.91	0.76-1.08	1.14	0.96-1.36	1.14	0.95-1.35	1.11	0.93-1.32	1.04	0.80-1.24	1.03	0.86-1.23
		Worse	1.07	0.87-1.32	**1.77**	**1.42-2.16**	**1.86**	**1.49-2.32**	**1.72**	**1.37-2.17**	**1.39**	**1.08-1.80**	**1.35**	**1.04-1.23**
		Don't know	1.10	0.90-1.35	**1.23**	**1.00-1.51**	**1.29**	**1.05-1.58**	**1.24**	**1.01-1.53**	1.10	0.88-1.37	1.06	0.85-1.32

Table 8. Association of global self-rated health with mortality

	N=944		Adjusted for											
	Alive		Unadjusted		Age		+sex, occupational class		+chronic diseases		+functional ability		+social participation	
Follow-up	%		RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI
5 years	69	Good	1		1		1		1		1		1	
		Average	1.11	0.81-1.52	1.23	0.90-1.68	1.28	0.94-1.76	1.27	0.92-1.76	1.09	0.78-1.53	1.00	0.72-1.41
		Poor	1.67	1.23-2.27	1.75	1.29-2.39	1.88	1.37-2.58	1.85	1.32-2.59	1.37	0.94-2.01	1.19	0.81-1.75
10 years	49	Good	1		1		1		1		1		1	
		Average	1.28	1.02-1.61	1.45	1.16-1.83	1.51	1.20-1.91	1.51	1.19-1.92	1.37	1.07-1.75	1.30	1.02-1.67
		Poor	1.73	1.37-2.19	1.91	1.50-2.41	2.08	1.63-2.65	2.07	1.60-2.67	1.68	1.26-2.24	1.54	1.15-2.06
20 years	13	Good	1		1		1		1		1		1	
		Average	1.09	0.93-1.29	1.27	1.07-1.49	1.28	1.08-1.52	1.24	1.04-1.48	1.16	0.97-1.39	1.12	0.94-1.35
		Poor	1.53	1.28-1.82	1.70	1.43-2.03	1.83	1.53-2.19	1.74	1.44-2.11	1.49	1.20-1.84	1.41	1.13-1.75

The greatest difference between the two measures was connected to age. Age influenced the association of SRH and mortality differently depending on the measure used. Unadjusted, worse comparative SRH was not statistically significantly associated with increased mortality risk. After age-adjustment the risk was statistically significant after 5, 10 and 20 years of follow-up. Poor global SRH was associated with increased mortality risk when unadjusted, and with adjustment for age the association became somewhat stronger. After adjustment for age the association between worse comparative SRH and mortality was somewhat stronger than between poor global SRH and mortality but the differences were only marginal.

Other health indicators, functional ability and chronic diseases, and social indicators had a similar influence on the association between SRH and mortality; this indicates that comparative and global measures cover mostly the same domains of health. Furthermore, a similar dose-response pattern can be seen both in the association between comparative SRH and mortality and in the association between global SRH and mortality: the poorer the self-assessment of health the greater the likelihood of increased mortality risk.

Because of the reported differences in the association of SRH with mortality between men and women, analyses were also conducted separately for both genders. Table 9 shows the gender-specific associations of comparative and global SRH with mortality at 10 years of follow-up. Unadjusted, comparative SRH was not associated with either women's or men's increased mortality risk. Adjusted for age, the risk became statistically significant for both men and women. Additional adjustment first for occupational class and then chronic diseases did not change the risks, but when functional ability was added into the models the association between worse comparative SRH and mortality became insignificant among women but remained significant among men. For men, the association also remained after adjustment for social participation.

As a crude measure, poor global SRH was significantly associated with mortality for both women and men. Among men, the age-adjusted mortality risk was over twofold compared to those who assessed their health as good, and the association remained almost unchanged when control variables were included into the analyses step by step. When social participation was added to the model the risk dimished slightly, still remaining highly significant. Adjusted for age, poor and average global SRH were found to be equally strong predictors of women's mortality. The predictive power remained stable until functional ability was added to the model, after which the risks were no longer statistically significant.

Table 9. Gender-specific associations of global and comparative SRH with mortality at 10-year follow-up.

				Adjusted for									
		Unadjusted		Age		+occupational class		+chronic diseases		+functional ability		+social participation	
		RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI
	Comparative SRH												
Male	Better	1		1		1		1		1		1	
N=202	About the same	0.88	0.65-1.20	1.19	0.87-1.63	1.20	0.88-1.64	1.16	0.84-1.59	1.06	0.76-1.48	1.03	0.74-1.43
	Worse	1.39	0.99-1.96	**2.44**	**1.70-3.50**	**2.46**	**1.70-3.55**	**2.27**	**1.54-3.34**	**1.85**	**1.21-2.83**	**1.72**	**1.12-2.64**
	Don't know	1.32	0.95-1.86	**1.41**	**1.01-1.98**	**1.41**	**1.01-1.98**	1.37	0.97-1.94	1.17	0.80-1.70	1.10	0.75-1.61
Female	Better	1		1		1		1		1		1	
N=300	About the same	1.05	0.72-1.54	**1.53**	**1.04-2.25**	**1.51**	**1.02-2.23**	**1.52**	**1.03-2.24**	1.42	0.95-2.13	1.43	0.96-2.13
	Worse	1.02	0.63-1.64	**1.68**	**1.03-2.73**	**1.68**	**1.02-2.74**	**1.70**	**1.03-2.79**	1.37	0.78-2.35	1.33	0.77-2.28
	Don't know	1.34	0.88-2.05	1.50	0.98-2.28	1.50	0.98-2.28	1.50	0.98-2.30	1.36	0.88-2.10	1.32	0.86-2.05
	Global SRH												
Male	Good	1		1		1		1		1		1	
	Average	1.21	0.91-1.62	**1.44**	**1.07-1.93**	**1.48**	**1.10-2.00**	**1.46**	**1.07-1.99**	**1.39**	**1.01-1.91**	1.32	0.95-1.83
	Poor	**1.96**	**1.46-2.63**	**2.36**	**1.72-3.17**	**2.45**	**1.79-3.33**	**2.37**	**1.71-3.29**	**2.10**	**1.44-3.05**	**1.89**	**1.28-2.78**
Female	Good	1		1		1		1		1		1	
	Average	1.41	0.98-2.04	**1.52**	**1.05-2.19**	**1.52**	**1.05-2.19**	**1.53**	**1.05-2.22**	1.36	0.92-1.99	1.35	0.92-1.97
	Poor	**1.53**	**1.03-2.26**	**1.52**	**1.03-2.25**	**1.51**	**1.02-2.24**	**1.55**	**1.02-2.35**	1.24	0.78-1.95	1.20	0.76-1.89

Cultural differences in self-rated health between Tampere, Finland, and St. Petersburg, Russia (Study IV)

The aim of this study was to examine if there are differences in self-rated health (SRH) between older people in St. Petersburg, Russia, and Tampere, Finland.

Differences in health indicators

Table 10 shows the distribution of global and comparative SRH and other health indicators for men and women in St. Petersburg and Tampere. Health was assessed as good and as better more often in Tampere than in St. Petersburg; the difference was statistically significant for both measures. Women in St. Petersburg assessed their health as poor ($p<0.001$) or worse ($p<0.05$) more often than men. In Tampere there were no differences between the genders.

In St. Petersburg the respondents reported significantly more symptoms and chronic diseases, and women also functional disabilities than the respondents in Tampere. Women in St. Petersburg reported more symptoms ($p<0.001$), chronic diseases ($p<0.001$), and functional disabilities ($p<0.001$) than men. Women in Tampere reported significantly more functional disabilities than men ($p<0.001$). All health indicators showed that women in St. Petersburg had the poorest health.

Relation of self-rated health and other health indicators

To examine the possible differences in the evaluations of health, the numbers of different health problems between St. Petersburg and Tampere at each level of global and comparative self-rated health were compared.

At every level of global SRH the Russian men reported slightly more symptoms, chronic diseases and functional disabilities than the Finnish men, but the differences were not statistically significant ($p>0.05$).

Table 10. Frequencies (%) of global and comparative self-rated health and other health indicators in St. Petersburg and Tampere. Significances of differences of health indicators between St. Petersburg and Tampere tested by χ^2-test.

	Male				Female			
	St. Petersburg		Tampere		St. Petersburg		Tampere	
	N	%	N	%	N	%	N	%
Global SRH								
Very good	8	2	26	7	6	1	32	8
Fairy good	60	15	110	31	48	6	126	32
Average	205	53	133	38	357	46	149	38
Fairy poor	67	17	69	19	224	29	65	17
Poor	50	13	18	5	143	18	22	5
				p<0.001				**p<0.001**
Comparative SRH								
Better	99	25	144	40	156	20	171	43
About the same	123	32	102	29	216	28	109	28
Worse	78	20	50	14	216	28	55	14
Cannot say	90	23	60	17	190	24	59	15
				p<0.001				**p<0.001**
Number of symptoms								
0	107	27	120	34	83	11	102	26
1–3	161	41	167	47	232	30	207	52
4 or more	122	32	69	19	463	59	85	22
				p<0.001				**p<0.001**
Number of chronic diseases								
0–1	194	50	223	62	276	35	242	61
2–3	156	40	110	31	341	44	126	32
4 or more	40	10	23	7	161	21	26	7
				p<0.001				**p<0.001**
Functional ability								
No difficulty	206	53	189	54	216	28	148	38
Only IADL difficulties	115	29	118	34	339	43	183	47
ADL difficulties	69	18	42	12	223	29	57	15
				p>0.05				**p<0.001**

Among those women who assessed their health as good, women in St. Petersburg had significantly more chronic diseases than women in Tampere ($p<0.001$) Of those with "average" self-rated health, women in St. Petersburg had more chronic diseases ($p\leq0.001$) and more symptoms ($p<0.001$). Of those reporting "poor" self-rated health, women in St. Petersburg had more symptoms ($p<0.001$) than women in Tampere.

Among those men who assessed their health as "better" than that of their age peers, men in St. Petersburg had more chronic diseases ($p<0.01$) than men in Tampere. Of those with worse self-rated health men in St. Petersburg had more symptoms ($p<0.05$) than men in Tampere.

Among women who assessed their health as "better", women in St. Petersburg had more symptoms ($p<0.001$) and chronic diseases ($p<0.001$) than women in Tampere. When health was assessed as "about the same", Russian women had more symptoms ($p<0.001$), chronic diseases ($p<0.001$) and functional difficulties ($p<0.05$) than women in Tampere. Of those who assessed their health as "poor", women in St. Petersburg had more symptoms ($p<0.01$) and chronic diseases ($p<0.01$). Among women who answered "cannot say", women in Russia had more symptoms ($p<0.001$) than women in Tampere.

Women, in both St. Petersburg and in Tampere, had more symptoms, chronic diseases and difficulties in functional ability at different levels of both global and comparative SRH than men. The differences were statistically significant more often in St. Petersburg than in Tampere, and the level of significance was usually higher in St. Petersburg than in Tampere. In Tampere the difference was mostly in functional ability; this includes both SRH measures. In St. Petersburg the difference emerged quite equally in symptoms, chronic diseases and functional ability.

In all, the results show that the poorer or worse the self-assessed health is, the more the respondents also have symptoms, chronic diseases and functional difficulties; this can be seen in both countries. However, at each level of self-rated health the subjects in St. Petersburg have a tendency to report more health problems than the subjects at the same level of SRH in Tampere.

Determinants of self-rated health

Separate data

Tables 11 and 12 show the results of logistic regression analyses conducted separately for men and women in St. Petersburg and Tampere. The determinants are age, occupational class, symptoms, chronic diseases, and functional ability.

Among men, both in St. Petersburg and Tampere, good self-rated health was independently associated with fewer symptoms, and in Tampere also with small number of chronic diseases as well as non-manual occupational class. Among women, good global SRH was independently associated with fewer symptoms in both cities, and in Tampere this was also associated with the number of chronic diseases and good functional ability.

Among men, better comparative SRH was associated with fewer symptoms in both cities, and in Tampere it was also associated with higher age. Among women, better comparative SRH was associated with higher age, small number of symptoms and good functional ability in both cities, and in St. Petersburg also with non-manual occupational class.

Table 11. Associations of determinants with good global SRH and better comparative SRH. Results of logistic regression analyses, not good and not better SRH are the reference groups. Analyses conducted separately for St. Petersburg and Tampere.

GLOBAL SELF-RATED HEALTH												
Good (vs. not good)												
	Male						Female					
	St. Petersburg			**Tampere**			**St. Petersburg**			**Tampere**		
	p	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI
Age	0.21	0.96	0.92-1.01	0.53	1.01	0.97-1.05	0.99	0.99	0.95-1.05	0.12	1.02	0.99-1.06
Occupational class												
Manual		1			1			1			1	
Others	0.10	2.10	0.87-5.07	0.28	0.30	0.03-2.66	0.27	1.67	0.70-3.98	0.10	1.43	0.71-2.88
Non-manual	0.26	1.44	0.75-2.70	**0.007**	**2.06**	**1.21-3.48**	0.39	1.35	0.66-2.71	0.10	1.57	0.90-2.74
Symptoms												
4 or more		1			1			1			1	
1-3	**0.01**	**4.13**	**1.34-12.71**	**0.002**	**6.25**	**1.97-19.86**	**0.001**	**4.05**	**1.76-9.31**	**0.002**	**4.06**	**1.74-9.45**
0	**<0.001**	**8.74**	**2.76-27.65**	**<0.001**	**10.84**	**3.25-36.14**	**<0.001**	**10.88**	**4.32-27.39**	**<0.001**	**7.13**	**2.85-17.84**
Chronic diseases												
4 or more		1			1			1			1	
2-3	0.51	0.62	0.15-2.53	0.41	2.30	0.27-19.36	0.78	0.84	0.28-2.48	0.18	3.37	0.40-28.20
0-1	0.51	1.55	0.41-5.86	**0.04**	**8.48**	**1.05-68.62**	0.53	1.38	0.47-4.01	**0.002**	**16.38**	**2.05-130.82**
Functional ability												
ADL difficulty		1			1			1			1	
Only IADL difficulty	0.25	0.48	0.14-1.68	0.30	0.55	0.17-1.70	0.34	1.64	0.51-467	0.05	2.76	0.95-7.94
No difficulty	0.55	1.38	0.46-4.07	0.73	1.22	0.39-3.79	0.09	2.55	0.85-7.69	**0.001**	**6.19**	**1.99-19.28**

Table 12. Associations of determinants with better comparative SRH. Results of logistic regression analysis, not better comparative SRH as a reference group. Analysis conducted separately for St. Petersburg and Tampere, and for men and women.

COMPARATIVE SELF-RATED HEALTH												
Better (vs. not better)												
	Male						Female					
	St. Petersburg			**Tampere**			**St. Petersburg**			**Tampere**		
	p	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI
Age	0.41	1.01	0.97-1.05	**0.002**	**1.06**	**1.02-1.10**	**<0.001**	**1.05**	**1.02-1.09**	**<0.001**	**1.06**	**1.03-1.10**
Occupational class												
Manual		1			1			1			1	
Others	0.89	1.96	0.94-4.09	0.63	0.70	0.16-2.97	0.25	1.43	0.80-2.57	0.96	1.15	0.61-2.15
Non-manual	0.59	1.16	0.67-2.01	0.27	1.31	0.80-2.16	**0.006**	**1.87**	**1.19-2.95**	0.05	1.63	0.98-2.69
Symptoms												
4 or more		1			1			1			1	
1-3	0.09	1.81	0.90-3.65	**0.03**	**2.39**	**1.05-5.43**	**<0.001**	**2.91**	**1.86-4.55**	0.23	1.49	0.79-2.80
0	**0.001**	**3.67**	**1.71-7.84**	**0.003**	**3.92**	**1.60-9.56**	**<0.001**	**3.08**	**1.68-5.64**	**0.005**	**2.91**	**1.40-6.06**
Chronic diseases												
4 or more		1			1			1			1	
2-3	0.35	1.73	0.54-5.48	0.17	0.44	0.13-1.44	0.67	0.87	0.47-1.61	0.36	0.61	0.22-1.65
0-1	0.20	2.08	0.66-6.57	0.30	1.79	0.58-5.44	0.09	1.69	0.91-3.14	0.23	1.77	0.67-4.67
Functional ability												
ADL difficulty		1			1			1			1	
Only IADL difficulty	0.93	1.04	0.39-2.79	0.65	0.80	0.30-2.09	0.07	1.67	0.94-2.98	0.07	2.07	0.94-4.54
No difficulty	**0.01**	**3.03**	**1.21-7.58**	0.35	1.60	0.59-4.36	**<0.001**	**4.66**	**2.46-8.83**	**0.002**	**4.24**	**1.69-10.61**

Pooled data

Data from both countries were pooled together and site was one determinant in the logistic regression analyses (Table 13). Other determinants were again age, occupational class, chronic diseases, symptoms and functional ability. The analyses were conducted separately for men and women.

Among men, the likelihood of good global SRH was over twofold in Tampere (OR 2.75; 95% CI 1.85–4.11) compared to men in St. Petersburg. Also, good global SRH was associated with a low number of chronic diseases and symptoms and non-manual occupational class. Among women, the likelihood of good global SRH was over sixfold in Tampere (OR 6.11; 95% CI 4.09–9.14) compared to St. Petersburg. Good global SRH was also significantly associated with small number of symptoms, chronic diseases, functional ability and non-manual occupational class.

Among men, the likelihood of better comparative SRH was almost twofold in Tampere (OR 1.80; 95% CI 1.26–2.56) compared to St. Petersburg. Better comparative SRH was also associated with small number of symptoms, functional ability and higher age.

Among women, the likelihood of better comparative SRH was almost twofold in Tampere (OR 1.85; 95% CI 1.35–2.53) compared to St. Petersburg. Better comparative SRH was also associated with few chronic diseases and symptoms, functional ability, higher age and non-manual occupational class.

Table 13. Associations of determinants with good global and better comparative SRH. Data are combined, site as one determinant. Results of logistic regression analyses

	Global self-rated health **Good (vs. not good)**						**Comparative self-rated health** **Better (vs. not better)**					
	Male			Female			Male			Female		
	p-values	OR	95% CI	p-values	OR	95% CI	p-values	OR	95% CI	p-values	OR	95% CI
Age	0.89	0.99	0.96-1.02	0.32	1.01	0.98-1.04	**0.002**	**1.04**	**1.01-1.07**	**<0.001**	**1.06**	**1.04-1.08**
Occupational class												
Manual		1			1			1			1	
Others	0.07	1.50	0.71-3.18	0.20	1.57	0.92-2.67	0.22	1.66	0.88-3.10	0.68	1.28	0.84-1.95
Non-manual	**0.004**	**1.78**	**1.16-2.67**	**0.01**	**2.05**	**1.16-3.62**	0.73	1.26	0.87-1.81	**0.001**	**1.73**	**1.24-2.41**
Site												
St. Petersburg		1			1			1			1	
Tampere	**<0.001**	**2.75**	**1.85-4.11**	**<0.001**	**6.11**	**4.09-9.14**	**<0.001**	**1.80**	**1.26-2.56**	**<0.001**	**1.85**	**1.35-2.53**
Symptoms												
4 or more		1			1			1			1	
1-3	**<0.001**	**4.63**	**2.12-10.35**	**0.001**	**3.82**	**2.14-6.80**	**<0.001**	**1.90**	**1.13-3.20**	**<0.001**	**2.31**	**1.60-3.32**
0	**<0.001**	**9.40**	**4.13-21.43**	**0.001**	**7.57**	**4.04-14.20**	**0.01**	**3.53**	**2.00-6.22**	**<0.001**	**3.32**	**2.11-5.23**
Chronic diseases												
4 or more		1			1			1			1	
2-3	0.87	1.12	0.36-3.50	**0.81**	1.07	0.41-2.78	0.99	1.01	0.45-2.27	0.37	0.79	0.47-1.32
0-1	**0.02**	**3.51**	**1.18-10.46**	**0.006**	**3.48**	**1.39-8.67**	0.05	2.19	1.00-4.81	**0.03**	**1.72**	**1.03-2.86**
Functional ability												
ADL difficulties		1			1			1			1	
Only IADL difficulties	0.16	0.56	0.25-1.25	0.05	2.08	0.99-4.38	0.96	0.97	0.50-1.88	**0.008**	**1.87**	**1.19-2.96**
No difficulties	0.46	1.36	0.63-2.95	**<0.001**	**4.14**	**1.81-9.12**	**0.01**	**2.31**	**1.20-4.44**	**<0.001**	**4.64**	**2.75-7.82**

The influence of selective loss on positive health ratings in old age (Studies I and III)

The possible influence of selective loss on positive health ratings was examined in two Studies, I and III.

First, two logistic regression analyses were performed among 80–89 year-old people (Table 14). First those who were living in institutions or for whom a proxy interviewee was used were excluded because SRH was not elicited in these cases (Model 1). In the second analysis the sample also included those who were living in the institutions or for whom a proxy informant were used. They were categorized into the "not better" group in the dichotomous variable "better-not better" (Model 2), because their health is likely to be poor and they presumably would also rate it as "worse". Age, sex, occupational class, functional ability, chronic diseases and social participation were used as determinants. The results show that in both models the same determinants, age, functional ability, chronic diseases and social participation, were associated with better comparative SRH. The association of age was weaker in Model 2 but it was still statistically significant. The influence of functional ability was stronger in Model 2. The results suggest that although those who were included in the study were likely to be in better health than those who were excluded this exclusion does not alone explain the increasingly positive SRH in old age.

Table 14. Associations of determinants with good comparative SRH, not better as a reference group. Model 1 includes home-dwelling people who answered themselves. Model 2 includes home-dwelling people who answered themselves, those living in institutions and those with proxy informants.

	Model 1		Model 2	
Determinant	OR	95% CI	OR	95% CI
Age	**1.20**	**1.09-1.32**	**1.11**	**1.01-1.22**
Sex				
Female	1		1	
Male	1.08	0.66-1.78	0.92	0.56-1.55
Occupational class				
Others	1		1	
Non-manual	1.29	0.77-2.17	1.38	0.81-2.35
Functional ability				
Poor	1		1	
Moderate	**2.39**	**1.29-4.42**	**4.78**	**2.63-8.68**
Good	**4.31**	**1.95-9.53**	**9.72**	**4.72-22.29**
Chronic diseases				
2 or more	1		1	
0-1	**2.43**	**1.48-3.97**	**2.45**	**1.58-4.06**
Social participation				
Low	1		1	
Moderate	**2.72**	**1.55-4.78**	**3.03**	**1.72-5.32**
High	**2.68**	**1.38-5.17**	**3.30**	**1.62-6.74**

Two ways were used to examine the possible effect of selection bias among 60–99 year-old people. First, the separate category, "missing", was added to both comparative and global SRH variables, including those 80 people for whom observations were missing – because they were living in institutions, proxy respondents were used, or for other reasons – so that responses to either of the SRH questions were missing. It was possible to include these people because information on age and functional ability was available for them. Second, the "missing" values were included in the category "worse" for comparative SRH, and in the category "poor" for global measure, respectively. The associations of age and functional ability with both SRH measures were then analysed using cross-tabulations and multinomial regression analyses.

Altogether, 74% of those in the "missing" category belonged to the age group 80–99, and 79% of them had poor functional ability. In the unadjusted multinomial regression analyses in which missing values formed a separate category, with worse comparative SRH and poor global SRH as reference groups, age 80–99 was associated with a "missing" category in both comparative (OR 72.52; 95% CI 23.70–221.89) and global (OR 10.46; 95% CI 3.46–31.67) SRH. Adjusted for functional ability, the association of age with both

measures diminished but was still highly significant. Without adjustments, good functional ability was inversely associated with a "missing" category both in comparative SRH (OR 0.02; 95% CI 0.003–0.21) and global SRH (OR 0.11; 95% CI 0.01–0.93), and this result did not markedly change when age was introduced into the model. All the other coefficients were the same as in Table 6.

Next, all the "missing" values were included in the "worse" category in the comparative measure and in the "poor" category in the global measure, and these categories were used as reference groups in the multinomial regression analyses (Table 15). The 80–99 year age group, which in our earlier analyses without missing values was associated with better comparative health, was now inversely associated with it. However, with the introduction of functional ability into the model, the association again became significantly positive. The association of older age with global SRH was of the same magnitude as in the previous analysis without the missing values, both unadjusted and adjusted for functional ability. Our analyses suggest that comparative SRH may be more sensitive than global SRH to selective loss due to poor health status: the results in which "missing" cases were included in the negative response category differed from those without the missing cases, more for comparative than global SRH.

Table 15. Associations of age with comparative and global self-rated health. Results of multinomial regression analyses in which "missing" cases are included in the "worse" category for comparative SRH and in the "poor" category for global SRH. Worse comparative and poor global SRH are reference groups.

	Comparative self-rated health						**Global self-rated health**			
	Better		**About the same**		**Cannot say**		**Good**		**Average**	
Unadjusted	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age										
60-69	1		1		1		1		1	
70-79	**0.58**	**0.38-0.91**	**0.59**	**0.37-0.95**	1.12	0.65-1.93	**0.30**	**0.19-0.46**	**0.47**	**0.31-0.70**
80-99	**0.41**	**0.26-0.64**	**0.12**	**0.06-0.23**	**0.49**	**0.27-0.89**	**0.30**	**0.19-0.46**	**0.24**	**0.14-0.39**
Adjusted for functional ability										
Age										
60-69	1		1		1		1		1	
70-79	1.09	0.64-1.83	0.91	0.54-1.52	1.44	0.84-2.65	0.50	0.30-8.26	0.64	0.40-1.00
80-99	**2.37**	**1.33-4.23**	**0.41**	**0.20-0.82**	1.03	0.52-2.02	**1.78**	**1.01-3.15**	0.75	0.43-1.29
	worse+missing is a reference category						poor+missing is a reference category			

Discussion

The focus of this study was on methodological issues of self-rated health. The number of older people is increasing and people are also living longer. In this situation, there is a growing need for information of the health of older people. The increasing use of self-rated health as a health measure has made it important to be aware of possible differences between different SRH questions, and the consequences these differences may have in the research on the health of older people.

This study examined the differences between two self-rated health measures, a global measure without any explicitly expressed reference group, and a comparative or age-referential measure where respondents are asked to compare their health with that of their age peers. Further, the aim was to examine the relation of age and functional ability with the two SRH measures, the differences in the power to predict subsequent mortality, and cultural differences. Also, the possible effect of selective loss on positive health ratings was examined.

The results show that global and comparative SRH are not entirely comparable and the way the question is elicited influences the way the health is assessed. In old age the logic behind self-ratings of health is influenced by the complex relationship between a person's health status, age, and the reference group used. With the global question, respondents have more freedom to choose their reference points (e.g. the person's own earlier health) whereas the explicit expression of the reference group in comparative question leads respondents to focus more on the health of other people; thus, in addition to a respondent's own health comparative SRH requires respondents to estimate the health of a group of other people. The growing number of positive comparative self-ratings on old age implies that the reference group used, "the health of the age peers", is understood more negatively with increasing age. In addition to age peers known, general stereotypes of old age or the health history of a person's own birth cohort may also be used as a reference. These negative reference points mean that with advancing age, a person's own health can be assessed as "better that that of my age peers" at increasingly higher levels of disability and morbidity.

Determinants of self-rated health

The determinants of better comparative SRH were much the same as the determinants of good global SRH found in earlier studies (Kaplan et al. 1996, Shadbolt et al. 1997, Leinonen et al. 2000). The only exception was the influence of age. Our results confirm earlier findings (Dening et al. 1998) that with increasing age people are likely to rate their health as better than that of their age peers when they grow older; this is particularly true among very old people, 80 years and over. Over half of the 80–99 year-old people rated their health as better than that of their health peers after physical functioning, chronic diseases, and psychosocial factors were controlled for. For global SRH, the results were different: in unadjusted analysis, good global SRH was more likely in younger age groups. Adjusted for functional ability, the age group 80–99 was more likely to have good global SRH, but the likelihood was clearly weaker than that between old age and better comparative SRH. When age, sex, occupational class, functional ability and chronic diseases were controlled for, age was not significant at all.

As in earlier studies (Moum 1992, Johnson and Wolinsky 1993, Lundberg and Manderbacka 1996, Farmer and Ferraro 1997, Benyamini et al. 1999) functional ability was an important factor in both self-ratings of health and in global SRH in particular. It seems that age and functional ability influenced each other in their association with comparative and global SRH: adjustment for functional ability increased the likelihood of better comparative SRH or good global SRH in high age, respectively, and adjustment for age increased the association of good functional ability with positive SRH. This tendency was clear, although the interaction, measured by interaction term, between age group and functional ability was not significant for either SRH measure.

Self-rated health as a predictor of mortality

The ability of self-rated health to predict mortality was also confirmed in this study.

Both SRH measures predicted mortality even after 20 years of follow-up when several social and health indicators were controlled for, but some differences between global and comparative measure were found. The greatest difference between the two SRH measures was connected to age. Without adjustments, worse comparative SRH was not statistically significantly associated with increased mortality risk but after age-adjustment

the risk was statistically significant after 5, 10 and 20 years of follow-up. Poor global SRH was associated with increased mortality risk when unadjusted, and with adjustment for age the association became somewhat stronger. The difference in the crude measures is understandable as the age-referential question itself has an age-adjusting effect: it allows the respondents to judge their health by adjusting the base of comparisons to the overall higher levels of morbidity and disability found among people of their own age. In analyses where the study population has a wide age range this is likely to result in situation where health comparisons are relatively better in the oldest age groups where morbidity and mortality are highest, and consequently, comparative health ratings are not predictive of mortality in the whole sample. The similar effect of health and social indicators on the association of comparative and global SRH with mortality indicates that comparative and global measures cover mostly the same domains of health.

As in some earlier studies (e.g. Benyamini et al. 2000), both SRH measures were better predictors of men's mortality. It has been suggested that men's health ratings reflect mainly serious, life-threatening diseases (e.g. heart disease) whereas women's self-assessments are based on both life-threatening and non-life-threatening diseases (e.g. arthritis). Because both factors lower women's health ratings but only serious diseases are expected to predict mortality, women's SRH will have weaker relationship to mortality than men's SRH.

Cultural differences in self-rated health

This study offered an interesting opportunity to compare self-rated health of older people between two different cultures. St. Petersburg and Tampere are in many ways different social and cultural environments. Russia has faced enormous economic and social problems in recent years after the transition to a market economy. Public health in Russia has deteriorated: mortality rates have risen and life expectancy has been falling. (Carlson 1998) In Finland, it has been possible to live in quite a stable society. There was also a possibility to study self-rated health of older people which has not been studied in Russia before. In addition, the same questionnaire increased the comparability of self-rated health between St. Petersburg and Tampere.

The deteriorated health situation of Russian people was also obvious in this study. The respondents in St. Petersburg had more health problems than their age peers in Tampere. The main finding was that the respondents in Tampere, both men and women, were more likely to make positive health assessments compared to the respondents in St.

Petersburg even after other health indicators, symptoms, chronic diseases and functional ability, were adjusted for. There are several explanations for this finding. One explanation is that there are real differences in morbidity, in the prevalence and seriousness of the diseases, in functional ability and in symptoms which other health measures used were not sensitive enough to cover. SRH reflects these differences.

The difference may also exist in the cognitive process of evaluation, that is, in the way different aspects of "objective" health status are taken into account in choosing the preset alternative answers. In this study, there was a tendency that, at the same level of self-rated health, the respondents in St. Petersburg, particularly women, reported more chronic diseases and more symptoms than the respondents in Tampere. This indicates that, in relation to the number of reported health problems, the response scale was used differently in the two cities, although in relation to the site-specific distribution of health problems the differences may not be large. Earlier research also indicates that, probably depending on cultural conventions in describing normal health (Idler and Benyamini 1997), "normal" or "good" health can be understood differently in different cultures, and they may have different reference levels. Palosuo (2000a) in her study among middle-aged people in Russia and Finland observed that "normal" Russian health tolerated more illness than the "average" Finnish health and having no long-standing illness did not automatically mean that self-rated health would be good in Russia. In this study the "average" category was chosen more often by the Russians than the Finns which is consistent with other studies comparing Russia and Western countries (see Palosuo 2000a.) Further, it may also be a question of cultural modes of speaking. Nancy Ries talks about a "litany of suffering", which refers to a wider collective way of dealing with the transition from a communist system to a capitalist system and which helps Russian people to cope with troubles that perestroika caused to them. (Ries 1997)

There may be some factors which influence health in Russia but are not measured in this study. Some studies have mentioned chronic psychosocial stress caused by the socioeconomic changes after the collapse of communism as a probable cause of the deteriorating health situation in Russia and other East European countries (Palosuo 2000b, Gilmore et al. 2002, Pikhart et al. 2004). Carlson (2004) found that the economic situation had a strong effect on people's self-rated health, and people in countries of the former Soviet Union tend to be worse off than in Western Europe in terms of the economy. Thus, the variables "occupational class" and "site" do not cover those cultural and social factors which are connected to the way how health is assessed (see Bobak et al. 1998, Kopp et al. 2000).

The correlational structure of self-rated health was different between Tampere and St. Petersburg. This finding was not congruent with former cross-cultural studies reporting a similar association of medical indicators with self-rated health in spite of differences in the level of self-rated health (Jylhä et al. 1998, Lee and Shinkai 2003, Bardage et al. 2005). Symptoms were the only health indicator that was associated with global SRH in adjusted analyses in St. Petersburg. In Tampere, chronic diseases, and in women functional ability, were associated with global SRH. This suggests that there are some differences in the elements of health or disease that are important in self-ratings between the cities. In St. Petersburg the attitude to symptoms may be different, and the effect of chronic diseases may be mediated by symptoms which were more frequent in St. Petersburg than in Tampere. When health was assessed with comparative measure, chronic diseases were not associated with SRH either in Tampere or in St. Petersburg, and the association of symptoms was weaker in both cities. This suggests that the health dimensions important for health assessments may vary between different SRH measures.

In Tampere there were no essential gender differences in health ratings or in other health indicators but in St. Petersburg the differences between the genders were obvious. Women in St. Petersburg rated their health clearly poorer than men, especially when the global measure was used, and reported more chronic diseases, symptoms and functional disabilities. It can be assumed that the different distribution of SRH between men and women in Russia reflects the different distribution of diseases and other medical conditions.

The effect of selective loss

In surveys it is usual that the older the age group, the more people are excluded from analyses because of the decision to study only home-dwelling people, or because data is missing due to health reasons or refusal to participate. The possible effect of selective loss on positive health ratings with advancing age was studied in two studies. In a study among 89–89 year old respondents the health of those who were included in the analyses was somewhat better than that of those who were excluded; this did not, however, completely explain the phenomenon of better health ratings in old age.

When the age range of the study group was wider, 60–99 years, the analyses suggest that comparative SRH may be more sensitive than global SRH to selective loss: the results in which “missing” cases were included in the negative response category differed from those without the missing cases, more for comparative than for global SRH. In these analyses was assumed, that all 80 persons with "missing" values would have assessed their

comparative SRH as "worse" and their global SRH as "poor", if they had answered. This is a strong "worse-case" assumption and may be somewhat misleading. Actually, the number of missing values was 80 only in the comparative question; in the global question it was 43. Of the 37 subjects for whom the global assessment was available, 20 answered either "good" or "average" to the global question. This suggests that not all 80 would have answered "worse" in the comparative question. If this is true, our analysis may have exaggerated the effect of the missing cases on the association between age and self-ratings of health, and in particular, resulted in exaggerated attenuation of the association between high age and "better" comparative self-rated health. To ensure that the different number of real missing values did not affect the results, we conducted analyses in which institutionalized people were omitted. The results show that compared to the analyses without missing values the association between age and comparative SRH changed more than the association between age and global SRH. Thus, comparative SRH seems to be more age-sensitive even if institutionalized persons were excluded from the analyses.

Methodological considerations

This study offered a good opportunity to compare two self-rated health measures, global self-rated health without any explicitly expressed reference point and comparative measure offering the health of the age peers as a reference point. Both cross-sectional and longitudinal settings were used to examine the differences between the two measures. Also, the data offered a rare opportunity to examine the differences in self-rated health between two cultures using the same structured questionnaire. However, some methodological considerations must be taken into account.

The SRH questions had different response categories. The option “cannot say “was available for the comparative measure but not for the global measure. In our analysis those who answered “cannot say” did not differ from those who rated their health as “worse” than that of their age peers. This suggests that the understanding “cannot say” answers as an average or a medium-level answer, as sometimes happens, can lead to biased conclusions. On the other hand, the increasing likelihood of “cannot say” answers with advancing age may partly due to the narrowed or missing reference group, and the desire to maintain a positive self-image when health is declining.

Number of chronic diseases and functional ability were used as covariates in all analyses because of the accumulated evidence that in old age chronic diseases have more influence on self-ratings of health than acute illnesses (e.g. Damian et al. 1999) and that

older people tend to evaluate their health through their functional abilities (e.g. Johnson and Wolinsky 1992, Moum 1992). Medical conditions and functional limitations were based on the self-reports of the respondents. They are not medically examined, which may have resulted in incomplete control of confounding. However, good agreement between self-reports and physician diagnosis has been reported (Haapanen et al. 1997). Also, ADL and IADL classification forms a hierarchical Guttman scale which has been found to be reliable (Jylhä et al. 1995). In the survival analysis only the baseline information on SRH was used; possible changes over time were not taken into account.

The sample in TamELSA in 1979 and the new cohort in 1989 were selected using stratification by sex and five-year age cohort. The same number of men and women were selected from each age cohort (1890–94, 1895–99, 1900–04, 1905–09, 1910–14, 1915–19) using systematic sampling in 1979. To ensure a sufficient sample size in the oldest age cohort, 130 men and women were selected from each of the three oldest age cohorts in contrast to 120 men and women from each of the youngest age cohorts. In 1989, a new cohort of 60–69 year olds, also stratified by age and sex, was sampled. Because of the stratified sampling technique the samples deviated by sex and age from the total population of Tampere born 1890–1919 and 1920–1929. The representativeness of the samples by five-year age groups and the effectiveness of the sampling method was examined earlier and statistically significant differences between the sample and population occurred only among men aged 70–74 and 85–89, and among women aged 90–94 years. (Jylhä et al. 1992)

In the cross-cultural study the sampling method was different between St. Petersburg and Tampere. In Tampere the sample was drawn from official statistics, but in St. Petersburg the data was collected by recruiting suitable people from door-to-door, and it was not stratified by age and sex. The age distribution was similar in both sets of data but there were differences in gender distribution. In St. Petersburg there were twice as many women as men, whereas in Tampere the number of men and women was almost equal due to the stratified sampling method. In St. Petersburg the sample structure was based on the population structure, with a 4.2 times higher mortality rate for men than women (Pietilä et al. 2002). In addition to the different sampling method, the time of data collection was different: in Tampere it occurred 11 years before that of St. Petersburg. In Tampere data from 1999 was also available, but the number of subjects was so low that it was not optimal for purposes of comparison. However, some analyses in the Tampere data (not shown) from 1999 showed an increase in self-rated health and decrease in the number of chronic diseases, symptoms and functional ability among 70–99 year-old people compared to the

situation ten years earlier, implying that the difference between the cities persisted, or was even greater.

The strength of the study was the same questionnaire. Nevertheless, although the questions used in this study were asked similarly, one can not be sure that the questions are understood similarly: the differences in self-rated health between Tampere and St. Petersburg can partly also be explained by linguistic factors. It is difficult to translate evaluative questions so that the meanings are identical in different languages. In addition, it can not be excluded that the translation process influenced the formulation of the questions and, thus, changed their meaning. Also, the way different health conditions are reported may vary across countries (see Börsch-Supan et al. 2005).

Conclusions

Self-rated health is a widely used health measure in studies on ageing. It has been used both in population-based studies and also as a measure in clinical examinations. In this study, differences were found between global and comparative self-rated health. Both measures are comprehensive summary measures of health but the comparative measure is more sensitive to age and selective loss. Age-sensitiveness has implications for the usability of comparative SRH in research, and also as a measure in clinical settings. In studies with a wide age range global SRH may be a more valid measure for general health status and a better predictor of future health outcomes. In clinical examinations where a general estimate of the health status of an older person is needed, the global measure should be preferred. Cultural differences in self-rated health imply that the health of older people in different countries cannot be compared on the basis of self-ratings only.

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Appendix

Appendix. Studies reporting association between self-rated health and mortality. Adapted partly from Idler and Benyamini in 1997 and Benyamin and Idler 1999.

Study	Sample	SRH question	Other health variables	Other covariates	Adjusted OR/RR compared to best	95% CI
Mossey and Shapiro 1982	N=3128	For your age, in general,	Manitoba Health	Sociodemographics	**1971-1973**	
Manitoba Longitudinal	Ages 65+	would you say your health is:	Services data:	Life satisfaction	Poor 2.9	1.8-4.7
Study on Aging	1971-1977	excellent, good, fair, poor, bad	ICDA-8 diagnoses		Fair 2.0	1.5-2.8
Canada	72% survived		physician visits		Good 2.8	1.2-2.8
			hospitalization		**1974-1977**	
			Self-reported conditions		Poor 2.8	1.9-3.9
					Fair 2.0	1.2-3.2
					Good 1.4	1.2-1.6
Kaplan and Kamacho 1983	N=6928	All in all, would you say your	Self-reports of	Sociodemographics	Poor 3.9	1.8-2.1
	Ages 16-94	health is: excellent,good,fair,poor	functional ability	Health practices		
Alameda County	1965-1974		chronic conditions	Social networks		
California	89,7% survived		symptoms	Psychological		
			energy level	functioning		
Jagger and Clarke 1988	N=1203	Do you think your health is good,	Self-reports of	Sociodemographics	Poor 2.1	1.5-3.0
Leicester, England	Ages 75+	fair,poor, for your age	physical disability		Fair 1.3	1.0-1.7
	1981-1985		incontinence			
	67,8% survived		cognitive function			
			prescribed medication			
Idler et al. 1990	**Connecticut**	**Connecticut:**	Self-reports of:	Sociodemographics	**Connecticut**	
New Haven, Connecticut	N=2812	How would you rate your health	chronic conditions	Health practices	**Males**	
Iowa County, Iowa	Ages 65+	at present	functional disability		Poor 5.3	1.9-14.7
		time:excellent,good,fair,				
	1982-1986	poor,bad	pain symptoms		Fair 3.2	1.4-7.2
	77,8%survived		interviewer-measured		Good 2.5	1.1-5.8

Appendix cont.

Study	Sample	SRH question	Other health variables	Other covariates	Adjusted OR/RR compared to best	95% CI
	Iowa N=3097 Ages 65+ 1982-1986 85,9% survived	**Iowa:** Compared to other people your age would you say your health is:excellent,good,fair,poor,very poor	blood pressure interviewer-observed prescribed medication		**Female** Poor 3.0 Fair 2.6 Good 2.3 **Iowa** **Males** Poor 4.8 Fair 2.3 **Female** Poor 3.2	 1.3-6.9 1.3-5.4 1.1-4.6 2.2-10.6 1.3-4.0 1.5-6.7
Ho 1991 Hong Kong	N=1054 Ages 70+ 1985-1987 91,5% survived	How is your health compared with other your age: better, same worse	Self-reports of: symptoms in last to weeks chronic conditions in last two years functional disability interviewer-measured height, weight, blood pressure	Sociodemographics Health practices Social networks Social support Bradburn Affect Balance Scale	Worse 2.0	1.3-3.3
Rakowski et al. 1993 LSOA, USA	N=5630 Ages 70+ 1984-1990 72% survived	Would you say your health general is: excellent, very good, good, fair, poor	Self-reports of: functional ability chronic conditions weight, height	Sociodemographics Social support activity compared to age peers	Poor 1.8 Fair 1.5	1.3-2.4 1.2-1.9
Appels et al. 1996 Kaunas, Lithuania Rotterdam, Netherlands	**Kaunas** N=2452 **Rotterdam** N=3365 Ages 45-60, males	What do you think of your own health conditions compared to that of other men of your age?	Physician observation of: CHD blood pressure cholesterol glucose tolerans weight, height	Sociodemographics Health practices	**Kaunas** Poor 1.6 **Rotterdam** Poor 1.6	 1.0-2.6 1.2-2.1

Appendix cont.

Study	Sample	SRH question	Other health variables	Other covariates	Adjusted OR/RR compared to best	95% CI
	1972-1982 Survived Kaunas 83% Rotterdam 90%					
Kaplan et al. 1996 KIHD, Finland	N=2512 Ages 42-60, males 1984-1991 93,9% survived	How do you rate your current health?Extremely good,good, average, bad, extremely bad	Diagnoses, medication, exercise test,body mass index, systolic blood pressure, HDL and LDL cholesterol, atherosclerosis	Age, income Health practices	Bad 1.69	1.01-2.82
Leung et al. 1997 Taipei, Taiwan	N=411 (institutionalized) 65+ 1992-1995 79,5% survived	**SRH-1**:How would you rate your present health status in general: good, average, fair,or poor? **SRH-2**: How would you rate your present health status compared with others of your age: better, similar, worse,or worst? **SRH-3**: Have you had any discomforts in the past month: none, slight, moderate,severe?	Chronic diseases ADL/IADL difficulties Urinary function Vision Medication used Cognitive function Falls	Sociodemographics Institution	**SRH-1** Average 4.05 Fair/Poor 6.00 **SRH-2** Similar 2.40 Worse/worst 2.75 **SRH-3** Slight 1.05 Moderate/severe 2.54	 0.93-17.70 1.39-25.90 0.64-8.96 0.64-11.83 0.32-3.41 0.65-9.80
Fried et al. 1998 The Cardiovascular Health Study, USA	N=5201 Ages 65+ 1989-1994 87,6% survived	(exact wording n.a.) Excellent, very good, good, fair, poor	Self-reported diagnoses Medical records Physical examination Direct measures of clinical and subclinical disease Medication use Weight IADL activity Cognitive function	Sociodemographics Income Health practices	Poor 1.91	1.27-2.87

Appendix cont.

Study	Sample	SRH question	Other health variables	Other covariates	Adjusted OR/RR compared to best	95% CI
Jylhä et al. 1998 ELSA Tampere, Finland Florence, Italy	**Tampere** N=1.059 1979-1986 57% survived **Florence** N=864 1980-1987 54% survived Ages 60-89	How would you evaluate your present health?Is is very good, fairly good, average, fairly poor, or poor?	Self-reports of: diagnosed chronic diseases functional ability experienced symptoms problems with hearing problems with vision prescribed drugs	Sociodemographics	**Tampere** Fairly good 1.04 Average 1.18 Fairly poor 1.32 Poor 1.63 **Florence** Fairly good 1.14 Average 1.32 Fairly poor 1.52 Poor 3.03	 0.66-1.62 0.75-1.89 0.79-2.21 0.93-2.87 0.74-1.74 0.83-2.66 0.87-2.66 1.48-1.84
Heidrich et al. 2002 MONICA Augsburg Cohort Study Germany	N=3019 Ages 35-64 1984-1995 91,5 survived	**Global SRH**:How would you assess your current health condition:excellent,good, fair, poor? **Comparative SRH:** How would you assess your health compared to others your age - better, same, worse,don't know?	Diagnoses Hypertension Serum total cholesterol HDL-C cholesterol Body mass index	Sociodemographics Health practices	**Global SRH** *Male* Fair/Poor 1.5 *Female* Fair/Poor 1.1 **Comparative SRH** *Male* Worse 1.7 *Female* Worse1.9	 1.1-2.2 0.7-1.9 1.0-2.9 1.0-3.7
Mackenbach et al. 2002 GLOBE Netherlands	N=5667 Ages 15-74 1991-1998	How is your health in general? Very good, good, fair. sometimes good and sometimes poor, or poor	Self-reported chronic conditions Number of symptoms	Sociodemographics Behavioural risk factors Social support Psychosocial stressors Measures of personality	Good 1.18 Fair 2.13 Sometimes poor 2.58 Poor 3.98	0.67-2.09 1.15-3.96 1.30-5.14 1.65-9.61

Appendix cont.

Study	Sample	SRH question	Other health variables	Other covariates	Adjusted OR/RR compared to best	95% CI
				Coping styles		
Manderbacka et al. 2003	N=432	**Global SRH:** How do you describe		Age	**Global SRH**	
SweOld	Ages 77-98	your general state of health? Is it			*Men*	
Sweden	1992-1996	good, poor or something in between?			In between 1.28	0.74-2.21
	61,4% survived	**Comparative SRH:**How do you			Poor 1.07	0.50-2.28
		describe your general state of health			*Women*	
		compared to people of your own age?			In between 1.64	1.00-2.70
		Is it better, worse or about the same?			Poor 2.42	1.17-5.01
					Comparative SRH	
					Men	
					About the same 1.99	1.20-3.30
					Worse 4.03	1.86-8.71
					Women	
					About the same 1.42	0.88-2.30
					Worse 2.02	0.92-4.44
Baron-Epel et al. 2004	N=1138	**GSH:**In general, would you say that	Chronic diseases	Sociodemographics	**GSH**	
Israel	Ages 70+	the state of your health is excellent,		SES	Men 1.47	1.20-1.79
	1994-2001	very good, good, not so good, poor,		Religiosity	Women 1.23	0.97-1.56
	67% survived	very poor?			**ARSH**	
		ARSH:Compared with other people			Men 1.32	1.12-1.56
		your age, would you say your state			Women 1.14	0.91-1.43
		of health is excellent,very good, good,				
		not so good, poor, very poor?				
Han et al. 2005	N=905	At present time, would you say that	Self-reported	Sociodemographics	**Baseline SRH**	
WHAS, USA	Women aged 65+	your health is excellent, very good,	diseases and	Annual household	1.12	0.98-1.28
	1992-1995	good, fair, or poor?	IADL difficulties	income	**The most recent SRH**	
	70% survived	Baseline interview and reassessed	Walking difficulty	Years of smoking	1.24	1.09-1.41
		every 6 months for 3 years	Cognitive function		**Decline in SRH**	
			Depressive symptoms		1.32	1.16-1.51

Appendix cont.

Study	Sample	SRH question	Other health variables	Other covariates	Adjusted OR/RR compared to best	95% CI
Murata et al. 2006	N=2490	In general, how would you rate your	Diagnosed illnesses	Age	**Men**	
Japan	Ages 65+	health: good, average, fair or poor?	ADL impairment		Average 1.21	ns.
	1992-1999				Fair 2.12	p<0.01
	76% survived				Poor 1.26	ns.
					Women	
					Average 1.49	ns.
					Fair 2.00	p<0.05
					Poor 2.88	p<0.01
Jylhä et al. 2006	N=4065	**New Haven:** How would you rate	Serum albumin concentration	Sociodemographics	Good 1.02	ns.
EPESE, USA	Ages 65+	your health at present time? Excellent,	White blood cell count	Smoking	Fair 1.51	1.20-1.19
	1987-1992 New Haven	good, fair, poor, or bad?	Hemoglobin		Poor 1.80	1.35-2.41
	1987-1993 East Boston and Iowa communities	**East Boston**:As compared to with other people your same age, would you say your health is excellent, good,fair or poor?	HDL-C concentration			
			Creatinine concentration			
	73,3% survived		Blood pressure			
			Cardiovascular disease			
		Iowa:As compared with other people your same age, would you say that your health is exellent, good, fair,poor or very poor?	Stroke			
			Diabetes			
			Cancer			
			ADL disability			

Original Publications

Artikkeli

Hyvin vanhojen vertailevat terveysarviot ja niiden selittäjät

Tutkimuksen tarkoituksena oli löytää selittäviä tekijöitä sille, että ihmisillä on taipumus vanhetessaan arvioida oma terveytensä muiden samanikäisten terveyttä paremmaksi. Tutkimus on osa TamELSA-projektia, ja se kohdistui 80–89-vuotiaisiin. Tutkimus osoitti iän olevan tärkeä positiivisten terveysarvioiden selittäjä; todennäköisyys pitää omaa terveyttä ikätovereiden terveyttä parempana kasvoi jokaista ikävuotta kohden. Muita itsenäisiä selittäjiä olivat hyvä ja keskinkertainen toimintakyky, pieni haittaavien sairauksien lukumäärä, aktiivinen sosiaalinen osallistuminen ja tyytyväisyys elämään. Ne, jotka antoivat ei osaa sanoa – vastauksen, eivät selittäjien osalta eronneet niistä, jotka pitivät terveyttään ikätovereita huonompana. Vanhemmissa ikäryhmissä valikoitumisen huomioon ottaminen ei olennaisesti muuttanut tulosta. Tulokset tukevat teoriaa terveydelle asetettavien vaatimusten laskusta vanhetessa ja ajatusta siitä, että terveyden pitäminen ainakin ikätovereiden tasoisena on tärkeää iäkkään ihmisen käsitykselle itsestään.

MERJA JUNTTILA, TOMI LINTONEN, MARJA JYLHÄ

TUTKIMUKSEN TAUSTAA

Koettu terveys on osoittautunut sekä luotettavaksi että herkäksi yleisen terveydentilan mittariksi. Sen on todettu ennustavan kuolleisuutta (mm. Mossey ja Shapiro 1982, Kaplan ja Camacho 1983, Idler ym. 1990) ja toimintakykyisyyttä (mm. Kaplan ym. 1993). Se on keskeinen elämänlaadun indikaattori ja se myös ohjaa olennaisella tavalla iäkkäiden terveyskäyttäytymistä ja hakeutumista terveydenhuollon palvelujen piiriin (mm. Ewashwick ym. 1984, Dening ym. 1998).

Tärkeimpiä oman terveydentilan arvioon yhteydessä olevia tekijöitä ovat lääketieteellisesti mitattu terveydentila ja toimintakyky (mm. Maddox 1962, Maddox ja Douglas 1973, LaRue ym. 1979, Johnson ja Wolinsky 1993, Benyamini ym. 1999). Ikääntyneillä oman terveydentilan arvioihin vaikuttavat lähinnä krooniset ja vakavat sairaudet; akuuteilla ja vähemmän vakavilla ei näyttäisi olevan yhtä paljon merkitystä. Muita koettuun terveyteen yhteydessä olevia tekijöitä ovat mm. psyykkiset tekijät kuten masennus ja huoli omasta terveydentilasta ja siinä tapahtuvat vaihtelut sekä sukupuoli, ikä ja sosioekonominen asema (Benyamini ym. 1999, Jylhä 1985, Ferraro 1980). Kaikissa tutkimuksissa (mm. Moum 1992) sosioekonomisilla tekijöillä ei kuitenkaan ole todettu olevan yhteyttä koettuun terveyteen

Useissa tutkimuksissa (mm. Jylhä 1985, Dening 1998 ym.) on huomattu, että vaikka sairaudet ja toiminnanvajavuudet lisääntyvät iän myötä, omat arviot terveydestä eivät heikkene samassa määrin. Tätä on selitetty sosiaalipsykologisista teorioista käsin. Arvioidessaan omaa tilannettaan ihmiset implisiittisesti vertailevat omaa tilannettaan muihin jossain suhteessa samankaltaisiin henkilöihin, esimerkiksi muihin samanikäisiin. Stressiä aiheuttavissa tilanteissa, kuten sairastuessa, ihmisillä on taipumus verrata tilannettaan sellaisiin, joiden tilanne on vielä huonompi (Appels ym. 1998) Terveyden heiketessä positii-

Kiitokset

Tutkimusta ovat tukeneet Pirkanmaan sairaanhoitopiirin tutkimusrahasto, Juho Vainion Säätiö ja Yrjö Jahnssonin Säätiö.

vinen vertailu antaa mahdollisuuden nähdä oma tilanne valoisana ja näin säilyttää myönteinen käsitys itsestään. Sosiaalinen vertailu on siis kognitiivinen prosessi, joka voi auttaa positiivisen minäkuvan säilyttämisessä. Lars Tornstam (1973) taas puhuu aspiraatio- eli vaatimustasosta ikääntymisen ja koetun terveyden suhdetta koskevissa tutkimuksissaan. Hänen mukaansa omalle terveydelle asetetun vaatimustason laskeminen mahdollistaa terveyden kokemisen tyydyttäväksi, vaikka se olisikin huonompi kuin aikaisemmin.

Kun ikääntyneitä ihmisiä on suoraan pyydetty vertaamaan terveyttään muiden samanikäisten terveyteen, on usein huomattu, että nämä vertailut ovat sitä parempia, mitä vanhemmasta ikäryhmästä on kyse (mm. Jylhä 1985, Dening ym. 1998). Yli 75-vuotiaisiin englantilaisiin kohdistuneessa tutkimuksessaan Dening ym. (1998) havaitsivat, että kuuden vuoden seuranta-aikana fyysiset ja depressiivisyyttä kuvaavat oireet lisääntyivät, mutta suhteessa oireisiin terveysvertailut paranivat. Tärkeä muutos vertailevassa terveysarviossa oli, että monet terveyttään aikaisemmin keskinkertaisena pitäneet pitivät sitä kuuden vuoden jälkeen hyvänä tai erittäin hyvänä muihin samanikäisiin verrattuna. Iäkkäämmät pitivät useammin kuin nuoremmat terveyttään muiden samanikäisten terveyttä parempana. Terveyden arvioiminen ikätovereiden terveyttä huonommaksi oli yhteydessä lisääntyneeseen palvelujen tarpeeseen.

Appels ym. (1989) huomasivat 10-vuotisessa Kaunas-Rotterdam-seurantatutkimuksessa, että negatiivinen vertaileva terveysarvio oli merkitsevästi yhteydessä kohonneeseen kuolleisuusriskiin sekä hollantilaisilla (RR 5.21; 95 % CI 2.07–13.1) että liettualaisilla (RR 1.75; 95 % CI 1.18–2.59) 45–60-vuotiailla miehillä sen jälkeen, kun Coxin suhteellisen riskin mallissa oli kontrolloitu ikä, sydän- ja verisuonitaudit ja niiden riskitekijät, vanhempien elinaika, sosioekonominen asema ja siviilisääty.

Manderbackan ja Lundbergin (1996) 77–98-vuotiaiden koettua terveyttä koskeneessa tutkimuksessa puolet vastaajista piti terveydentilaansa muiden samanikäisten terveyttä parempana ja vain joka kymmenes huonompana. Ikävakioinnin jälkeen merkittävimmäksi vertailevia terveysarvioita selittäväksi tekijäksi miehillä nousi toimintakyky. Naisilla tilanne oli monimuotoisempi. Heillä psyykkiset ongelmat, verenkiertohäiriöt ja muut sairaudet olivat tärkeässä asemassa vertailuja tehtäessä. Smith ym. (1994) huomasivat 45–55-vuotiaiden australialaisten naisten terveysvertailuja koskeneessa tutkimuksessaan, että terveyden pitäminen muiden samanikäisten terveyttä huonompana oli yhteydessä lähinnä fyysisiin sairauden kokemuksiin, kun taas terveyden paremmaksi kokeminen oli yhteydessä sairauksien puuttumisen lisäksi myös sosioekonomisiin tekijöihin ja minäkuvaan.

Hyvin vanhojen terveysvertailuja koskevissa tutkimuksissa ei juurikaan ole pohdittu kadon vaikutusta tuloksiin. On todennäköistä, että vanhempiin ikäryhmiin siirryttäessä kato kasvaa ja tutkittavat otokset ovat valikoituneempia kuin nuoremmissa ikäryhmissä. On myös todennäköistä, että tutkimuksesta pois jääneet ovat sairaampia kuin tutkimukseen osallistuneet. Tämä valikoituminen saattaa osaltaan selittää positiivisten terveysarvioiden yleisyyttä vanhimmissa ikäryhmissä.

TUTKIMUKSEN TARKOITUS

Terveysvertailuja on tutkittu vähemmän kuin yleistä koettua terveyttä, ja niihin yhteydessä olevia tekijöitä tunnetaan vielä huonosti. Vertailut ovat kiinnostavia muun muassa siksi, että niissä tulee epäsuorasti esiin myös yksilön käsitys oman ikäryhmänsä yleisestä tilanteesta. Koska vertailut näyttävät paranevan iän lisääntyessä, on tärkeää tutkia myös hyvin vanhoja. Tämä tutkimus koskee 80–89-vuotiaiden vertailevia terveysarvioita ja niiden selittäjiä. Pyrimme selvittämään myös tutkimusjoukon valikoitumisen vaikutusta tuloksiin.

Tutkimuskysymykset ovat:

Millaisena 80–89-vuotiaat pitävät terveyttään verrattuna muiden samanikäisten terveyteen?

Mitkä terveyttä kuvaavat ja sosiodemografiset tekijät ovat yhteydessä siihen, että oma terveys arvioidaan muiden samanikäisten terveyttä paremmaksi; ja erityisesti, onko iällä yhteyttä siihen, että oma terveys arvioidaan ikätovereiden terveyttä paremmaksi?

Missä määrin positiivisten terveysvertailujen yleisyys vanhoilla johtuu tutkimusjoukon valikoitumisesta?

TUTKIMUSAINEISTO JA MENETELMÄT

Tutkimus on osa "Tampereen eläkeikäisten seurantatutkimus"-projektia (The Longitudinal Study of Aging, TamELSA). Tutkimusasetelmia

sekä tutkimuksen aineistoja ja menetelmiä on kuvattu tarkemmin toisaalla (Jokela ja Jylhä 1993). Tutkimuksen ensimmäisessä vaiheessa vuonna 1979 haastateltiin 1059 systemaattisella satunnaisotannalla poimittua 60–89-vuotiasta henkilöä (vuosina 1890–1919 syntyneet). Otosta poimittaessa perusjoukko ositettiin kuuteen viisivuotisikäryhmään (1890–94, 1895–99, 1900–04, 1905–09, 1910–14 ja 1915–1919 syntyneet) miehet ja naiset erikseen. Vuonna 1989 haastateltiin tästä joukosta elossa olevat 435 henkilöä, jotka nyt olivat 70–99 vuotiaita. Tämän lisäksi poimittiin otokset vuosina 1920–24 ja 1925–29 syntyneistä tamperelaisista miehistä ja naisista, joista haastateltiin 395 henkilöä. Yhteensä vuonna 1989 haastateltiin 830 henkilöä. (Jokela ja Jylhä 1993.)

Tämä tutkimus kohdistuu 80–89-vuotiaisiin. Tutkimusjoukon kasvattamista varten mukaan otettiin 80–89-vuotiaina haastatellut henkilöt kummaltakin tutkimusvuodelta, vuosilta 1979 ja 1989. Vuonna 1979 otoksessa oli 80–89-vuotiaita 407, joista haastateltiin 322; vastausprosentiksi muodostui 79. Vuonna 1989 otokseen kuului 182 80–89-vuotiasta henkilöä, joista haastateltiin 152; vastausprosentiksi muodostui 83. Yhteensä haastateltiin 472 henkilöä. Koska vertailevaa terveysarviota ei kysytty sijaishaastateltavilta ja laitoksessa olevilta, muodostui tämän tutkimuksen otoskooksi 367 henkilöä. Tästä joukosta 11 eli 3 % ei vastannut vertailevaa terveysarviota koskevaan kysymykseen. Lopullisesta tutkimusjoukosta 242 (68 %) haastateltiin vuonna 1979 ja 114 (32 %) vuonna 1989.

Vertailevia terveysarvioita tutkittiin tiedustelemalla, millainen on tutkittavien oma terveys verrattuna toisten samanikäisten terveyteen asteikolla parempi, suunnilleen samanlainen, huonompi, ei osaa sanoa. Iän yhteyttä tutkittiin sekä jakamalla haastateltavat kahteen ikäryhmään, 80–84-vuotiaisiin (65 %) ja 85–89-vuotiaisiin (35 %) että sisällyttämällä ikä monimuuttuja-analyyseihin jatkuvana muuttujana. Ammattiaseman mukaan haastateltavat jaettiin neljään ryhmään, toimihenkilöihin (32 %), työntekijöihin (45 %), maanviljelijöihin (12 %) ja perheenemäntiin (11 %). Monimuuttujamalleja varten ammattiasema luokiteltiin dikotomiseksi muuttujaksi, toimihenkilöihin ja muihin.

Toimintakykyä tutkittiin kahdentoista kysymyksen sarjalla, jotka koskettelivat päivittäisiä perustoimintoja (physical activities of daily living, PADL) tai asioiden hoitamista (instrumental activities of daily living, IADL). Ellei henkilöllä ollut vaikeuksia yhdessäkään toiminnassa toimintakyky katsottiin hyväksi (19 % vastaajista). Jos vaikeuksia oli yhdessä tai useammassa IADL-toiminnassa mutta ei yhdessäkään PADL-toiminnassa, toimintakyky katsottiin keskinkertaiseksi (41 % vastaajista). Toimintakyky katsottiin huonoksi (40 % vastaajista), jos vaikeuksia oli yhdessäkin PADL-toiminnassa.

Haastateltavilta kysyttiin, mitä päivittäisiä toimintoja haittaavia lääkärin diagnosoimia sairauksia heillä oli. Sairaudet jaoteltiin sydän- ja verenkiertoelinten, tuki- ja liikuntaelinten-, hermoston, sisäeritysjärjestelmän, ruoansulatuselimistön, hengityselinten, virtsaelinten ja ihon sairauksiin, infektiotauteihin, syöpiin sekä tarkemmin määrittelemättömiin tiloihin. Haittaavista sairauksista muodostettiin kaksiluokkainen muuttuja sen mukaan, kuinka monta haittaavaa sairautta tutkittavilla oli. Näin ensimmäisen luokan muodostivat ne, joilla oli enintään yksi haittaava sairaus (46 %) ja toisen luokan ne, joilla oli kaksi tai sitä useampia haittaavia sairauksia (54 %).

Sosiaalista osallistumista tutkittiin kahdeksan kysymyksen sarjalla. Haastatelluilta kysyttiin, kuinka monta kertaa he olivat 12 viime kuukauden aikana osallistuneet seuraaviin tilaisuuksiin: a) perhetapahtumat kuten häät, hautajaiset, syntymäpäiväjuhlat, b) teatteri, elokuvat, konsertit, taidenäyttelyt, c) erilaiset järjestöjen järjestämät toiminnot, d) kirjasto, e) urheilukilpailut, joko katsojana tai osallistujana, f) uskonnolliset tilaisuudet, g) matkat kotimaassa, ainakin 100 kilometriä, ja h) matkat ulkomailla. Osallistumiskertojen mukaan muodostettiin summamuuttuja. Perhetapahtumiin piti osallistua useammin kuin yhden kerran saadakseen yhden pisteen, muihin riitti yksi osallistumiskerta. Maksimipistemäärä oli 7 pistettä. Vähän osallistuviksi katsottiin 0–1 pistettä saaneet (53 %), melko aktiivisesti osallistuviksi 2–3 pistettä saaneet (28 %) ja erittäin aktiivisesti osallistuviksi 4 tai sitä useampia pisteitä saaneet (19 %).

Elämään tyytyväisyyttä koskevan kysymyksen vastausvaihtoehdot olivat hyvin tyytyväinen, tyytyväinen, joten kuten tyytyväinen, tyytymätön, hyvin tyytymätön ja en osaa sanoa. Monimuuttuja-analyysiin muodostettiin kaksiluokkainen muuttuja, ensimmäisenä luokkana hyvin tyytyväiset ja tyytyväiset (73 %), toisena luokkana kaikki muut (27 %). Liikunnan harrastamista tiedusteltiin kaksiluokkaisen muuttujan avulla,

vastausvaihtoehtoina olivat kyllä (44 %) tai ei (56 %).

Terveysvertailujen ja selittävien tekijöiden suhdetta tutkittiin ensin ristiintaulukoinnilla ja jakaumien erojen merkitsevyyttä testattiin $\chi 2$-testillä. Logistista regressioanalyysia varten selitettävästä muuttujasta muodostettiin kaksiluokkainen muuttuja, jossa toiseen luokkaan kuuluivat henkilöt, jotka pitävät terveyttään muita samanikäisiä parempana ja toiseen luokkaan terveyttään samanlaisena ja huonompana pitävät sekä ei osaa sanoa -luokkaan kuuluneet. Logistisella regressioanalyysilla tutkittiin erikseen kunkin yksittäisen selittäjän ikävakioitua yhteyttä terveysvertailuihin. Seuraavaksi muodostettiin monimuuttujamalli, jossa kaikki selittävät tekijät olivat mukana. Kaikissa malleissa oli mukana haastatteluvuosi, mutta se ei ollut missään analyysissa merkitsevästi yhteydessä terveysvertailuihin. Koska iän oletettiin aikaisempien tutkimusten perusteella olevan merkityksellinen positiivisten terveysvertailujen selittäjä, oli ikä mukana kaikissa analyyseissa jatkuvana muuttujana.

Tämän jälkeen tehtiin multinominaalinen regressioanalyysi sen selvittämiseksi, miten selitettävän muuttujan eri luokat, (parempi, suunnilleen samanlainen, huonompi, ei osaa sanoa), erosivat toisistaan niihin yhteydessä olevien tekijöiden suhteen. Lopuksi tehtiin vielä kaksi logistista regressioanalyysia valikoitumisen vaikutuksen tutkimiseksi. Toisessa analyysissa olivat mukana kotona asuvat itse vastanneet, siis se ryhmä, jolta vertailevaa terveysarviota oli kysytty. Toiseen analyysiin otettiin mukaan myös laitoksessa olevat ja sijaishaastatellut, ja heidät sijoitettiin vertailevaa terveysarviota kuvaavassa dikotomisessa muuttujassa parempi -ei-parempi luokkaan ei-parempi. Selittävinä tekijöinä käytettiin sellaisia mittareita, joita oli kysytty myös laitoksessa olevilta ja sijaishaastatelluilta: ikää, sukupuolta, ammattiasemaa, toimintakykyä, haittaavien sairauksien lukumäärää ja sosiaalista osallistumista. Myös näissä malleissa oli haastatteluvuosi vakioituna.

TULOKSET

Vertailevan terveysvertailun jakaumat esitetään taulukossa 1. Vastanneista 54 % piti terveyttään parempana, 18 % suunnilleen samanlaisena ja 7 % huonompana kuin muilla samanikäisillä. 21 % ei osannut sanoa. Ikäryhmittäin katsottuna 80–84-vuotiaissa terveyttään parempana piti 51 %, suunnilleen samanlaisena 20 %, huonompana 9 %, 20 % ei osannut sanoa. 85–89-vuotiaissa terveyttään parempana piti 61 %, suunnilleen samanlaisena 12 %, huonompana 4 %, 23 % ei osannut sanoa ($p = 0.058$).

POSITIIVISTEN TERVEYSVERTAILUJEN SELITTÄJÄT

Ristiintaulukoinnin mukaan terveysvertailuihin olivat merkitsevästi yhteydessä ammattiasema ($p < 0.05$), toimintakyky ($p < 0.001$), sosiaalinen osallistuminen ($p < 0.001$), haittaavien sairauksien lukumäärä ($p < 0.001$), tyytyväisyys elämään ($p < 0.001$) ja liikunnan harrastaminen ($p < 0.001$). Taulukossa 2 näkyvät sekä yhden selittäjän logistisen regressioanalyysin tulokset että tulokset analyysista, jossa mukana olivat kaikki selittäjät. Positiivisiin terveysvertailuihin yksittäin yhteydessä olivat korkeampi ikä, ja ikävakioituina ammattiasema, hyvä ja keskinkertainen toimintakyky, vähäinen haittaavien sairauksien lukumäärä, aktiivinen sosiaalinen osallistuminen, tyytyväisyys elämään ja liikunnan harrastaminen.

Monen selittäjän mallissa ikä osoittautui merkitseväksi positiivisia terveysarvioita selittäväksi tekijäksi: todennäköisyys pitää terveyttään muiden samanikäisten terveyttä parempana kasvoi jokaista ikävuotta kohden. Hyvä ja keskinkertainen toimintakyky, enintään yksi haittaava sairaus ja tyytyväisyys elämään olivat yhteydessä

Taulukko 1.
Vertailevan terveysarvion jakauma kaikkien vastanneiden kesken sekä ikäryhmittäin.

Terveys verrattuna samanikäisten terveyteen	80–84-vuotiaat		85–89-vuotiaat		Kaikki	
	N	%	N	%	N	%
Parempi	128	51	63	61	191	54
Suunnilleen samanlainen	51	20	12	12	63	18
Huonompi	23	9	4	4	27	7
Ei osaa sanoa	51	20	24	23	75	21
Kaikki	253	100	103	100	356	100

Taulukko 2.
Tutkittavia kuvaavien muuttujien jakauma sekä logistiset regressiomallit, jotka kuvaavat eri tekijöiden yhteyttä positiivisiin terveysarvioihin. Yhden selittäjän mallissa on ensin iän vaarasuhde haastatteluvuosi vakioituna, ja sen jälkeen muiden selittäjien vaarasuhteet yksi kerrallaan, vakioituina iän ja haastatteluvuoden mukaan Monen selittäjän mallissa kaikki selittäjät ovat mukana yhtä aikaa sekä lisäksi ikä ja haastatteluvuosi.

	Kuvaajien jakauma	Yhden selittäjän malli		Monen selittäjän malli	
Kuvaaja	%	OR	95% CI	OR	95% CI
Ikä		1.11	1.02–1.20	1.19	1.08–1.31
Sukupuoli					
Nainen	55	1		1	
Mies	45	1.45	0.45–2.28	1.1	0.60–1.69
Ammattiasema					
Muut	68	1		1	
Toimihenkilöt	32	1.63	1.04–2.55	1.39	0.81–2.36
Toimintakyky					
Huono	40	1		1	
Keskinkertainen	41	2.72	1.50–4.92	2.1	1.11–3.98
Hyvä	19	9.85	4.88–19.89	3.86	1.66–9.00
Haittaavat sairaudet					
2 tai enemmän	44	1		1	
0–1	56	3.76	2.46–5.75	2.48	1.50–4.10
Sosiaalinen osallistuminen					
Vähäinen	53	1		1	
Melko aktiivinen	28	4.29	2.59–7.09	3.11	1.75–5.51
Erittäin aktiivinen	19	5.04	4.64–16.28	3.16	1.54–6.48
Tyytyväisyys elämään					
Ei-tyytyväinen	27	1		1	
Tyytyväinen	73	3.85	2.24–6.61	2.42	1.29–4.53
Liikunnan harrastaminen					
Ei	56	1		1	
Kyllä	44	3.85	2.24–6.61	1.36	0.82–2.24

positiivisiin terveysvertailuihin, samoin erittäin aktiivinen ja melko aktiivinen sosiaalinen osallistuminen. Sen sijaan sukupuoli, ammattiasema tai liikunnan harrastaminen eivät muiden selittäjien vakioimisen jälkeen olleet yhteydessä positiivisiin terveysvertailuihin

VERTAILEVAN TERVEYSARVION ERI LUOKKIEN VÄLISTEN EROJEN SELITTÄJÄT

Seuraavaksi tehtiin multinominaalinen regressioanalyysi sen tutkimiseksi, kuinka muihin terveysarvion luokkiin kuuluvat erosivat niistä, jotka pitivät terveyttään ikätovereiden terveyttä huonompana. Tämän analyysin tarkoituksena oli myös selvittää sitä, miten melko suureen ei osaa sanoa-ryhmään kuuluvat erosivat muista. Analyysin tulokset esitetään taulukossa 3.

Terveyttään ikätovereiden terveyttä parempana pitävien ja sitä huonompana pitävien eroa selittivät toimintakyky, sosiaalinen osallistuminen sekä haittaavien sairauksien määrä. Ikä oli erittäin tärkeä selittäjä; todennäköisyys pitää omaa terveyttään ikätovereiden terveyttä parempana kasvoi merkitsevästi jokaista ikävuotta kohden (OR 1.39; 95 % CI 1.10–1.59).

Kun terveyttään suunnilleen samanlaisena pitäviä verrattiin terveyttään huonompana pitäviin huomattiin, että ainoa merkitsevä itsenäinen selittäjä oli haittaavien sairauksien lukumäärä. Ei osaa sanoa-ryhmään kuuluvat eivät eronneet yhdenkään selittäjän osalta niistä, jotka pitivät terveyttään muiden samanikäisten terveyttä huonompana.

VALIKOITUMISEN VAIKUTUS TULOKSIIN

Valikoitumisen vaikutusta selvitettiin vertailemalla silmämääräisesti kahta logistista regressiomallia, joissa tutkittiin samojen selittäjien yhteyttä positiivisiin terveysvertailuihin (Taulukko 4). Toisessa olivat mukana ne, joilta kysymys oli kysytty, siis kotona asuvat itsevastanneet, ja toisessa oli ei-parempi-luokkaan sisällytetty myös laitoksessa asuvat ja sijaishaastatellut. Kummassakin mallissa samat selittäjät olivat merkitsevästi

Taulukko 3.
Vertailevan terveysarvion luokkien välisten erojen selittäjät multinominaalisen regressioanalyysin mukaan, referenssiluokkana terveyttään huonompana pitävät.

	Parempi		Suunnilleen samanl.		Ei osaa sanoa	
Kuvaaja	OR	95 % CI	OR	95 % CI	OR	95 % CI
Ikä	1.39	1.10–1.59	1.11	0.92–1.36	1.19	0.19–1.44
Sukupuoli						
Nainen	1		1		1	
Mies	0.97	0.32–2.54	1.24	0.45–3.40	0.99	0.37–2.62
Ammattiasema						
Muut	1		1		1	
Toimihenkilöt	2.89	0.85–9.74	2.67	0.75–9.46	1.91	0.55–6.65
Toimintakyky						
Huono	1		1		1	
Keskinkertainen	4.13	1.40–12.16	2.87	0.93–8.89	2.07	0.70–6.07
Hyvä	13.66	1.40–133.1	7.4	0.71–77.0	2.54	0.24–27.0
Haittaavat sairaudet						
2 tai enemmän	1		1		1	
0–1	5.04	1.70–14.93	3.17	1.02–9.90	2.05	0.67–6.28
Sosiaalinen osallistuminen						
Vähäinen	1		1		1	
Melko aktiivinen	4.19	1.24–14.13	1.59	0.42–5.90	2.25	0.67–7.83
Erittäin aktiivinen	5.22	0.58–46.59	3.9	0.41–36.74	1.48	0.18–18.06
Tyytyväisyys elämään						
Ei-tyytyväinen	1		1		1	
Tyytyväinen	1.44	0.52–3.95	0.64	0.23–1.79	0.66	0.24–1.77
Liikunnan harrastaminen						
Ei	1		1		1	
Kyllä	2.32	0.73–7.18	0.73	0.21–2.54	2.48	0.78–7.90

Taulukko 4.
Taustatekijöiden yhteys positiivisiin terveysvertailuihin
a) kotona asuvilla itsevastanneilla
b) joukossa jossa mukana myös laitoksessa olevat ja sijaishaastatellut.

Kuvaaja	Kotona asuvat itsevastanneet		Kotona asuvat itsevastanneet, laitoksessa olevat ja sijaishaastatellut	
	OR	95 % CI	OR	95 % CI
Ikä	1.20	1.09–1.32	1.11	1.01–1.22
Sukupuoli				
Nainen	1		1	
Mies	1.08	0.66–1.78	0.93	0.56–1.55
Ammattiasema				
Muut	1		1	
Toimihenkilöt	1.29	0.77–2.17	1.38	0.81–2.35
Toimintakyky				
Huono	1		1	
Keskinkertainen	2.39	1.29–4.42	4.78	2.63–8.68
Hyvä	4.31	1.95–9.53	9.72	4.24–22.29
Haittaavat sairaudet				
2 tai enemmän	1		1	
0–1	2.43	1.48–3.97	2.45	1.58–4.06
Sosiaalinen osallistuminen				
Vähäinen	1		1	
Melko aktiivinen	2.72	1.55–4.78	3.03	1.72–5.32
Erittäin aktiivinen	2.68	1.38–5.17	3.30	1.62–6.74

yhteydessä positiivisiin terveysvertailuihin. Iän merkitys heikkeni, mutta se pysyi merkitsevänä silloinkin, kun analyysiin sisällytettiin ne, joilta terveysvertailua ei ollut kysytty. Toimintakyvyn yhteys oli voimakkaampi tässä mallissa. Suuria eroja mallien kesken ei ollut vaan samat selittäjät tulivat merkitseviksi kummassakin.

TULOSTEN TARKASTELUA

Tutkimuksen lähtökohtana olivat aikaisemmat huomiot siitä, että iäkkäillä on taipumus pitää omaa terveyttään muiden samanikäisten terveyttä parempana. Tutkimusjoukkona olivat TamELSA-tutkimuksen hyvin vanhat, 80–89-vuotiaat, haastatellut vuosilta 1979 ja 1989. Otosta voidaan pitää ikäryhmittäin varsin edustavana (kts. Heikkinen ym. 1981, Jokela ja Jylhä 1993).

Tutkimuksen keskeinen tulos oli se, että terveysvertailuja selittävät tekijät ovat samoja, jotka useiden tutkimusten mukaan ovat yhteydessä yleiseen koettuun terveyteen (mm. Johnson ja Wolinsky 1993, Benyamini ym. 1999). Poikkeuksena tästä on ikä. Ikä tuli selvästi esiin itsenäisenä positiivisia terveysvertailuja selittävänä tekijänä siitä huolimatta, että tutkittavien ikäero tässä tutkimuksessa oli korkeintaan 10 vuotta. Valikoitumisen merkityksen selvittämiseksi tehty logistinen regressioanalyysi, jossa oletettiin kaikkien laitoksessa asuvien ja niiden, joiden tiedot oli saatu sijaishaastateltavalta, sijoittuvan terveysvertailussa muuhun kuin parempi-luokkaan, ei oleellisesti muuttanut tulosta (taulukko 4). TamELSA-tutkimuksen aikaisemmasta katoanalyysista (Jokela ja Jylhä 1993) ilmeni, että vanhimmissa ikäryhmissä kato ei ollut sen suurempi kuin nuoremmissakaan. Katoanalyysin kuolleisuusvertailut viittasivat siihen, että tutkimusjoukkoon kuuluneet naiset olisivat jonkin verran terveempiä kuin perusjoukko. Etenkin naisten osalta tämä ero koski kuitenkin myös muita ikäryhmiä kuin 80–89-vuotiaita eikä se siksi selitä terveysvertailujen paranemista iän myötä.

Yli puolet vastanneista piti omaa terveyttään ikätovereiden terveyttä parempana, ja vanhemmassa ikäryhmässä eli 85–89-vuotiaissa terveyttään parempana pitäviä oli 10 % enemmän kuin nuoremmassa eli 80–84-vuotiaissa. Lisäksi todennäköisyys sille, että terveyttä pidettiin muiden samanikäisen terveyttä parempana kasvoi jokaista lisääntyvää ikävuotta kohden erityisesti silloin, kun analyyseissa oli vakioitu muut selittäjät. Tulokset tukevat teorioita aspiraatiotason laskusta vanhetessa: terveydelle asetettavat vaatimukset laskevat iän lisääntyessä. Selitystä voidaan hakea myös siitä, millaisen vertailukohdan tutkittavat ovat arvioilleen ottaneet. Tuloksemme viittaavat siihen, että vertailussa omien ikätovereiden terveys on oletettu varsin huonoksi. Aiempien tutkimusten perusteella vertailussa saatetaan ottaa huomioon myös jo kuolleet ikätoverit (vrt. Jylhä 1993).

Tässä tutkimuksessa ei muilla mukana olleilla sosiodemografisilla tekijöillä eli sukupuolella ja ammattiasemalla ollut yhteyttä terveysvertailuihin sen jälkeen, kun analyyseissa oli mukana kaikki selittäjät. Tuloksesta voi vetää sen johtopäätöksen, että sairautta kuvaavien tekijöiden ollessa mukana sosiodemografisten tekijöiden vaikutus välittyy pääasiassa niiden kautta.

Vanhemmilla ihmisillä terveys määrittyy usein toimintakyvyn ja selviytymisen kautta, vaikka terveyttä pidetään myös onnellisuutena ja mielentilana (Blaxter 1990). Toimintakyky on tärkeä koetun terveyden yleisarvioon vaikuttava tekijä, ja tämän tutkimuksen mukaan se on myös tärkeä terveysvertailuja selittävä tekijä. Toimintakyky voi olla myös yhteydessä haittaavien sairauksien lukumäärään, mikä myös osoittautui itsenäiseksi positiivisia terveysarvioita selittäväksi tekijäksi. Huomattavaa on myös, että liikunnan harrastaminen osoittautui yhden selittäjän mallissa merkitseväksi selittäjäksi, mutta monimuuttujamallissa sen itsenäinen selitysvoima hävisi. Tämä selittynee sillä, että liikunnan harrastaminen on yhteydessä muihin mukana olleisiin tekijöihin, esim. toimintakykyyn ja haittaavien sairauksien lukumäärään.

Psykososiaalisista tekijöistä mukana analyyseissa olivat sosiaalinen osallistuminen ja tyytyväisyys elämään. Sosiaalisen osallistumisen on aikaisemmin huomattu olevan voimakas kuolleisuuden ennustaja (mm. Jylhä ja Luukkaala 2000) ja tässä tutkimuksessa se osoittautui myös positiivisia terveysvertailuja selittäväksi tekijäksi. Yhden selittäjän mallissa kuuluminen erittäin aktiivisiin oli selittäjänä merkitsevä, mutta kuuluminen melko aktiivisiin ei. Monimuuttujamallissa kuuluminen melko aktiivisiin nousi myös merkitseväksi selittäjäksi ja jonkin verran jopa merkitsevämmäksi kuin kuuluminen erittäin aktiivisiin. Tämä voi selittyä sillä, että monimuuttujamallissa on mukana sellaisia eri selittäjien välisiä vuorovaikutuksia, joita tämän tutkimuksen puitteissa ei ollut mahdollista selvittää. Tyytyväisyys elämään osoittautui myös positiivisia terveysvertailuja selittäväksi tekijäksi sekä yhden selittäjän

mallissa että monimuuttujamallissa, mutta ei enää multinominaalisessa analyysissa, jossa vertailukohtana olivat terveyttään ikätovereita huonompana pitävät.

Multinominaalisen regressioanalyysia tulkittaessa on huomattava, että havaintojen lukumäärät vertailevan terveysarvion eri luokissa saattavat olla hyvinkin pieniä. Se selittää osaksi isot OR:t ja laajat luottamusvälit (kts. taulukko 3 toimintakyvyn osalta) ja sen, että isoista OR:stä huolimatta merkitsevyys jäi usein melkein merkitsevän alapuolelle (kts. taulukko 3 sosiaalisen osallistumisen osalta). Tulosten merkitystä vahvistaa kuitenkin se, että ne ovat samansuuntaisia kaksiluokkaisessa logistisessa regressioanalyysissä saatujen tulosten kanssa. Haittaavien sairauksien lukumäärä oli kuitenkin kaikissa analyyseissa selittäjänä merkitsevä, mikä antaa aihetta pohtia haittaavien sairauksien ja muiden selittävien tekijöiden välistä yhteyttä ja hierarkiaa.

Erityisen mielenkiinnon kohteeksi tutkimuksen kuluessa nousivat ne henkilöt, jotka eivät olleet osanneet sanoa vertailua kysyttäessä. Heidän osuutensa oli iso, 21 % vastanneista. Multinominaalinen regressioanalyysi vahvisti ennakko-oletukset siitä, että he ovat itse asiassa melko huonokuntoisia: he eivät eronneet terveyttään huonompana pitävistä minkään mukana olleen selittävän tekijän osalta. Ainoa selvästi terveyttään huonompana pitävistä eroava ryhmä oli terveytään parempana pitävät. Tulos viittaa siihen, että ainakin sensitiivisissä kysymyksissä, jollainen vertaileva terveysarvio ilmeisesti on, ei osaa sanoa-luokan ymmärtäminen keskitasoiseksi vastaukseksi tai sen jättäminen pois analyyseista, kuten joskus tapahtuu, voi johtaa harhaisiin johtopäätöksiin.

Tutkimus osoittaa, että arvioidessaan terveyttään ikääntyneet käyttävät monista eri lähteistä peräisin olevaa tietoa. Vertailujen pohjana on selviä kriteerejä, mm. toimintakyky ja sairaudet, mutta niihin vaikuttavat myös monet muut eri tekijät, mm. terveyskäsitykset sekä omat ja ympäristön terveydelle asettamat vaatimukset. Mahdollisen valintaharhan selvittämiseksi tehty analyysi osoitti, että vaikka tutkimuksessa mukana olevat mahdollisesti olivatkin parempikuntoisia kuin muut samanikäiset, ei se kuitenkaan selitä kokonaisuudessaan positiivisten terveysarvioiden yleisyyttä. Ilmiö on huomattavasti moniselitteisempi. Molemmat päätuloksemme, se, että iän karttuessa terveyttä verrataan muihin samanikäisiin yhä positiivisemmin, ja se, että juuri ne, joiden terveys muilla indikaattoreilla oli ikätovereihin nähden melko huono olivat taipuvaisia valitsemaan ei osaa sanoa -vastauksen, viittaavat samaan suuntaan: iän karttuessa ja terveydentilan heikentyessä on erityisen tärkeää voida pitää terveyttään ainakin samantasoisena kuin muilla samanikäisillä.

Junttila M et al. Health comparisons of the very old people and factors associated to them. Sosiaalilääketieteellinen Aikakauslehti – Journal of Social Medicine 2002:39:42–50

Older people often rate their health better than that of their age peers and despite the common awereness of this phenomenon it has not been studied as much as non-comparative self-rated health. However, health comparisons are interesting because they include individual's perception of the situation of his or her's own age group. The study is a part of TamELSA-project and aim was to investigate how 80–89 years old people compare their health to that of their age peers and what kind of factors are associated with these comparisons. Altogether 356 persons were interviewed and 54 % of them rated their health better than that of their age peers. In multiple logistic regression models older age was significantly associated with positive health comparisons after controlling for chronic diseases, physical functioning and psychosocial factors. Other independently associated factors were good physical functioning, low number of diseases diagnosed by a physician, active social participation and life satisfaction. Those who answered "cannot say" did not differ from those who rated their health as worse than age peers. The results did not change markedly after the selection bias was taken into account. Our results support the theory of decreasing aspirations concerning health with old age, and they indicate the importance of relatively good health image to one's self concept in old age.

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Global self-rated health data from a longitudinal study predicted mortality better than comparative self-rated health in old age

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Abstract

Background and Objective: Self-rated health (SRH) has proved to be a predictor of subsequent mortality in old age. This study examines if the different question wording in SRH questions influences the association of SRH with mortality. Two SRH measures are examined, an age group comparative question and a global question with no explicit point of reference.

Methods: The data are from the Tampere Longitudinal Study on Ageing, consisting 944 respondents aged 60–89 years. The association between mortality and self-rated health was studied at 5, 10, and 20 years follow-up using Cox proportional hazard models.

Results: As crude measures, global SRH was significantly associated with mortality after 5, 10, and 20 years follow-up, but the comparative SRH was not. After adjustment for age and several social and health indicators both SRH measures were associated with inceased mortality risk even after 20 years of follow-up.

Conclusions: Because the age-sensitivity of the comparative SRH the global SRH may be a more appropriate measure in studies where the study population has a large age range and also as a health measure in clinical settings.

Keywords: Age; Comparative self-rated health; Global self-rated health; Health measures; Mortality

1. Introduction

The research interest in self-rated health (SRH) has grown considerably since the discovery that it is a strong predictor of mortality both among the general population [1–3] and especially among elderly people [4,5]. The results show considerable consistency irrespective of the age group, country, and time period studied and control variables included; SRH appears to predict mortality even if the objective health status of the respondents is taken into account through measurement of the number and diagnoses of illnesses reported by a physician or the individual himself [6,7]. SRH is one of the indicators recommended for health monitoring by the World Health Organization [8]. Because the meaning of the self-assessments of health has become obvious and SRH measure is used more and more often in research as a proxy for more detailed health examinations it is important to know how it behaves and what it really measures.

The operational definition of SRH and the wording used in questionnaires differ across the studies. The main difference between the studies is if frame of reference is offered [6]. In many studies the self-assessment of health is elicited by asking the respondents to rate their health in general without any frame of reference (global SRH). In some studies a frame is provided, often the health of age peers (age referential or comparative SRH). It has been suggested that the concept of SRH is insensitive to semantic variations, and that comparisons with socially similar others are implicit in all self-ratings of health whether or not they are explicitly elicited [6,9]. However, Baron-Epel and Kaplan [10] found that different wordings in questions are not entirely comparable, especially if the study population has a large age range or/and great differences in educational background.

Evidence of the validity of SRH began accumulating from studies of its predictive power; SRH was found to be an independent predictor of a range of future health outcomes, especially mortality [1–7,11,12] Studies examining the association of SRH and mortality have mostly used global SRH, whereas studies on the association between comparative SRH and mortality are sparse (see [6,7]).There are only few studies that have studied SRH as a predictor of mortality using both global and comparative (age-referential) measures. These studies indicate that to some extent comparative and global SRH behave differently. Heidrich et al. [13] examined the association between SRH and mortality in 3,019 men and women aged 35–64.They found in their 11-year follow-up study that adjusted for age, comparative SRH was

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more strongly associated with all-cause mortality than global SRH both in women (RR 2.5; 95% CI 1.3–4.6 vs. RR 1.4; 95% CI 0.9–2.2) and men (RR 2.6; 95% CI 1.6–4.1 vs. RR 1.8; 95% CI 1.3–2.5). Additional adjustment for risk factors of cardiovascular diseases and medical conditions reduced these associations but the association between comparative SRH and all-cause mortality was still statistically significant. Grand et al. [14] found in their 4-year follow-up study in people aged 60 and over that age-adjusted comparative SRH predicted mortality more strongly (RR 3.94; 95% CI 2.33–6.67) than global SRH (RR 2.47; 95% CI 1.46–4.17). Both in the study by Heidrich et al. and in the study by Grand et al. the study population had a wide age range, and they had no results of nonadjusted associations between SRH and mortality. In the 3-year-follow-up study of Leung et al. [15] in institutionalized Chinese people aged 65 and over, global SRH predicted mortality more strongly (RR 6.00; 95% CI 1.39–25.1) than comparative SRH (RR 2.72: 95% CI 0.64–11.83) when several social indicators and physical and medical conditions were adjusted for. We found only one study that focused especially on the influence of different question wording on the association between SRH and mortality. Manderbacka et al. [16], found in their 5-year follow-up study among people aged 77 and over that comparative SRH was a better predictor of older men's mortality both in nonadjusted models and in models where age and both SRH measures were included. Among women, the global and the comparative questions were found to be equally strong predictors of mortality. They concluded that SRH measures are sensitive to differences in question wording.

The aim of this study is to investigate if the different question wording in SRH questions influences the association between SRH and mortality in old age. Two SRH measures are examined: a global question without any frame of reference, and a question with an explicit comparison with age peers. Several social and health indicators known to be associated with higher risk of mortality are included step by step in to the analyses to find out their influence on the relation between SRH and mortality. Particularly we are interested in the impact of age adjustment on the association between SRH and mortality. Further, we investigate whether the predictive power of the two SRH measures differs according to the length of the follow-up. The analyses are done separately with the comparative SRH and the global SRH to ascertain whether the associations are different when the reference point is explicitly expressed.

2. Materials and methods

2.1. Sample

This study is a part of the Tampere Longitudinal Study on Ageing (TamELSA), a population-based study of living conditions, health and functioning, life-styles, and use of services among older people in the city of Tampere, Finland. The baseline study was conducted in 1979, and two follow-up studies in 1989 and 1999. The design and sample of the study have been described in more detail elsewhere [17]. The data were collected in face-to-face interviews using structured questionnaires.

The data comes from the baseline study in 1979. A total of 1,059 persons aged 60–89 were interviewed. The response rate was 81%. Mortality was examined according to global and comparative (age referential) SRH. A proxy informant was used if the person was for physiologic or mental reason unable to answer him/herself. Global SRH was not asked in cases where proxy informants were needed, and comparative SRH was not asked of those living in institutions and those with proxy informants. Only those who answered both questions were included; the number was 944: 477 men and 467 women. The vital status and dates of death were provided by the national Population Register Centre; this center has comprehensive data of births and deaths in Finland. The mortality within the sample was followed up until the year 2000.

2.2. Measures

2.2.1. SRH measures

Global SRH was assessed by asking "In general, how would you describe your present health; is it very good, fairly good, average, fairly poor or poor." Comparative SRH was assessed by asking "How would you describe your health compared to that of your age peers; is it better, about the same or worse." The option "don't know" was also available. For mortality analyses the global SRH was categorized as good (very good and fairly good), average, and poor (fairly poor and poor) for make the SRH measures more comparable.

2.3. Control variables

Age was used as a continuous variable. Functional ability was assessed with a set of 13 questions dealing with basic activities of daily living (ADL; e.g., using the lavatory, dressing and undressing, eating) and instrumental activities of daily living (IADL; e.g., moving outdoors, using stairs, cutting toe nails) (see [17–19]). The respondents were asked if they were able to do the tasks without difficulty, with difficulty but without help, only with help, or not at all. No difficulty in any of the 13 tasks was classified as good, difficulty, or inability in one or more IADL but in no ADL was classified as moderate, and any difficulty or inability in ADL was classified as poor functional ability. This classification forms a hierarchical Guttman scale, which was found to be reliable [20]. Social participation was assessed with a series of eight questions. The respondents were asked how many times they had visited the following places or taken part in the following events during the past 12 months: (1) family occasions, such as weddings, funerals, birthdays, etc.; (2) theatre, movies; (3) meetings or events arranged by different organisations; (4) library; (5) sport

competitions, either as a participant or as a spectator; (6) religious events; (7) domestic travel, at least 60 miles; and (8) foreign travel. Respondents were categorized as active it they had attended at least two family occasions or at least one other activity. For each activity the respondent received one score, and the scores were added together. Social participation was categorised as low (score 0–1), moderate (score 2–3), and high (score 4 and over) [21]. Reported chronic diseases that according to the respondents had been diagnosed by a physician and that affected their daily activities were coded into the following categories: cardiovascular, musculoskeletal, nervous system, endocrine, gastrointestinal, infectious, respiratory, urinary, diseases of skin, cancers, and others (ICD-9 classification). The respondents were divided into three groups on the basis of the number of diseases they had: 0–1, 3–4, and 5 or more. Sex and occupational class (nonmanual vs. others) were used as other control variables.

2.4. Methods

The dates of death were provided by the national Population Register Center. We measured time from the date of interview to date of death, censored at 5, 10, and 20 years, respectively. The association between mortality and SRH was analyzed using Cox proportional hazard models. Analyses were performed separately for global and comparative SRH so that their predictive validity of mortality could be compared.

The analyses proceeded in a series of steps. First, crude associations of poor/worse SRH with mortality were studied, and after that control variables were included in the analyses step by step, in the order (1) age, (2) sex and occupational class, (3) number of chronic diseases, (4) functional ability, and (5) social participation.

3. Results

The characteristics of the sample by variables used in the analyses are shown in Table 1.

The number of those rating their health as better compared to that of their age peers was 393 (42%), about the same 262 (28%), worse 140 (14%), and 149 (16%) did not know. The number of those rating their health as very good was 88 (10%), fairly good 266 (28%), average 341 (36%), fairly poor 182 (19%), and poor 67 (7%). When the distributions of comparative and global SRH are considered by age groups a clear difference can be seen in the oldest age group (Table 2). In the age group 80–89, 52% rated their health as better than that of their age peers, whereas 39% rated their health as very good or fairly good. The percentage of those rating their health worse than that of their age peers was 8%, whereas 25% rated their health as fairly poor or poor.

The number of deaths was 243 (26%) after 5 years, 442 (47%) after 10 years, and 802 (85%) after 20 years.

Table 1
Distribution of comparative self-rated health, global self-rated health, and control variables

Variable	*N*	%
Comparative SRH		
Better	393	42
About the same	262	28
Worse	140	14
Don't know	149	16
Global SRH		
Very good	88	10
Fairly good	266	28
Average	341	36
Fairly poor	182	19
Poor	67	7
Age		
60–69	358	38
70–79	348	37
80–89	238	25
Sex		
Male	467	49
Female	477	51
Occupational class		
White-collar	239	25
Blue-collar	508	54
Farmer	5	1
Housewife	92	10
Other	99	10
Number of chronic diseases		
0–1	313	34
2–4	548	58
5-	78	8
Functional ability		
Good	441	47
Moderate	360	38
Poor	143	15
Social participation		
High	352	37
Moderate	320	34
Low	268	29

Abbreviations: SRH, self-rated health.

Social participation: low = scores 0–1, moderate = scores 2–3, high = scores 4 and over.

3.1. Association of comparative SRH with mortality

Table 3 shows the risk ratios for mortality according to comparative SRH.

At the first step, comparative SRH was alone in the model. Individuals reporting worse comparative health did not have a significantly higher risk of mortality than those reporting better comparative health after any follow-up. Adjusted for age, the risk became statistically significant both after 5, 10, and 20 years, the respective RRs being 2.09 (95% CI 1.43–3.03), 2.02 (95% CI 1.52–2.69), and 1.77 (95% CI 1.42–2.16). When sex and occupational class were included in the analysis, the mortality risk increased slightly both after 5, 10, and 20 years. After 10 years those who assessed their health as about the same or who did not know also had increased mortality risk.

When chronic diseases were added into the analysis the association between increased mortality and worse reported

Table 2
Distribution (%) of comparative and global self-rated health by age groups

	60–69	70–79	80–89	*P*-value
Comparative SRH	%	%	%	<.001
Better	33	43	52	
About the same	32	29	19	
Worse	20	14	8	
Don't know	15	14	21	
	100	100	100	
	Age groups			
	60–69	70–79	80–89	*P*-value
Global SRH	%	%	%	ns
Good	34	40	39	
Average	40	33	36	
Poor	26	27	25	
	100	100	100	

Abbreviation: SRH, self-rated health.
P-value have generated by Pearson chi-square test.

SRH diminished slightly but the risk was still over twofold at 5 and 10 year follow-up and almost twofold at 20 years follow-up. The relation between worse comparative SRH and mortality decreased further after additional adjustment for functional ability but the risks were still statistically significant after 5, 10, and 20 years. When social participation was added to the model the relationship between worse comparative SRH and mortality was still significant at 10- and 20-year follow-up, but not at the 5-year follow-up.

3.2. Association of global SRH with mortality

Table 4 presents the risk ratios for mortality according to global SRH.

Poor global SRH alone was associated with increased mortality risk: those who rated their health as poor or fairly poor were over one and a half times as likely to die after 5, 10, and 20 years compared to those who rated their health as very good. Age adjustment increased the risk ratios slightly after 5, 10, and 20 years. When sex and occupational class were included in the analysis the relations of poor SRH with mortality became stronger after 5, 10, and 20 years. Additional adjustment for chronic diseases did not reduce the risks essentially, but when functional ability was added to the model the risk decreased, being statistically significant after 10 and 20 years of follow-up. When social participation was included in the analysis the mortality risk was still significant after 10 and 20 years.

3.3. Gender-specific associations of comparative and global SRH with mortality

Because of reported differencies in the association of SRH with mortality between men and women analyses were also conducted separately for both genders. In general, both measures were found to predict better men's mortality than women's. Among women, neither comparative nor global SRH was associated with increased risk of mortality at the 5-year follow-up, whereas for men both measures were predictors of mortality also at the 5-year follow-up (analyses not shown).

Table 5 shows the gender-specific associations of comparative and global SRH with mortality at the 10-year follow-up. As unadjusted, comparative SRH was not associated with either women's or men's increased mortality risk. Adjusted for age, the risk became statistically significant among both men (RR 2.44; 95% CI 1.70–3.50) and women (RR 1.68; 95% CI 1.03–2.73). Additional adjustment for

Table 3
Associations of comparative self-rated health with mortality

Comparative self-rated health														
					Adjusted for									
	$N = 944$		Unadjusted		Age		+sex, occupational class		chronic diseases		+functional ability		+social participation	
Follow-up	Alive %		RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI
5 years	74	Better	1		1		1		1		1		1	
		About the same	0.95	0.74–1.20	1.37	0.95–1.84	1.33	0.96–1.86	1.32	0.94–1.85	1.15	0.81–1.62	1.11	0.79–1.57
		Worse	1.21	0.92–1.60	2.09	1.43–3.03	2.28	1.56–3.33	2.20	1.48–3.27	1.62	1.05–2.50	1.47	0.95–2.27
		Don't know	1.30	1.00–1.69	1.28	0.90–1.85	1.29	0.90–1.85	1.27	0.88–1.84	1.04	0.71–1.53	0.94	0.64–1.39
10 years	53	Better	1		1		1		1		1		1	
		About the same	0.95	0.75–1.20	1.30	1.02–1.69	1.30	1.02–1.66	1.29	1.01–1.65	1.16	0.90–1.49	1.14	0.88–1.47
		Worse	1.21	0.92–1.88	2.02	1.52–2.69	2.14	1.62–2.90	2.09	1.55–2.84	1.63	1.17–2.27	1.54	1.10–2.15
		Don't know	1.30	1.00–1.69	1.41	1.08–1.83	1.45	1.11–1.88	1.43	1.09–1.87	1.21	0.91–1.61	1.15	0.86–1.53
20 years	15	Better	1		1		1		1		1		1	
		About the same	0.91	0.76–1.08	1.14	0.96–1.36	1.14	0.95–1.35	1.11	0.93–1.32	1.04	0.80–1.24	1.03	0.86–1.23
		Worse	1.07	0.87–1.32	1.77	1.42–2.16	1.86	1.49–2.32	1.72	1.37–2.17	1.39	1.08–1.80	1.35	1.04–1.23
		Don't know	1.10	0.90–1.35	1.23	1.00–1.51	1.29	1.05–1.58	1.24	1.01–1.53	1.10	0.88–1.37	1.06	0.85–1.32

Self-rated health and mortality in old age.

Table 4
Associations of global self-rated with mortality

Global self-rated health														
					Adjusted for									
	$N = 944$		Unadjusted		Age		+sex, occupational class		+chronic diseases		+functional ability		+social participation	
Follow-up	Alive %		RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI
5 years	74	Good	1		1		1		1		1		1	
		Average	1.11	0.81–1.52	1.23	0.90–1.68	1.28	0.94–1.76	1.27	0.92–1.76	1.09	0.78–1.53	1.00	0.72–1.41
		Poor	1.67	1.23–2.27	1.75	1.29–2.39	1.88	1.37–2.58	1.85	1.32–2.59	1.37	0.94–2.01	1.19	0.81–1.75
10 years	53	Good	1		1		1		1		1		1	
		Average	1.28	1.02–1.61	1.45	1.16–1.83	1.51	1.20–1.91	1.51	1.19–1.92	1.37	1.07–1.75	1.30	1.02–1.67
		Poor	1.73	1.37–2.19	1.91	1.50–2.41	2.08	1.63–2.65	2.07	1.60–2.67	1.68	1.26–2.24	1.54	1.15–2.06
20 years	15	Good	1		1		1		1		1		1	
		Average	1.09	0.93–1.29	1.27	1.07–1.49	1.28	1.08–1.52	1.24	1.04–1.48	1.16	0.97–1.39	1.12	0.94–1.35
		Poor	1.53	1.28–1.82	1.70	1.43–2.03	1.83	1.53–2.19	1.74	1.44–2.11	1.49	1.20–1.84	1.41	1.13–1.75

first occupational class and then chronic diseases did not change the risks, but when functional ability was added into the models the association between worse comparative SRH and mortality became insignificant among women but remained significant among men. For men, the association also remained after adjustment for social participation. Among women, those who assessed their health about the same had increased mortality risk after age adjustment; the risk remained statistically significant when first occupational class and then chronic diseases were added to the model. Among men, those who did not know, had increased mortality risk when first age and then occupational class were added into the model. After 20 years (analyses not shown) the pattern was basically similar to that of 10 years for both measures.

As a crude measure, poor global SRH was significantly associated with mortality for both women and men. Among men, the age-adjusted mortality risk was over twofold compared to those who assessed their health as good, and the

Table 5
Gender-specific associations of global and comparative self-rated health with mortality at 10 years follow-up

Comparative self-rated health														
					Adjusted for									
Male	Alive %		Unadjusted		Age		+occupational class		+chronic diseases		+functional ability		+social participation	
$N = 202$	40		RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI
		Better	1		1		1		1		1		1	
		About the same	0.88	0.65–1.20	1.19	0.87–1.63	1.20	0.88–1.64	1.16	0.84–1.59	1.06	0.76–1.48	1.03	0.74–1.43
		Worse	1.39	0.99–1.96	2.44	1.70–3.50	2.46	1.70–3.55	2.27	1.54–3.34	1.85	1.21–2.83	1.72	1.12–2.64
		Don't know	1.32	0.95–1.86	1.41	1.01–1.98	1.41	1.01–1.98	1.37	0.97–1.94	1.17	0.80–1.70	1.10	0.75–1.61
Female	Alive %													
$N = 300$	60													
		Better	1		1		1		1		1		1	
		About the same	1.05	0.72–1.54	1.53	1.04–2.25	1.51	1.02–2.23	1.52	1.03–2.24	1.42	0.95–2.13	1.43	0.96–2.13
		Worse	1.02	0.63–1.64	1.68	1.03–2.73	1.68	1.02–2.74	1.70	1.03–2.79	1.37	0.78–2.35	1.33	0.77–2.28
		Don't know	1.34	0.88–2.05	1.50	0.98–2.28	1.50	0.98–2.28	1.50	0.98–2.30	1.36	0.88–2.10	1.32	0.86–2.05

Global self-rated health														
					Adjusted for									
Male	Alive %		Unadjusted		Age		+occupational class		+chronic diseases		+functional ability		+social participation	
$N = 202$	40		RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI	RR	95% CI
		Good	1		1		1		1		1		1	
		Average	1.21	0.91–1.62	1.44	1.07–1.93	1.48	1.10–2.00	1.46	1.07–1.99	1.39	1.01–1.91	1.32	0.95–1.83
		Poor	1.96	1.46–2.63	2.36	1.72–3.17	2.45	1.79–3.33	2.37	1.71–3.29	2.10	1.44–3.05	1.89	1.28–2.78
Female	Alive %													
$N = 300$	60	Good	1		1		1		1		1		1	
		Average	1.41	0.98–2.04	1.52	1.05–2.19	1.52	1.05–2.19	1.53	1.05–2.22	1.36	0.92–1.99	1.35	0.92–1.97
		Poor	1.53	1.03–2.26	1.52	1.03–2.25	1.51	1.02–2.24	1.55	1.02–2.35	1.24	0.78–1.95	1.20	0.76–1.89

association remained almost unchanged when control variables were included into the analyses step by step. When social participation was added to the model the risk dimished slightly, remaining still highly significant. After age adjustment, also those men, who assessed their health as average, had increased mortality risk. The risk remained almost unchanged until social participation was added to the model; after that the association was not anymore statistically significant.

Adjusted for age, poor and average global SRH were found to be equally strong predictors of women's mortality. The predictive power remained stable until functional ability was added to the model, after that the risks were not anymore statistically significant.

4. Discussion

This study indicates that, whatever way it is elicited, SRH predicts subsequent mortality even after 20 years of follow-up when several social and health indicators are controlled for. However, to some extent comparative and global SRH behave differently. The greatest difference between the two SRH measures was connected to age.

The complex relationship between age and SRH demonstrated in many studies was also shown in this study. Earlier studies indicate that older people often assess their health as good despite several chronic conditions; this has been noticed despite the way SRH is elicited [22–26]. In old age SRH does not seem to decline at the same rate as health problems increase, but in relation to them, may even improve. This has been explained by the declining standards for health when people grow old [27,28].

In this study age influenced differently the association of comparative SRH with mortality and the association of global SRH with mortality. Unadjusted, worse comparative SRH was not statistically signicantly associated with increased mortality risk. After age adjustment the risk was statistically significant after 5, 10, and 20 years of follow-up. Poor global SRH was associated with increased mortality risk when unadjusted, and with adjustment for age the association became somewhat stronger. After adjustment for age the association between worse comparative SRH and mortality was somewhat stronger than between poor global SRH and mortality, but the differences were only marginal. The difference in the crude measures is understandable as the age-referential question itself has an age-adjusting influence: it allows the respondents to judge their health by adjusting the base of comparisons to the overall higher levels of morbidity and disability found among people of their own age. Thus, it means that with advancing age a person's own health can be perceived as "better than that of my age peers" at increasingly higher levels of disability and morbidity (see [24]). In the analyses where the study population has a large age range this is likely to result in situation where health comparisons are relatively better in the oldest age groups where morbidity and mortality are highest, and consequently, comparative health ratings are not predictive of mortality in the whole sample.

Sex, socioeconomic status, medical health status and, especially among old people, functional ability, have been observed to be significantly associated with both global and comparative SRH [12,29]. In this study the health and social indicators had a similar influence on the association between SRH and mortality despite different question wording; this indicates that comparative and global measure cover mostly the same domains of health. Furthermore, a similar dose–response pattern can be seen both in the association between comparative SRH and mortality and in the association between global SRH and mortality: the worse the self-assessment of health the greater the likelihood of increased mortality risk (Tables 3 and 4). Also, the length of follow-up had a similar influence on the predictive power of mortality for both measures.

The separate analyses for men and women indicate that both SRH-measures are better predictor of men's mortality than women's mortality (Table 5); this result is consistent with some other studies [30]. Neither global SRH nor comparative SRH were associated with women's mortality at 5 years of follow-up. For men, both measure were associated with mortality also at 5-year follow-up. This can be partly due to the low mortality in women: 67% of men were alive after 5-year follow-up, whereas the percentage of women was 82. It has been reported that women's health assessments are based on a wider range of health-related and nonhealth-related factors than men's [30]. It has been suggested that men's health ratings reflect mainly serious, life-threatening diseases (e.g., heart disease), whereas women's self-assessments reflect both life-threatening and nonlife-threatening diseases (e.g., arthritis). Because both factors lower women's health ratings but only serious diseases are expected to predict mortality, women's SRH will have a weaker relationship to mortality than men's SRH [31]. In this study, among women the association between both comparative and global SRH with mortality was significant after adjusting for age, occupational class, and chronic diseases, but disappeared when functional ability was added to the model.

This study used only the baseline information of SRH; possible changes over time were not taken into account. Chronic diseases and functional limitations are based on the self-reports of respondents and are not medically examined, which may have resulted in incomplete control of confounding. However, good accordance between self-reports and physician diagnosis has been reported [32]. Also, the category "don't know" is problematic for the interpretation. The analyses suggest (Table 3) that those who answer "don't know" are in poorer health than those who answer "better" or "about the same." In the earlier study [29] we have examined this group more in detail. The results indicate that the health of those who answered "don't know" were basicly similar to that of those who answered "worse."

In this study those who could not answer themselves and those who lived in institutions were excluded from the sample. This could cause selection bias so that the study included only those who are in rather good health. However, in an earlier analysis [29] dealing with the factors associated with better comparative SRH the results did not change markedly after excluded groups was taken into account.

In general, it seems that in old age the logic behind the self-ratings of health is influenced by the complex relationship between a person's health status, age, and the reference group used. It has been suggested that self-assessments of one's health always involve a comparison process, and at least two points of reference are important: one's previous health, and the health of age peers [16]. Global health ratings are also likely to include social comparison process even if no comparison is explicitly elicited, and in an age-referential question other implicit reference points than age may also be used [6]. The explicit expression of the reference point in an age-referential question leads respondents to focus more on the health of other people; thus, in addition to a respondent's own health age-related SRH requires the respondent to estimate the health of a group of people. The frequency of favorable comparative health ratings in old age (Table 2) implies that the reference point used, "the health of the age peers" is understood more negatively with increasing age; in a qualitative study [33] where interview episodes in SRH were analyzed the comparative question could be answered by "Well, most of them are dead, aren't they?"

The most important practical implication of this study comes from the difference between global and comparative measure of SRH when used as crude measures, without adjustment for age. As the comparative measure by definition is "adjusted for age," it does not measure objective health conditions in the same way for different age groups. Therefore, in studies with a wide age range global SRH is likely to be a more valid measure of general health status and a better predictor of future health than the comparative measure. The gender differences in the predictive power of mortality do not affect the influence of age, but, however, they should be taken into account in health research. The researcher should be aware of the behavior of the two measures when using them in population research. When SRH is used as a measure in clinical setting global question should be preferred.

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Comparative vs global self-rated health: associations with age and functional ability

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ABSTRACT. ***Background and aims:*** *This study examined the relationship of age and functional ability with comparative (age-referential) and global self-rated health (SRH), and the possible effect of selection bias. The focus is on differences between these questions and on the consequences which these differences have in research.* ***Methods:*** *The data came from the second wave of the Tampere Longitudinal Study on Ageing (TamELSA), consisting of 830 persons aged 60-99 years. The associations of both self-rated health measures with age and functional ability were examined using multinomial regression analyses.* ***Results:*** *People with increasing age, particularly over 80-year-old, are inclined to rate their health better than that of their age peers. The association of older age with better comparative SRH became even stronger after adjustment for functional ability, chronic diseases and sociodemographic factors. The relation of older age with global SRH was weaker than that with age-referential SRH. By contrast, functional ability was more strongly associated with global than with comparative SRH.* ***Conclusions:*** *Our results suggest that comparative and global self-rated health cannot be used interchangeably. The comparative measure is more strongly "calibrated" by age. Therefore, when SRH is used as a measure in survey studies or in clinical settings, the global question should be preferred.*

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INTRODUCTION

Self-rated health (SRH) has proved to be a powerful predictor of subsequent mortality (1-8) and functional ability (9). The operational definition of self-rated health and the exact wording used in questionnaires varies from one study to another. The main difference is between the global question without explicit reference and the age-referential question, in which the subjects are asked to assess their health in comparison with that of their age peers.

It has been suggested that the concept of SRH is insensitive to semantic variations and that comparisons with socially similar others are implicit in all self-ratings of health whether they are explicitly elicited or not (2, 9). However, there are studies which indicate that global and comparative SRH predict mortality differently (5- 8, 10). Baron-Epel and Kaplan (11) found that different wordings in questions are not entirely comparable, especially if the study population has a large age range and/or great differences in educational background.

Particularly in old age, functional status is a major determinant of both global and comparative SRH (3, 12-16), but the association of age is more complicated. It is usual for older people to assess their health as good in spite of several chronic conditions (17-19). These findings have usually been explained by implicit points of reference and by declining expectations of health with increasing age (20, 21). Several studies (13, 22-24) suggest that, with older age, people are more likely to assess their health as better than that of their age peers. This implies that the reference point used, "the health of their age peers", is understood more negatively with increasing age. Yet the possibility cannot be excluded that the results are produced by selective response bias or by differential loss in various age groups. In the oldest age groups, a higher proportion of people than in the young-old are living in institutions and, thus, excluded from many survey studies. Also, it is possible that those with poor health and severe disability are more reluctant to answer the comparative question. This selection bias may at least partly explain the results of improving comparative SRH towards very old age.

In this study, we examined the relationship of age and functional ability with two different self-ratings of health, comparative and global. Our aim was, first, to examine the associations of age and functional ability with SRH, and second, to analyse the influence of selection

Key words: Age, comparative self-rated health, functional ability, global self-rated health.

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bias on the results indicating better comparative SRH with increasing age. All analyses were carried out separately with comparative SRH and global SRH as outcomes, to ascertain whether the associations are different when the reference point is explicitly expressed.

METHODS

Sample

This study is a part of the Tampere Longitudinal Study on Ageing (TamELSA), a population-based study of living conditions, health and functioning, life-styles and use of services among older people in the city of Tampere, Finland. The design and sample of the study have been described in more detail elsewhere (25). The data used here come from the second wave of the study in 1989. The sample consisted of 1038 people aged 60-99 years. Data were collected in face-to-face interviews using structured questionnaires. A proxy informant was used whenever subjects themselves, for physical or mental reasons, were unable to answer the questions. The response rate was 80%, and a total of 830 persons were interviewed.

Comparative SRH was not inquired about if the interviewee was living in an institution (n=67; 8% of the sample) or in cases in which a proxy informant was used for a home-dwelling interviewee (n=11; 1% of the sample). Data on comparative SRH were also missing in 2 other cases (0.2%). Global SRH was not inquired about in cases with a proxy informant (n=42; 5%) and data were missing for 1 person (0.1%). The final sample consisted of those 750 people for whom information on both SRH questions was available. The mean age of the respondents was 70 years; 47% were men and 53% were women.

Measures

Comparative self-rated health was assessed by asking: "How would you describe your health compared with that of your age peers; is it better, about the same, or worse?" The option "cannot say" was also available.

Global self-rated health was assessed by asking: "In general, how would you describe your health; is it very good, fairly good, average, fairly poor, or poor?" For multinomial regression models, global SRH was categorized as good (very good, fairly good), average and poor (fairly poor and poor) in order to have a sufficient number of respondents in each category.

Three age brackets were formed, 60-69, 70-79 and 80-99 years. In the third group the two oldest 10-year age groups were combined because of the small number (18) of respondents aged 90 and over. Functional ability was assessed with a set of 13 questions addressing basic (ADL) and instrumental activities (IADL) of daily living. No difficulty in any of the 13 tasks was classified as good, difficulty in one or more IADL but in no ADL was classified as moderate, and any difficulty in ADL was classified as poor functional ability. This classification forms a hierarchical Guttman scale which has been found to be reliable (26). Reported chronic diseases that according to the respondents, had been diagnosed by a physician were encoded in the following categories: cardiovascular, musculoskeletal, nervous system, endocrine, gastrointestinal, infectious, respiratory, urinary, diseases of skin, cancers, and others (ICD-9 classification). The respondents were divided into three groups on the basis of the number of diseases they had: 0-1, 2-3, and 4 or more. Sex and occupational class (non-manual, manual, farmers, housewives) were used as other control variables.

Table 1 - *Distributions of comparative and global self-rated health (SRH) according to age groups and functional ability (%).*

	Age groups			Functional ability				
	60-69	**70-79**	**80-99**	**Good**	**Moderate**	**Poor**	**All**	**No.**
Comparative SRH								
Better	41	35	59	55	34	22	42	314
About the same	32	28	14	30	30	17	28	212
Worse	15	17	7	5	18	32	14	105
Cannot say	12	20	20	10	18	29	16	119
All	100	100	100	100	100	100	100	750
	(n=395)	(n=234)	(n=121)	(n=337)	(n=323)	(n=90)		
Global SRH								
Very good	8	4	13	12	5	2	8	57
Fairly good	36	25	29	46	22	11	31	237
Average	39	39	29	37	42	22	38	282
Fairly poor	14	24	22	4	26	39	18	134
Poor	3	8	7	1	5	26	5	40
All	100	100	100	100	100	100	100	750
	(n=395)	(n=234)	(n=121)	(n=337)	(n=323)	(n=90)		

Table 2 - *Relation between comparative and global self-rated health (SRH) (%).*

	Comparative SRH					
	Better	**About the same**	**Worse**	**Cannot say**	**All**	**n**
Global SRH						
Very good	88	7	0	5	100	57
Fairly good	63	24	2	11	100	237
Average	33	40	12	15	100	282
Fairly poor	13	25	34	28	100	134
Poor	10	12	53	25	100	40
	(n=314)	(n=212)	(n=105)	(n=119)		750

$p<0.001$ tested by χ^2

Statistical analysis

The relation between comparative and global SRH was analysed by cross-tabulation, and by using Spearman's rho. The associations of both SRH measures with age and functional ability were first analysed by cross-tabulations and tested by the χ^2. Multinomial regression analyses were used to identify independent association with age and functional ability. We began by examining the unadjusted associations of age and functional ability with SRH measures. Then age and functional ability appeared simultaneously in the analyses. Finally, sex, occupational class and number of chronic diseases were added to the models.

As a next step, we used two different ways to examine whether the results indicating better comparative SRH with increasing age could be caused by selection bias. First, the separate category, "missing", was added to both comparative and global SRH variables, including those 80 persons for whom observations were missing – because they were living in institutions, proxy respondents were used, or for other reasons – so that responses to either of the SRH questions were missing. This was done in order to examine the characteristics of this group, which was possible because information on age and functional ability was available for them. Second, the "missing" values were included in the category "worse" for comparative SRH, and in the category "poor" for global measure, respectively. The associations of age and functional ability with both SRH measures were then analysed using cross-tabulations and multinomial regression analyses.

All analyses were conducted using the SPSS 11.5 program.

RESULTS

Sample characteristics

There were only minor differences in frequencies between comparative and global SRH (Table 1). The greatest difference was in the number of those who rated their health as worse (n=105, 14%) compared with those who rated it as fairly poor or poor (n=174, 23%). In the oldest age group, more people rated their health as better (59%) or as fairly good or good (42%). Those whose functional ability was poor rated their health as better (22%) more often than as fairly good or very good (13%).

Cross-tabulation between the two SRH measures (Table 2) shows that health can be rated "better" even if it is not "good": 13% of those who rated their health as fairly poor and 10% of those who rated it as poor assessed their health as better than that of their age peers. The rank order correlation between the two SRH measures was 0.48 ($p>0.01$).

Age and functional ability as determinants of comparative self-rated health

In unadjusted multinomial regression analysis (Table 3), the age group of 80-99 years was significantly associated with better comparative SRH (OR 3.17; 95% CI 1.44-6.98), and with "cannot say" answers (OR 3.76; 95% CI 1.55-9.08). No difference was seen between the two younger age groups. Good and moderate functional ability were associated with both better comparative SRH (OR 14.82; 95% CI 7.0-31.30) and with "about the same" answers (OR 10.74; 95% CI 4.82-23.91). When age and functional ability appeared simultaneously in the analysis, the associations of the 80-99 year age group and good functional ability with better comparative SRH were even stronger than in the unadjusted analyses, and this was true also when age, functional ability, sex, occupational class and chronic diseases were all included in the analysis.

Age and functional ability as determinants of global self-rated health

Without adjustments, age groups 70-79 (OR 0.32; 95% CI 0.20-0.51) and 80-99 (OR 0.53; 0.32-0.89) were inversely associated with good global SRH (Table 3). When age and functional ability appeared simultaneously in the analysis, the 80-99 year age group had a sig-

nificant positive association with good global SRH (OR 2.21; 95% CI 1.19-4.13), but for the age group 70-79 the association still was inverse. The likelihood of good global SRH was significantly higher among those who had good or moderate functional ability. Adjusting for age, this association strengthened. In the fully adjusted model, there was no association between age and global SRH, but good and moderate functional ability still were associated with good and average SRH.

The effect of selection bias

Altogether, 74% of those in the "missing" category (including institutionalized people, proxy respondents, and those who did not answer the comparative question) belonged to the age group 80-99, and 79% of them had poor functional ability. In the unadjusted multinomial regression analyses in which missing values formed a separate category, and worse comparative SRH and poor global SRH were reference groups, age 80-99 was associated with a "missing" category in both comparative (OR 72.52; 95% CI 23.70-221.89) and global (OR 10.46; 95% CI 3.46-31.67) SRH. Adjusted for functional ability, the association of age with both measures diminished but was still highly significant. Unadjusted good functional ability was inversely associated with a "missing" category both in the comparative SRH (OR 0.02; 95% CI 0.003-0.21) and global SRH (OR 0.11; 95% CI 0.01-0.93), and this result did not change markedly when age was introduced into the model. All the other coefficients were the same as in Table 3.

Next, all the "missing" values were included in the "worse" category in the comparative measure and in the "poor" category in the global measure, and these categories were used as reference groups in multinomial regression analyses (Table 4). The 80-99 year age group, which in our earlier analyses without missing values was associated with better comparative health (Table 3), was now inversely associated with it. However, with the introduction of functional ability into the model, the association again became significantly positive (Table 4). The association of older age with global SRH was of the same magnitude as in the previous analysis without the missing values, both unadjusted and adjusted for functional ability.

Table 3 - *Associations of age and functional ability with comparative and global self-rated health (SRH). Results of multinomial regression analyses. Fully adjusted models include sex, occupational class and chronic diseases. Worse comparative SRH and poor global SRH are reference groups.*

	Comparative SRH						**Global SRH**			
	Better		**About the same**		**Cannot say**		**Good**		**Average**	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Age										
60-69	1		1		1	1	1		1	
70-79	0.73	0.45-1.19	0.75	0.45-1.25	1.42	0.80-2.53	**0.32**	**0.20-0.51**	**0.50**	**0.32-0.76**
80-99	**3.17**	**1.44-6.98**	0.95	0.39-2.34	**3.76**	**1.55-9.08**	**0.53**	**0.32-0.89**	**0.51**	**0.24-0.71**
Functional ability										
Poor	1		1		1	1	1		1	
Moderate	**2.75**	**1.43-5.28**	**3.21**	**1.60-6.53**	1.11	0.58-2.12	**4.29**	**2.16-8.52**	**3.98**	**2.25-7.04**
Good	**14.82**	**7.01-31.30**	**10.74**	**4.82-23.91**	2.16	0.99-4.71	**55.15**	**24.90-122.14**	**21.48**	**10.48-44.04**
Age/Functional ability										
Age										
60-69	1		1		1	1	1		1	
70-79	1.22	0.71-2.10	1.03	0.60-1.76	1.73	0.95-3.13	**0.49**	**0.29-0.91**	0.63	0.40-1.00
80-99	**12.37**	**5.13-29.80**	2.25	0.87-5.82	**5.85**	**2.29-14.84**	**2.21**	**1.19-4.13**	0.97	0.52-1.78
Functional ability										
Poor	1		1		1	1	1		1	
Moderate	**4.74**	**2.27-9.82**	**3.63**	**1.77-7.47**	1.48	0.75-2.92	**5.66**	**2.75-11.67**	**4.17**	**2.32-7.49**
Good	**36.63**	**16.96-90.62**	**12.87**	**5.57-29.69**	**3.75**	**1.62-8.67**	**80.70**	**34.14-190.73**	**21.36**	**10.11-45.12**
Fully adjusted model										
Age										
60-69	1		1		1	1	1		1	
70-79	1.32	0.76-2.30	2.57	0.92-7.12	1.80	0.98-3.28	0.51	0.30-0.87	0.65	0.41-1.05
80-99	**12.03**	**4.63-31.22**	1.10	0.64-1.90	**5.65**	**2.04-15.62**	1.59	0.80-3.18	0.86	0.45-1.66
Functional ability										
Poor	1		1		1	1	1		1	
Moderate	**4.00**	**1.85-8.65**	**3.49**	**1.65-7.38**	1.38	0.68-2.81	**4.93**	**2.18-11.15**	**3.64**	**1.97-6.70**
Good	**23.44**	**9.85-60.15**	**9.32**	**3.91-22.50**	**3.04**	**1.26-7.29**	**54.20**	**21.20-139.31**	**16.97**	**7.81-36.83**

Table 4 - *Associations of age with comparative and global self-rated health (SRH). Results of multinomial regression analyses in which "missing" cases are included in "worse" category for comparative SRH and in "poor" category for global SRH. Worse comparative SRH and poor global SRH are reference groups.*

	Comparative SRH						Global SRH			
	Better		About the same		Cannot say		Good		Average	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Unadjusted										
Age										
60-69	1		1		1		1		1	
70-79	**0.58**	**0.38-0.91**	**0.59**	**0.37-0.95**	1.12	0.65-1.93	**0.30**	**0.19-0.46**	**0.47**	**0.31-0.70**
80-99	**0.41**	**0.26-0.64**	**0.12**	**0.06-0.23**	**0.49**	**0.27-0.89**	**0.30**	**0.19-0.46**	**0.24**	**0.14-0.39**
Adjusted for functional ability										
Age										
60-69	1		1		1		1		1	
70-79	1.09	0.64-1.83	0.91	0.54-1.52	1.44	0.84-2.65	0.50	0.30-8.26	0.64	0.40-1.00
80-99	**2.37**	**1.33-4.23**	**0.41**	**0.20-0.82**	1.03	0.52-2.02	**1.78**	**1.01-3.15**	0.75	0.43-1.29
	worse+missing is a reference category						poor+missing is a reference category			

DISCUSSION

This study indicates that, in old age, the choice of reference group and the individual's own expectations of health with advancing age influence both global and comparative SRH, but not necessarily in exactly the same way. The results also suggest, consistent with earlier studies, that old people are inclined to contextualize "normal" health and deviations from it with regard to their age.

Our results confirm earlier findings (13, 22, 23) that with increasing age people are likely to rate their health as better than that of their age peers when they get older; this is particularly true in the age group 80 and over. The likelihood of better comparative health ratings in very old age strengthened as functional ability was adjusted for. The likelihood remained highly significant after controlling for chronic diseases and sociodemographic factors. This suggests that, particularly in relation to their functional ability and chronic conditions, older age people make increasingly favorable assessments of their health.

For global SRH, the results were somewhat different. In unadjusted analysis, good global SRH was more likely in younger age. By contrast, adjusted for functional ability, the age group 80-99 was more likely to have good global SRH, but the likelihood was clearly weaker than between old age and better comparative SRH. When age, sex, occupational class, functional ability and chronic diseases were accounted for, age was not significant at all.

As in earlier studies (3, 12-16), functional ability was an important factor in both self-ratings of health, and in global SRH in particular. It seems that age and functional ability influenced each other in their association with comparative and global SRH: adjustment for functional ability increased the likelihood of better comparative SRH or good global SRH in high age, respectively, and adjustment for age increased the association of good functional ability with positive SRH. However, when tested using an interaction term, the interaction between age group and functional ability was not significant for either comparative (p=0.39) or global (p=0.71) self-rated health.

In surveys, it is usual that, the older the age group, the more people are excluded from analyses because of the decision to study only home-dwelling people, or because data is missing due to health reasons or refusal to participate. Often, as was the case in our study, these people are likely to be older and in poorer condition than those who are included in the analyses (27). Therefore, we conducted separate analyses to examine the possible effect of non-respondents on the results. Our analyses suggest that comparative SRH may be more sensitive than global SRH to non-response: the results in which "missing" cases were included in the negative response category differed from those without the missing cases, more for comparative than global SRH.

In these analyses, we assumed that all 80 persons with "missing" values would have assessed their comparative SRH as "worse" and their global SRH as "poor", if they had answered. This is a strong "worse-case" assumption and may be somewhat misleading. Actually, the number of missing values was 80 only in the comparative question; in the global question, it was 43. Of the 37 subjects for whom the global assessment was available, 20 persons answered either "good" or "average" to the global question. This suggests that all 80 would not have answered "worse" to the comparative question either. If this is true, our analysis may have exaggerated the effect of the missing cases on the association between age and self-ratings of health, and in particular, resulted in exaggerated attenuation of the association between high age

and "better" comparative self-rated health. To ensure that the different number of real missing values did not affect the results, we conducted analyses in which the institutionalised people were omitted. The results show that compared to the analyses without missing values the association between age and comparative SRH changed more than the association between age and global SRH. The unadjusted association between age and comparative SRH was not statistically significant (OR 1.65; 95% CI 0.91-2.99 for age group 80-99) whereas the association between age and global SRH (OR 0.46; 95% CI 0.28-0.75 for age group 80-99) remained almost the same as in the original analysis. Adjusted for functional ability, the association between age and comparative SRH was highly significant (OR 7.83; 95% CI 3.80-16.12 for age group 80-99) and the association between age and global SRH also was positive (OR 2.27; 95% CI 1.23-4.18). Thus, comparative SRH seems to be more age-sensitive even if the institutionalised persons were excluded from the analyses.

Some weaknesses in our study deserve comment. The influence of missing values was analysed here only among those who participated in the study, 80% of the sample. The situation of the 20% who constituted the loss remains open. We know, however (25), that the loss included both sick and well-functioning, active people, who were mainly community-dwelling. Therefore, it is not likely that their health status was worse than that of those included in the "missing" category in our analysis. Further, 16% of the respondents answered "cannot say" when they were asked to compare their health with that of their age peers. A similar response category was not available for global SRH. We do not believe that the comparisons between the two SRH measures were hampered by this difference. The increasing likelihood of "cannot say" answers with advancing age and worsening functional ability may partly be due to the missing or narrowed comparison group, and the intention to maintain a positive self-image when health is getting worse.

Both this study and studies on SRH and mortality (5, 8, 10) indicate that, to some extent, comparative and global self-rated health behave differently. For global self-ratings of health, respondents have more freedom to choose their reference points (e.g., the person's own earlier health), while an explicit age-referential question invites respondents to construct an image of what is usual for health "at my age". In addition to age peers known to the subject, general negative stereotypes of old age or the health history of a person's own birth cohort may also be used as a reference. If these negative reference points are used, it means that with advancing age, a person's own health can be assessed as "better than that of my age peers" at increasingly higher levels of disability and morbidity.

CONCLUSIONS

The behavior of different self-ratings of health in relation to age has consequences which affect their usability in research. Comparative self-rated health is a comprehensive but age-calibrated summary measure of health-related domains. This is also true for global self-rated health (19), but our results indicate that the comparative measure may be even more influenced by age. Therefore, comparative self-rated health may not be a valid measure of health status in samples in which the age range is wide, or in comparisons between different age groups. Comparative SRH may also be more sensitive to selection bias. Thus, when self-rated health is used as a measure in survey studies or in clinical settings, the global question should be preferred.

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