

RAINER REILE

Self-rated health:
assessment, social variance and
association with mortality



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Institute of Social Studies, University of Tartu, Estonia

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LIST OF ORIGINAL PUBLICATIONS

This dissertation is based on four original publications which will be referred to in the dissertation by their respective Roman numbers (**Studies I–IV**):

- I Reile, Rainer; Leinsalu, Mall (2013). Differentiating positive and negative self-rated health: results from a cross-sectional study in Estonia. *International Journal of Public Health*, 58(4), 555–564.
- II Reile, Rainer; Helakorpi, Satu; Klumbiene, Jurate; Tekkel, Mare; Leinsalu, Mall (2014). The recent economic recession and self-rated health in Estonia, Lithuania and Finland: a comparative cross-sectional study in 2004–2010. *Journal of Epidemiology and Community Health*, 68, 1072–1078.
- III Reile, Rainer; Stickley, Andrew; Leinsalu, Mall (2017). Large variation in predictors of mortality by levels of self-rated health: Results from an 18-year follow-up study. *Public Health*, 145, 59–66.
- IIIa Reile, Rainer; Stickley, Andrew; Leinsalu, Mall (2017). Re: Letter to the Editor of *Public Health* in response to ‘Large variation in predictors of mortality by levels of self-rated health: results from an 18-year follow-up study’. *Public Health*, 147, 157–158. (Supplementary publication)
- IV Reile, Rainer; Leinsalu, Mall (2017). Ethnic variation in self-rated health–mortality association: Results from a 17-year follow-up study in Estonia. *Medicina*, 53, 114–121.

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Study I: Rainer Reile (RR) formulated the research question, prepared the data, performed the data analyses and wrote the first draft of the manuscript. Revising the manuscript and responding to the reviewers’ comments was done in collaboration with Mall Leinsalu.

Study II: RR participated in the study design and data preparation, performed the data analyses and wrote the first and consecutive drafts in collaboration with the co-authors. RR was the corresponding author and revised the manuscript according to the reviewers’ comments.

Studies III, IIIa and IV: RR formulated the research questions and prepared the data together with Mall Leinsalu. RR performed the data analyses and wrote the first draft of the manuscript. Revising the consecutive drafts and responding to the reviewers’ comments was done jointly by all authors.

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INTRODUCTION

Health is one of the most valued domains of human life and it can determine both the chances and outcomes of every endeavor. Health may be defined in numerous ways, but it is often perceived as a holistic concept of overall individual well-being. Yet, aside of its unquestionable individual importance and meaning, health can also be studied on the societal level, where the measurement of health and its predictors become the focus of interdisciplinary research in the fields of social and health sciences alike.

Health varies both between and within populations. Although the determinants of health such as age, gender, genes, health behavior and environment (just to name a few) may not always affect every individual's health directly, they influence health outcomes at the population level where an unequal distribution of health-related resources and opportunities can lead to systematic health disparities. Over the past few decades, the relative inequalities in health have widened in most European countries. Since the 1990s, the difference in the magnitude of these inequalities between the regions has become stronger, mostly because of increasing health inequalities in Eastern Europe (Mackenbach, Kulhanova et al. 2015). At the end of the 20th century, Estonia among other Eastern European countries witnessed not only substantially lower life expectancy at birth compared to the West but also very large differences in mortality between higher and lower socioeconomic groups (Leinsalu 2002, Leinsalu, Stirbu et al. 2009).

Health is a latent concept that cannot be measured directly. Its operationalization in the research context has led to a multitude of objective and subjective health measures that vary in their scope and application. Some measures are disease specific and especially useful when assessing the responsiveness of patients to interventions in a clinical setting, whereas other generic health measures, include an array of relevant health dimensions and range from single-item questions to complex multi-dimensional instruments.

The single question on an individual's self-rated health (SRH) – “How would you rate your health at the present time?”– has become one of the main tools in health and social survey research. SRH is a summary statement of an individual's health status and merges various aspects of ones' health including current and past experiences as well as socio-environmental and cultural conventions. In this, SRH has demonstrated high predictive validity regarding mortality outcomes with consistent association between poor SRH and higher mortality risk even after adjustment for key covariates such as functional status, depression, and co-morbidity (Idler and Benyamini 1997, DeSalvo, Bloser et al. 2006). Previous research has found that SRH is determined by a large set of biological, material, cultural and psychological components. Their relative importance for ones' health rating is assessed within an active cognitive evaluation process that consists of compiling the relevant health information and comparing it against a reference group or a standard (Manderbacka, Kareholt et

al. 2003, Jylha 2009). Due to the subjective nature of SRH, different populations and social groups may have (systematically) different expectations and reporting standards for health. As a result, the determinants of SRH may vary considerably across social clusters and populations. The findings that the same objective health status may not translate into an equivalent SRH category in different socioeconomic groups (Dowd and Zajacova 2010) and that different levels of SRH are associated with different factors (Kaplan and Baron-Epel 2003) indicate the likely variation in health concepts underlying subjective health assessments.

This dissertation will focus on SRH, a common measure of individual health status. The overarching aim of the thesis is to analyze the mechanisms underlying the subjective health evaluations. This will be done by studying the determinants and trends of SRH and its association with mortality using both survey and registry data from Estonia, Lithuania and Finland. In this, the thesis contributes to the research on the determinants of SRH and their social variance, a topic of key importance for tackling health inequalities within public health. Additionally, as the assessment mechanisms of SRH have received relatively limited research interest, this study will further elaborate the health concepts underlying SRH.

This dissertation draws upon four original publications – **Studies I–IV** – and presents an analytical overview of the studies and of relevant research on the subject and is structured as follows. Chapter 1 elaborates the theoretical and empirical context relevant to conceptualizing and measuring health. Chapter 2 provides an overview of the methodological aspects of the study by describing data and methods used in the original studies. The findings are presented in Chapter 3 and are discussed in Chapter 4. Conclusions are followed by a summary in Estonian.

1. DEFINING AND MEASURING HEALTH

1.1. Concepts of health and illness

Health is an elusive term as it has a variety of meanings. From an individual perspective, health is commonly identified as overall well-being and the states of illness and disease are seen as the lack of health. Yet, as health and illness are fundamental experiences of human life, their meaning surpasses the borders of the medical sphere highlighting the complexity of these concepts.

One of the most widely accepted definitions of health is that proposed by the World Health Organization (WHO) in which health is seen as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (Huber, Knottnerus et al. 2011). Health is thus understood as a combination of both the professional (e.g. lack of disease) and personal assessment (e.g. perception of well-being). While this definition acknowledges the multi-dimensional nature of health and emphasizes the importance of social factors, it does not provide a clear and concise definition of the nature of the subject. According to Tulloch (2005), it represents merely a vague description of the concept in terms of another unspecific term – well-being – and fails to provide any guidance on what it is and how to measure it.

From the sociological point of view, health as a description of “good life” reflects the values and nature of society. According to Turner (2000, p. 10): “Conceptions of health tend to merge into or be based on fundamental religious and moral views about existence, and differences in orientations towards health tend to reflect or to express basic structural and cultural differences in power relations in society”. In this, the meanings of health and illness have evolved over time and cannot be considered as static, given terms. For example, in primitive societies and early civilizations, life, disease and death were associated with mysticism where sacral belief systems explained the origin of all illness, disease and death (Encyclopedia of Bioethics). Secular traditions in understanding health and disease can be identified since the philosophical tradition of ancient Greeks, most notably in works of Hippocrates, Empedocles and Galen (Turner 2000) where, in addition to the emergence of rational observation in medical practice, health became defined as a balance of bodily liquids – humors (Crivellato and Ribatti 2007, Kleisiaris, Sfakianakis et al. 2014). This holistic theory led the medical practice until the 18th century when biomedical understanding of health and illness emerged from the advances in anatomy and other medical disciplines. This new approach was based on the etiological framework that viewed disease as a condition with biological causes and emphasized the role of medicine in eradicating these pathological symptoms (Armstrong 2000). Biomedical tradition, influenced by the Cartesian mechanistic conception of body, has relied on the negative definition of health as a state without disease or injury (Armstrong 2000, Mehta 2011).

In social sciences, the distinction between the terms “disease”, “illness” and “sickness” is often made. In this context, “disease” refers to pathological states

that deviate from a biological norm identified by professionals. “Illness” is an entirely personal experience of a lack of health and can thus be adequately perceived and described only by the subject itself. “Sickness” on the other hand, refers to the socially negotiated representations of ill health (Boyd 2000, Young 2004). The latter is an important addition as it extends the illness to the social and societal domain as “The experience of illness is not bounded by the bodies or consciousness of those who are ill” (Kleinman 2000, p. 31). Moreover, as people experience different social and cultural circumstances, the conceptualization of health may be found to vary systematically among social groups (Nettleton 1995). In this sense, the broader definition of health as a general quality of life becomes useful for health research as it does not restrict itself to professional definitions of disease nor to subjective illness experiences.

1.2. Health and illness from a societal perspective

There are close ties between people’s health and their social environment. The strong association between social position and health outcomes has been established since the 19th century (Irwin and Scali 2007) when the role of social conditions in the spread of the diseases in populations was scrutinized by early social critics and advocates of public health like Rudolf Virchow (Schultz 2008) and Friedrich Engels (Krieger and Higgins 2002). Since then, several noteworthy contributions to studies on the social determinants of health have been made.

Abdel Omran (1971) proposed that improvements in sanitation, nutrition and also healthcare have led to declining mortality rates and subsequently, to a change in disease profiles with the prevalence of degenerative and manmade conditions surpassing the previously dominant acute infectious diseases in Western societies. Similar claims were made by Thomas McKeown (1979), who used mortality data from the mid-19th century England and Wales to illustrate the declining mortality from infectious diseases before relevant medical interventions were introduced. He argued, that the increased longevity and growth in world population from the 1700s onwards, rests on broad economic and social changes rather than on public health or medical interventions. While McKeown’s work has faced criticism, the underlying concept of the negative effects of deprivation on well-being and health were essentially true (Colgrove 2002).

Although the definition of health in the WHO Constitution provided epistemological space for a holistic concept of health already in 1948 (Huber, Knottnerus et al. 2011), the public health initiatives of the following decades were mostly disease-specific or oriented towards medical technology with only limited focus on the social and societal factors of health outcomes (Irwin and Scali 2007). The Black Report, originally published in 1980 (Townsend 1986) represents a major milestone in understanding the social gradients in health. It reviewed the evidence on health differences between the social classes in Great

Britain and found that despite considerable improvements in overall health, health inequalities between social classes had been widening. Similar findings from Whitehall studies (Marmot, Smith et al. 1991) showing a graded association between employment grade of civil servants and health outcomes, sparked academic and policy interest for health inequalities followed by a rapid rise in empirical studies addressing this issue.

1.2.1. Health inequalities and their explanations

There is consistent evidence for systematic differences in the health of people who are in unequal positions of society. The term “health inequality” is used to refer to differences in any measurable aspect of health of individuals or groups (Kawachi, Subramanian et al. 2002). Alternatively, terms “health inequity” or “health disparity” are used to note observed differences in health that are unjust and could be avoided by reasonable means (*ibid.*).

Cross-national comparative studies have found that social inequalities in health are systematic and universal with those in less-favorable social positions having poorer health (Silventoinen and Lahelma 2002, Mackenbach, Stirbu et al. 2008, Mackenbach, Kulhánová et al. 2015). Health inequalities are present in all countries and are persistent even in affluent societies with well-developed social safety nets (Marmot, Allen et al. 2012). Moreover, health disparities have since the 1980s been stable or even increased (Mackenbach, Kulhánová et al. 2015, Hu, van Lenthe et al. 2016). The latter is emphasized foremost by the increase in relative inequalities (e.g. measured as rate ratios) observed for both self-rated health (Hu, van Lenthe et al. 2016) and mortality outcomes (Mackenbach, Kulhánová et al. 2015) whereas trends in absolute inequalities (e.g. measured as rate differences) have remained mostly constant (*ibid.*).

The contribution and variation of social determinants in health outcomes is of significant interest in the context of health inequalities. The Black Report (Townsend 1986) suggested, that the observed social differences in health could be either measurement artefacts, outcomes of natural or social selection, or result from cultural/behavioral or materialist differences. The “artefact” explanation criticized the measurement of health and social class implying that the association between health and social clusters might relate to the operationalization of the measures themselves (Blane 1985). The second explanation considered the possibility that an individual's health might influence their chances of social mobility. Yet, as health inequalities were found across all age groups the role of health selection in health inequalities is limited (Townsend 1986). Cultural explanations viewed gradients in health as the result of social class differences in behaviors such as the consumption of harmful commodities (e.g. tobacco and alcohol), leisure-time exercise and utilization of preventive health care. The materialist explanation interprets social class differences in health as a result of structurally determined differences in the spheres of production and consumption (Townsend 1986).

Theoretical explanations of health inequalities have later been elaborated in several theoretical papers (Blane 1985, Link and Phelan 1995, Macintyre 1997, Graham 2004, Phelan, Link et al. 2010, Bambra 2011). The materialist approach that focuses on the structural factors that affect health through individual socio-economic status (SES) has been a dominant framework for many later analyses. As SES (defined often by educational level, income or occupational class) embodies an array of resources, such as money, knowledge, prestige, power, and beneficial social connections that affect health no matter what mechanisms are relevant at any given time, inequalities in SES are often seen as “fundamental” causes of health inequalities (Link and Phelan 1995, Phelan, Link et al. 2010).

While a detailed review of these mechanisms is available elsewhere (Mackenbach 2012), most theoretical approaches explain the causation of health inequalities with “social selection”, “social causation” and/or with “life course perspectives” (Solar and Irwin 2010). These, often interacting pathways, emphasize the role of social determinants in health outcomes and form the basis for the social model of health.

1.2.2. Social model of health

The social model of health is an interdisciplinary approach that moves beyond the biomedical model and explains outcomes of health and health inequalities as a result of complex interactions between individual characteristics, lifestyle and the physical, social and economic environment (Yuill 2010). The social model of health thus follows the holistic definition of health and emphasizes the central role of the social determinants in health outcomes (Solar and Irwin 2010). The social determinants of health are defined as “The economic and social conditions that influence the health of people and communities” which are shaped by personal resources and influenced by policy choices and affect factors that are related to health outcomes (Commission on Social Determinants of Health 2008).

Several models explaining the social determinants of health have been proposed. Georg Engel (1977) was among the first to contest the biomedical approach by including the psychosocial dimensions of health in addition to the biological, disease-related aspects. A model by Dahlgren and Whitehead (2007) distinguishes between individual characteristics and several layers of influences amenable by policies: personal behaviors; interactions within their peers and community; living conditions; and finally, the economic, cultural and environmental influences of the society. These determinants of health that can be influenced by individual, commercial or political decisions could be categorized into positive health factors, protective factors, or risk factors (*ibid.*). The first refers to aspects contributing to maintenance of health (e.g. income), whereas the protective (e.g. healthy diet) and risk factors (e.g. smoking) address the risk (or its absence) for poor health and disease. Another conceptual model for

health determinants was proposed by Brunner and Marmot (Brunner and Marmot 2001). Similarly, to the previous approach, this framework places the biological and psychological pathways to poor health in the context of wider, social and environmental structures. The characteristics of the society shape the social and work environments which thus affect the individual health behavior. Psychological and biological processes are the intermediates on the pathway from the societal level to individual health outcomes with important contributions from genetic, cultural and life-course related aspects (Brunner and Marmot 2001).

One of the latest contributions is the model developed by WHO's Commission on Social Determinants of Health (Marmot, Friel et al. 2008, Solar and Irwin 2010). This framework (Figure 1) links health outcomes with a complex set of interactions between structural mechanisms and the social determinants of health. The first defines the individual's socioeconomic position within hierarchies of power, prestige and access to resources which are shaped by the cultural, political, and social contexts. Social status reflects how individuals experience illness and differentiates the exposure and vulnerability to health-compromising conditions that together with material and psychosocial circumstances, behavioral and biological factors – defined as intermediary determinants – lead to social gradation in health outcomes. Health systems and access to healthcare that contribute to health outcomes and also mediate the different consequences of illness are seen as the components of the social determinants of health (Solar and Irwin 2010).

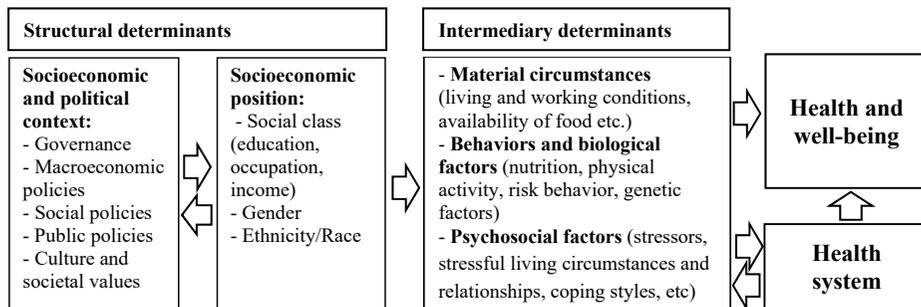


Figure 1. Conceptual framework for the social determinants of health proposed by WHO's Commission on Social Determinants of Health. Adaption from Solar and Irwin (2010).

These different approaches to the determinants and causal pathways of health and health inequalities discussed above can be termed the social model of health. Based on a holistic understanding of health, this approach explains how the social structures and individual agency contribute to health outcomes and their social variance. In this, the social model of health also serves as an analytical framework for the current thesis.

1.3. Measuring health in a research context

A range of different instruments have been used to measure health with the choice of metric reflecting both the definition of health and the purpose of the measurement (McDowell 2006, Shroufi, Chowdhury et al. 2011). In general, disease-specific, preference-based and generic tools can be distinguished (McHorney 2000). In the first case, health is operationalized to capture either a certain dimension of health (e.g. mental health) or aspects relevant to a specific disease. Preference-based instruments such as health-related quality of life measures such as Medical Outcome Scale SF-36 (Ware and Sherbourne 1992) and EuroQol's EQ-5D (The EuroQol Group 1990) combine health state assessment with population weighted values yielding an aggregate summary score for health status. Generic health status measures include an array of health dimensions relevant across disease or illness categories and are intended to be appropriate for various population groups. Both single- and multi-item measures are used to measure health outcomes, yet for the latter, the general trend has been towards shortening the questionnaires (McHorney 2000). Compared to full-length scales, the single items may underestimate the magnitude of association and provide lower reliability (Hays, Reise et al. 2012), yet longer questionnaires have been associated with lower overall response rates (Rolstad, Adler et al. 2011) and higher item non-response (Sahlqvist, Song et al. 2011).

Health is a latent property and cannot be measured directly, thus the conceptualization and operationalization of health are the main concerns for any research interested in health assessment (McDowell 2006, Keszei, Novak et al. 2010). Different conceptions of health (e.g. defining health in positive or negative terms) influence how health is operationalized into measurable items. Traditionally, health outcomes at the population level have been based on countable events, defined as changes in the occurrence of diseases, disabilities, injuries, and/or deaths (Thacker, Stroup et al. 2006). Mortality statistics and other registry based data are often considered as an example of objective health measures whereas patient-reported measures are subjective in nature. In practice, the distinction between objective and subjective becomes often arbitrary as interpretational biases, introduced in the collection and data processing phases, might be present in both cases (McDowell 2006). One of the shortcomings of event based measures is their focus on limited aspects of health status and their inability to account for the individual variability of illness experiences. For example, the same diagnosis may be associated with different

levels of health in the same individual at different points in time, or among different individuals from within and beyond the same population (Fayers and Sprangers 2002). In case of chronic illnesses, patients develop coping strategies and use various resources to reorganize their lives (Pierret 2003) and the illness experiences, albeit subjective in nature, which can lead to different health outcomes depending on the severity and progression of the disease (Sanders, Donovan et al. 2002) as well as the social environment (Lauveng, Tveiten et al. 2016).

The key questions for every measurement effort are whether the test measures are valid, i.e. they measure what they are intended to measure, and the results are reliable, and they are consistent. Validity of an instrument can be assessed in multiple ways with criterion, content and construct validity being common theoretical approaches (McDowell 2006). For example, in one of the first validation studies on self-rated health, Suchman and colleagues (1958, p. 232) concluded that “as a substitute for an actual medical examination, these self-ratings do indeed appear to have extremely low validity /.../ But as measures of “perceived” health – how the individual “feels” about his health – these self-ratings show significant relationships to both attitudinal and behavioral correlates of health.” This implies that the criterion validity of the measure compared to medical examination as the gold standard is rather low whereas SRH presents high construct validity as a measure of subjective health. Thus the validity is not an inherent property of the measure itself but depends on the scale, conditions and the group being tested (Keszei, Novak et al. 2010).

Patient-reported measures of overall health-related quality of life have become accepted as important for both the evaluation and comparison of treatments and for the assessment and management of individual patients (Fayers and Sprangers 2002). Generic health-related quality of life indices address several health domains separately and the structure of these instruments reflects the way health is conceptualized by the researcher. Given the variation in the meanings associated with health, another approach for conceptualizing the latent variable of health is to formulate a single straightforward question on the item (Cano and Hobart 2011).

1.4. Measures of self-rated health

Self-rated health (SRH, also self-assessed health, self-reported health or self-perceived health), refers to subjective health assessments that are collected in survey settings. SRH is commonly measured as a response to the question “How would you rate your health at the present time?” with considerable variation in question wording, type of scale and the number or wording of response options across studies (Table 1). In addition to global measures that ask respondents to rate their health in general without specific reference, sometimes age- or peer-group comparisons (Eriksson, Unden et al. 2001, Vuorisalmi, Lintonen et al. 2006) or health-domain specific contexts such as self-rated

mental (Ahmad, Jhaji et al. 2014) or oral health (Benyamini, Leventhal et al. 2004) are used.

SRH is also included in several multi-item instruments of health-related quality of life such as SF-36 and EQ-5D and is also a part of Mini European Health Module (Robine and Jagger 2003). SRH is recommended as a standard survey instrument by WHO (de Bruin, Picavet et al. 1996) and included in many ongoing large international survey programs such as the European Social Survey (ESS), the Survey on Health, Ageing and Retirement in Europe (SHARE), The European Union Statistics on Income and Living Conditions (EU-SILC), European Health Interview Survey (EHIS) and Eurobarometer. In this, SRH has become one of the main tools in health measurement research as it is often the only consistently collected measure of health in general population surveys (Au and Johnston 2014).

Table 1. Examples of question and response options for SRH used in different surveys

Question	Response scale	Survey
Would you say that your health in general is ...?	excellent; very good; good; fair; poor	National Health Interview Study, USA (Dowd and Zajacova 2007)
How is your health in general? Would you say it is...?	very bad (1); bad (2); fair (3); good (4); very good (5)	European Social Survey, (Alvarez-Galvez, Rodero-Cosano et al. 2013)
In the last twelve months, would you say your health has been ...?	very good; good; fair; bad; very bad	National Health Survey of Spain (Giron 2012)
How is your health at the moment?	very good (1); good (2); not good (3); poor (4)	Nord-Trøndelag Health Study (Dalen, Huijts et al. 2012)
How would you describe your state of health in general?	excellent; quite good; fair; rather poor; very poor	Community health study in Switzerland (Bopp, Braun et al. 2012)
How would you rate your health today?	very good; good; moderate; poor; very poor	Health survey in Greece (Zavras, Tsiantou et al. 2013)
What is your own assessment of your present state of health?	good; reasonably good; average; rather poor; poor	FinBalt Health Monitor Survey (Helasoja, Lahelma et al. 2006)
How do you describe your general state of health compared to people of your own age?	better; worse; about the same	SweOld study in Sweden (Manderbacka, Kareholt et al. 2003)

SRH has been associated with morbidity (Chan, Teh et al. 2015, Waller, Janlert et al. 2015), functional ability (Ghorbani Saeedian, Nagyova et al. 2014), hospitalization and health care utilization (Tamayo-Fonseca, Nolasco et al. 2015), and with long-term sick-leave and disability pensions (Halford, Wallman et al. 2012, Henderson, Stansfeld et al. 2013). Furthermore, SRH has repeatedly been shown to predict mortality even after controlling for a variety of health-related measures, such as chronic diagnoses, physical and mental symptoms, medication usage and functional ability (Idler and Benyamini 1997, DeSalvo, Bloser et al. 2006). Considerable social gradation in SRH by education, income, occupational class and by other indicators of socioeconomic status (SES) has been reported, therefore SRH has been widely used to monitor health inequalities (Kunst, Geurts et al. 1995, Lahelma, Kivelä et al. 2002, Kunst, Bos et al. 2005, Hu, van Lenthe et al. 2016).

The advantage of SRH is that it provides a holistic approach to health (Fayers and Sprangers 2002) capturing elements of health that more guided questions cannot (Jylha 2009). SRH represents a summary statement which brings together various aspects of one's health including both past and present experiences and social, environmental or cultural conventions.

1.5. Empirical studies on self-rated health

Despite the extensive use of SRH as an outcome measure of health status in previous literature, the importance of the subjective health evaluation process and its relevance to observed social variance of SRH is still relatively little acknowledged. In line with the overall aim of the study, the following review describes previous empirical studies analyzing: a) the evaluation mechanisms of SRH, b) the social determinants of SRH and health inequalities, c) associations between SRH and mortality, and d) methodological challenges when using SRH as an indicator of health.

1.5.1. Conceptualization of self-rated health

Several studies have attempted to conceptualize the health assessment processes. Knäuper and Turner (2003) proposed a model that rests on the cognitive knowledge about diagnosed conditions, health care utilization, health beliefs and knowledge about physical abilities and bodily sensations in the present and the past. This introspective process is likely to include compiling relevant information on one's health and evaluating this information in terms of a reference-group comparison or a standard (Manderbacka, Kareholt et al. 2003). Manderbacka and colleagues suggest that such assessment relies on the intuitively weighted information that is considered relevant for mortality outcomes and ignores mortality-irrelevant elements, thus explaining the high validity of SRH-mortality association. These explanations are supported by findings from

experimental studies (Williams, Wasserman et al. 2003) that have shown variance in the health assessment process with those having poorer SRH taking longer to process health-related information and being more proficient when using health-related terms.

Similarly, another model proposed by Jylhä (2009) explains the assessment mechanism of SRH as a cognitive process. Firstly, this process involves interpreting the meaning of health and identifying the relevant components. Secondly, one has to consider the way in which these components are taken into account based on various social and cultural frameworks. Finally, one has to decide which of the levels in the SRH scale best reflects the collected and assessed health information. This approach has faced some criticism (Huisman and Deeg 2010) suggesting that the cognitive information processing of SRH is not necessarily rational nor constrained within these hypothetical stages of assessment. Also, the health evaluation should not be considered as finite (when asked to assess their health) but rather as an ongoing process. For example, it has been argued that health assessments of younger and healthier respondents are not based on illness-related health conceptions as they lack such experience (Idler, Leventhal et al. 2004). This is supported by the findings from a recent study (Au and Johnston 2014) that found vitality (i.e. being energetic and full of life) being the most important dimension in SRH in healthy subgroups. In this respect, SRH can be interpreted as an “enduring self-concept” (Dowd and Todd 2011) that is resilient to fluctuations due to temporary health conditions (Bailis, Segall et al. 2003) which could explain the high predictive power of SRH in relation to future health outcomes in empirical studies.

Huisman and Deeg (2010) suggest that SRH should be recognized as a measure of people’s perception of their health rather than a proxy for objective health, as the latter is too difficult to measure. Some authors (Jürges 2007, Layes, Asada et al. 2012) have interpreted SRH as an interaction of latent ‘true health’ and reporting behavior. The former is defined by Layes and colleagues (2012:1) as the “value assigned to duration of life modified by the impairments, functional states, perceptions, and social opportunities that are influenced by disease, injury, treatment, or policy” (Figure 2). Reporting behavior is the interpretation of latent health that is affected by systematic measurement error as individuals and population groups have different knowledge, perceptions and coping strategies regarding their health. This phenomenon, known as reporting heterogeneity will be discussed in more detail in Chapter 1.5.4.

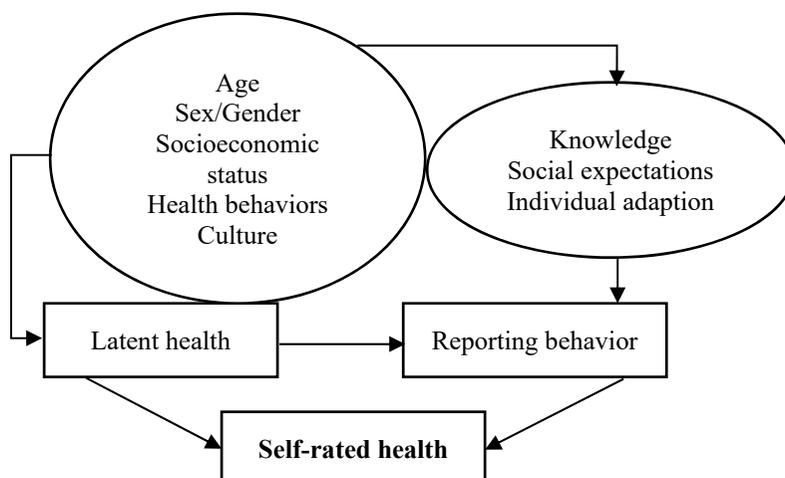


Figure 2. The role of latent health and reporting behavior in subjective health assessments (Layes, Asada et al. 2012)

1.5.2. Social determinants of self-rated health

The components and pathways of the social model of health discussed previously have been extensively studied in respect to SRH as an outcome measure. In addition to age, that presents almost universal association with SRH in different populations (Martikainen, Aromaa et al. 1999, Groot 2000, Jylha, Guralnik et al. 2001, af Sillen, Nilsson et al. 2005, Vuorisalmi, Lintonen et al. 2006), associations with SRH have been found for a wide range of demographic and socioeconomic indicators. Gender is an important social dimension that in the context of SRH relates to the differential exposure and vulnerability to both biological and social forces affecting health (af Sillen, Nilsson et al. 2005). Biological factors as well as behavioral components lead to varying disease burdens and reflect thus also discrepancies in SRH. Some empirical studies have shown that ethnic or racial minorities tend to report poorer SRH compared to main ethnic or racial groups (Lindstrom, Sundquist et al. 2001, Lim, Ma et al. 2007, Brewer, Miyasato et al. 2013) whereas no significant differences have been found in other studies (Newbold 2005, Komar, Nagymajtenyi et al. 2006). Ethnicity and race are demographic characteristics that, similarly to gender, may reflect the differences in health behaviors and health-related-resources that lead to health disparities (Kershaw, Mezuk et al. 2010). For example, it has been shown that ethnic variations in SRH can be explained by differences in socioeconomic status, acculturation, and access to health care (Min, Rhee et al. 2014). Being married or cohabiting has also been associated with better SRH in number of studies (Joutsenniemi, Martelin et al. 2006, Kawada and Suzuki 2011). The protective mechanisms of being married or cohabiting relate to the higher levels of material resources and social control of health-damaging behav-

iors such as smoking among married people (Hughes and Waite 2002). The health-effect of being married decreases at older ages and at lower levels of health (Zheng and Thomas 2013). Moreover, as significant variations in health evaluations by age (Zajacova and Woo 2016), gender (Jylha, Guralnik et al. 1998, Benyamini, Leventhal et al. 2000), ethnicity (Bzostek, Goldman et al. 2007, Seo, Chung et al. 2013), and marital status (Zheng and Thomas 2013) are found, the demographic characteristics are likely to contribute to most pathways between the social determinants of health and SRH.

Individual's socio-economic position is a powerful predictor of ones' health outcomes and is among the most important structural stratifiers in the context of social determinants of health (Solar and Irwin 2010). SRH has been repeatedly used to assess health inequalities, with adverse socioeconomic positions being associated with poorer health (Lahelma, Rahkonen et al. 1997, Kunst, Bos et al. 2005, Helasoja, Lahelma et al. 2006, Hu, van Lenthe et al. 2016). A higher socioeconomic position may reflect the availability of social, psychological and economic resources that lead to health differences (Martikainen, Adda et al. 2003). For example, in a study by Ahnquist and colleagues (2012), both low social and low economic capital were independently associated with poor health outcomes, and a combination of both further increased the risk of poor health. Socioeconomic position is generally operationalized into indicators of education, income and occupational class but other measures such as wealth, material circumstances or employment status are also used (Robert and House 2000). As different measures capture different aspects of an individual's social and economic status, considerable variations have been reported in empirical studies. For example, Perlman and Bobak (2008) found stronger associations with SRH for low income than for low education. The latter has found to be a stronger predictor of SRH among women than men (Ross, Masters et al. 2012) and individual income is a stronger predictor of SRH than income change (Contoyannis, Jones et al. 2004). Although these indicators separately capture slightly different resources, their total effects on health are either explained by or mediated through other socioeconomic indicators (Lahelma, Martikainen et al. 2004). In addition to individual level factors, macro-level indicators such as GDP per capita (Olsen and Dahl 2007) and welfare-state characteristics (Eikemo, Bambra et al. 2008) further contribute to SRH.

The relative importance of the health component in SRH has been demonstrated previously with several studies (Murata, Kondo et al. 2006, Singh-Manoux, Martikainen et al. 2006) indicating that morbidity and functional status account for up to 40% of the variance in sub-optimal SRH with those having more medical conditions and functional limitations having also poorer health ratings. Also, the negative health effects of smoking, physically inactive lifestyles, excessive body weight have been reported (Prus 2011). More recently, twin studies (Silventoinen, Posthuma et al. 2007, Mosing, Verweij et al. 2010, Harris, Hagenaars et al. 2016) have been used to explore the genetic and heritability aspects of SRH. While heritability could account for up to 40% of variations in individual health, it has been shown that genetic factors mediate

the associations between SRH and stress (Finkel, Gerritsen et al. 2014) and cognitive abilities (spatial reasoning, perceptual speed, and visual memory) for older adults (Svedberg, Gatz et al. 2009). Thus, the health related components and gene-environment interactions are likely to affect both the health status and its assessment, serving as the intermediary determinants to health outcomes in the context of social model of health (Solar and Irwin 2010).

1.5.3. Self-rated health and mortality

SRH has consistently been found to predict mortality outcomes (Idler and Benyamini 1997, DeSalvo, Bloser et al. 2006) indicating a strong association between poor SRH and higher mortality risk even after adjustment for key covariates such as functional status, depression, and co-morbidity. In this, SRH has appeared to be a better predictor of mortality than the type or number of symptoms experienced (Elliott, Hannaford et al. 2006), physician-rated health (Giltay, Vollaard et al. 2012) or health-related quality of life measures (Kaplan, Berthelot et al. 2007). While poor SRH results in a nearly twofold mortality risk compared to good SRH (DeSalvo, Bloser et al. 2006), the association between “excellent” and “very poor” SRH and mortality risk is also clearly hierarchical (Bopp, Braun et al. 2012).

The association with mortality persists even after 30 years of baseline measurements (Nielsen, Siersma et al. 2009, Bopp, Braun et al. 2012) and the strength of the association between SRH and mortality remains similar for studies with different follow-up periods (DeSalvo, Bloser et al. 2006). Some studies have shown, that the predictive validity of self-rated health may even increase over time. In a recent study (Schnittker and Bacak 2014), the relationship between SRH and mortality was found to be considerably stronger across all levels of self-rated health in respondents of the cohort from 2002 than of the cohort from 1980. Authors argued that due to the exposure of more health information in time, individuals have become better at assessing their health.

The SRH-mortality association seems to be universal in all the populations, yet studies have indicated considerable variances between population subgroups in this association. Higher predictive validity of SRH regarding all-cause mortality has been observed in younger ages (Zajacova and Woo 2016) and in men compared to women (Deeg and Kriegsman 2003). Also, while some studies have shown little to no variation in SRH-mortality association by occupational class (McFadden, Luben et al. 2009), education (Dalen, Huijts et al. 2012), or income (van Doorslaer and Gerdtham 2003), substantial socioeconomic differences have been reported by others. These studies have found stronger SRH-mortality association among higher educated respondents (Huisman, van Lenthe et al. 2007, Regidor, Guallar-Castillon et al. 2010) and higher SES individuals (Dowd and Zajacova 2007, Dowd and Zajacova 2010).

Social class differences in health behaviors and varying exposure to health hazards could contribute to the social variation in SRH-mortality association.

For example, job stress and work-related health hazards differ for professional and manual occupations (Cutler, Lange et al. 2011). Another line of argument attributes these variations to systematic differences in the health assessment process. Dowd and Zajacova (2007) have explained the socioeconomic disparities in mortality risk for the same SRH category with differences in health awareness. In this, the same SRH category does not reflect the same health state. Similar evidence has been found for ethnicity and race with minority groups often having worse baseline SRH, but similar risk of mortality compared to ethnic majorities (Franks, Gold et al. 2003, Suresh, Sabanayagam et al. 2011, Su, Wen et al. 2013).

1.5.4. Methodological challenges of using self-rated health

Although easy to administer and analyze, the seemingly straightforward measure of SRH has raised several methodological issues. These relate to subjective perceptions on the underlying health concepts, to the systematic variance observed in SRH ratings and also to the ways in which these self-ratings are interpreted.

As the assessment process is guided by the understanding of health concepts and relevant contextual factors (Jylha 2009), it can be assumed that the health evaluations could change in time. The test-retest reliability studies (Martikainen, Aromaa et al. 1999, Crossley and Kennedy 2002, Zajacova and Dowd 2011) have shown that individual SRH is rather volatile with 30–40% of respondents changing their assessments between measurements within the same surveys. Older respondents and those with lower SES are more likely to re-evaluate their health status (Crossley and Kennedy 2002, Zajacova and Dowd 2011). One likely explanation to the short-term response unreliability is the learning effects driven from other detailed health-related questions that stimulate the introspective process and lead to changing responses in the second assessment (Crossley and Kennedy 2002). In other longitudinal studies examining the change in SRH over longer periods (Leinonen, Heikkinen et al. 1998, Contoyannis, Jones et al. 2004, Breidablik, Meland et al. 2009), the reassessment of health is mostly influenced by a change in health status. For example, in a study of patients with type 2 diabetes (Nielsen, Jensen et al. 2015), only patients' perceived illness burden was associated with the change in SRH in mutually adjusted analysis. Although these results suggest considerable measurement error in individuals' health assessments, the reliability should not be considered as the major criteria as the subjective assessments are essentially characterized by their change rather than constancy (Damian 2012).

Another potential methodological and conceptual difficulty in SRH is that different populations and social groups may have systematically different expectations or reporting standards for health. Several authors (Jylha, Guralnik et al. 1998, Dowd and Todd 2011) have emphasized the potential impact of cultural variation in the meanings associated with seemingly universal value

labels of SRH scales that may lead to difficulties when interpreting SRH variation in cross-national and cross-cultural settings. This is illustrated by a study of 67 countries (Babones 2009) where the distribution of “very good” SRH ranged from 17% to 41% in developed countries but exceeded 42% in several countries from sub-Saharan Africa. According to Bzostek and colleagues (2007) ethnicity-related reporting variance can (among other reasons) be the result of acculturation and linguistic differences. Cultural and linguistic sensitivity can be illustrated with an example provided by Jürges (2007) that “excellent health”, commonly used in Anglo-Saxon language space may in German seem as ironic exaggeration in the context of health; a similar explanation for the relatively high proportion of people with “average” health in the Baltic countries compared to Finland was provided by Kasmel and colleagues (2004). Also, it has been found that adjective labels of excellent-to-poor SRH are not evenly spaced interval scale, with a noteworthy gap between “good” and “fair” health ratings (Perneger, Gayet-Ageron et al. 2013).

Although the subjective health assessments rely on the biological and constitutional aspects of health, there is also growing evidence that a given level of SRH may not translate into the same objective health categories in different groups of age (Groot 2000), gender (Ziebarth 2010), ethnicity and race (Kandula, Lauderdale et al. 2007, Lee and Schwarz 2014) and socio-economic status (Etile and Milcent 2006, Bago d’Uva, O’Donnell et al. 2008, Dowd and Zajacova 2010, Dowd and Todd 2011). This phenomenon has been termed as reporting heterogeneity (response shift and scale of reference bias are also used) and refers to a variation in reported measures across population groups for a given level of true health in which evaluation of health systematically differs across groups (Shmueli 2003). The reporting heterogeneity related to the metrics of SRH can arise from the index and cut-point shifts (Lindeboom and van Doorslaer 2004). Index shift occurs if the distribution of SRH remains the same, but there is a parallel shift in all of the reporting thresholds for particular sub-groups of the population. A cut-point shift implies that there is a change in the relative positions of the reporting thresholds for particular sub-groups of the population, leading to a change in the overall distribution of SRH.

Reporting heterogeneity is a problem for health measurement as it may confound the effects of “true health” with the error from different reporting behavior. Although the concept of “true health” has provoked some criticism in the context of subjective assessments (Jylha 2009, Huisman and Deeg 2010), a considerable number of studies have confirmed the effect of reporting behavior on SRH. It has been suggested, that individual and social characteristics such as ethnicity, SES and living standard, social networks, social capital, and the quality of the neighborhood influence the health evaluation frameworks (Jylha 2009). The use of anchoring vignettes, a short narrative descriptions of health states to fix the assessments of latent health has shown promising results in correcting for reporting heterogeneity (Bago d’Uva, Van Doorslaer et al. 2008, Dowd and Todd 2011, Grol-Prokopczyk, Freese et al. 2011). The reporting heterogeneity could also be minimized by transforming the SRH into a binary

variable with some loss in the detail (Etile and Milcent 2006). While differential health reporting presents a potentially serious problem for health measurement, subjectivity is inherent in all patient-reported outcome measures.

1.6. The aim of the study

This thesis is based on four original publications that aimed to contribute to the understanding of health assessment processes underlying SRH and provide new evidence on SRH-related social variation. The specific objectives of the study were to:

1. Explore the health assessment mechanisms by studying the predictors of SRH and mortality at different levels of SRH (**Study I** and **Study III**);
2. Analyze the trends and social inequalities in SRH in the context of macroeconomic changes (**Study II**);
3. Analyze the predictive validity of SRH on mortality and its social variations (**Studies III, IIIa** and **IV**).

2. METHODOLOGY

2.1. Setting

The empirical studies of this thesis use several datasets from Estonia and its nearby countries of Lithuania and Finland encompassing the past two decades. This period is characterized by several significant changes in the political, economic and social realities that form the setting for individual studies.

The baseline survey data for **Studies III** and **IV** originate from the mid-1990s when Estonian society started stabilizing after the rapid transformation from the planned economy to free-market system accompanied by severe recession and distinct social problems (Saar 2011). The deep social disruption was reflected in health outcomes that in addition to a general decline in life expectancy also saw a significant increase in health inequalities (Leinsalu, Vågerö et al. 2003, Leinsalu, Vågerö et al. 2004).

Estonia joined the European Union in 2004. This significant political change marked the end of the transition period. The mid-2000s (**Study I**) witnessed a period of economic optimism in the Baltic countries experiencing substantially higher growth rates in national income (7–8% of annual increase in gross domestic product) than most European high income countries (Åslund 2010). The bankruptcy of Lehman Brothers investment bank in the United States in September 2008 led to a financial crisis of global scale that had a severe impact on national economies all over the world (*ibid.*). The Baltic countries were among the most affected regions in Europe (The World Bank, 2013) with over 20% decreases in GDP per capita in 2008–2009 and a nearly tripling in unemployment levels by 2010 (17% in Estonia and 18% in Lithuania). Neighboring Finland faced also a sharp decline in economic output (GDP per capita declined by 14%) but the increase in the unemployment rate (reaching 8% in 2010) was not as dramatic as in the Baltic countries (The World Bank, 2013).

The abrupt economic changes in the 2000-s formed a unique platform for studying the associations of macro level processes and SRH (**Study II**). While the recent recession had profound effects on the society, it was relatively short in duration (*ibid.*). From 1994 onwards, life expectancy has been constantly increasing for both men and women in Estonian (Tiit 2016). Somewhat surprisingly, during the recession, life-expectancy increased at an even higher pace (Kristjuhan and Taidre 2012).

2.2. Datasets

Study I used data from the Estonian Health Interview Survey 2006, a large-scale national cross-sectional survey on health status, health behaviors and health care utilization of the population in Estonia (Oja, Matsi et al. 2008). The sampling frame consisted of all permanent residents aged 15–84 years in the Population Registry as of the 1st January 2006, from which a stratified (by age,

gender and region) systematic random sample of 11 023 individuals was drawn. In all, 6434 face-to-face structured interviews were completed between October 2006 and October 2007 with an overall adjusted response rate of 60.2%. The study population was limited to the 25–74 age group and included 4512 respondents (2127 men and 2385 women). This age restriction was intended to minimize the effects of the potential misclassification of socioeconomic status among younger respondents and of recall bias among older respondents.

Study II used cross-sectional data from the collaborative FinBalt Health Monitor project, a series of health surveys for monitoring health related behaviors, practices and lifestyles in Estonia, Latvia, Lithuania and Finland (Prättälä, Helakorpi et al. 2011). These surveys were conducted as biennial postal surveys using harmonized methodology and questionnaires, allowing for cross-national comparisons in the same timeframe with methodologically comparable data. Data were drawn from 2004, 2006, 2008 and 2010 surveys for Estonia, Lithuania, and Finland. Random samples, based on countries' national population registries consisted of 5000 persons in Estonia and in Finland, and of 3000 persons (2004–2008) and 4000 persons (2010) in Lithuania. Response rates varied across countries and study years between 59–63% in Estonia, 54–62% in Lithuania and 57–68% in Finland. The analyses cover the 20–64 age group with a total of 10 966, 7249 and 11 602 respondents included respectively from Estonia, Lithuania, and Finland.

Studies III and IV used a longitudinal data for mortality outcomes. The baseline data came from the Estonian Health Interview Survey 1996 (Leinsalu, Grintšak et al. 1998), a nationally representative cross-sectional survey carried out as face-to-face interviews between November 1996 and February 1997. For the survey, a multistage random sample of the 7807 persons aged 15–79 years at 01.01.1996 was drawn from the 1989 census database. Persons aged 15–64 were sampled in proportion to their sex and age composition in the sampling unit; persons aged 65 or over were over-sampled to ensure sufficient representation of older respondents. Accounting for the drop-outs and their substitution from the initial sample, the survey sample comprised of 6019 eligible respondents that were forwarded to the interviewers. In total, 4711 interviews were completed with an adjusted response rate of 84.3%.

For **Studies III and IV**, the respondents of the Estonian Health Interview Study 1996 were retrospectively followed-up using individual record linkage and personal ID numbers. The record linkages were performed by the Department of Epidemiology and Biostatistics, the National Institute for Health Development, Estonia. Data on 4711 respondents were linked to the Population Registry for vital status and the date of death or emigration marked the end of follow-up. **Study III** used data on 4058 respondents in the 25–80 age group (1803 men and 2255 women). In **Study III** respondents were followed up until 31st July 2015, with 1601 deaths observed over the follow-up period. **Study IV** used data from 3983 respondents aged 25–79 years old at baseline (1778 men and 2205 women) who were followed up until 31st December 2013. During the

17.3-year follow-up on average, 1465 deaths had occurred in the age-restricted dataset.

All original surveys were approved by national ethics review boards and informed consent was obtained from the respondents. **Studies I, III and IV** were approved by Tallinn Medical Research Ethics Committee, with additional approval (N^o 456; 14.11.2013) obtained for record linkage procedure. The FinBalt surveys used in **Study II** were sanctioned by the Tallinn Medical Research Ethics Committee in Estonia; Lithuanian Bioethics Committee in Lithuania and the Research Ethics Board of National Institute for Health and Welfare in Finland. For data analyses only anonymized data were used.

2.3. Variables and methods

2.3.1. Dependent variables

Self-rated health was treated as a dependent variable in **Studies I–II** and as a predictor variable in **Studies III–IV**. In all datasets, SRH was presented as a single-item question with response options in a symmetrical 5-point Likert scale. The wording of the question and response options varied slightly across surveys. Estonian Health Interview Surveys from 1996 and 2006 (**Studies I, III and IV**) had identical wording of response options in the original questionnaires. The metrics of SRH in the FinBalt surveys (**Study II**) were semantically different from those in other surveys. In this case, categories of “good” and “poor” health represented the extreme values of the scale compared to “very good” and “very bad” in other datasets. This also affects the distribution of SRH across studies (Table 2).

Table 2. The question and wording of response categories of SRH in surveys and original studies

Study I: “How do you evaluate your health in general?”		Study II: “How would you assess your present state of health?”		Study III/IV: “How would you evaluate your health status?”	
Initial scale	% (n)	Initial scale	% (n) ¹	Initial scale	% (n) ²
Very good	7.9 (357)	Good	20.4 (2227)	Very good	5.4 (219)
Good	32.8 (1481)	Reasonably good	24.9 (2714)	Good	26.4 (1064)
Fair	46.2 (2083)	Average	44.3 (4828)	Average/Satisfactory	52.5 (2115)
Bad	11.3 (511)	Rather poor	7.5 (817)	Bad	13.2 (532)
Very bad	1.8 (80)	Poor	2.8 (307)	Very bad	2.5 (100)
Merged scales used in Studies I–IV; % (n)					
Good	40.7 (1838)	Good	45.4 (4941)	Good	31.8 (1283)
Average	46.2 (2083)	Less-than-good	54.6 (5952)	Average	52.5 (2115)
Poor	13.1 (591)			Poor	15.7 (632)

¹ For comparison, aggregated data for 2004–2010 is presented only for Estonia.

² Data from **Study III** dataset refers to the 25–80 age group.

To address the statistical problems arising from a small number of respondents, especially in the lowest values of the scale, SRH was used as an aggregated measure in the original studies. In **Studies I, III and IV**, SRH was trichotomized into categories of a) good (response options very good and good), b) average (average/satisfactory), and c) poor (bad/very bad) SRH. In **Study II**, answers were dichotomized into categories of less-than-good health, merging a) categories of average, rather poor and poor health and b) good health, consisting of good and reasonably good SRH.

Survival analysis in **Studies III and IV** used all-cause mortality status as the outcome variable. Individual survival time in days was calculated by subtracting the date of the interview from the end-date of the follow up (31st December 2013 and 31st July 2015 in **Studies IV and III** respectively), the date of death or emigration marked the end of follow up for deceased or emigrated persons. A binary variable of vitality status (dead vs. alive) was calculated based on the mortality events.

2.3.2. Independent variables

Studies I–IV included a wide range of demographic, socioeconomic variables and measures of health status and health behavior (Table 3).

Table 3. Independent variables used in **Studies I–IV**

Independent variables		Study I	Study II	Study III	Study IV
Demographic variables	Age	X	X	X	X
	Gender	X	X	X	X
	Ethnicity	X	X	X	X
	Marital status			X	
Socioeconomic variables	Education	X	X	X	X
	Individual income	X		X	X
	Occupational class			X	X
	Employment status		X		
Health status	SRH			X	X
	Chronic or long-term illnesses	X			
	Limitations in daily activities	X		X	X
	Functional limitations	X			
	Depression	X		X	
	Emotional distress	X			
Health behaviors	Smoking			X	X
	Alcohol consumption			X	
	BMI			X	X
	Health examination			X	
Other variables	Locus of control	X			
	Well-being characteristics	X			

Age was used as a continuous variable, except in **Study II**, where age effects were analyzed in three age groups (20–34, 35–49, and 50–64 years). Similarly, analyses in **Study II** and **IV** were carried out separately for men and women, whereas **Study I** and **III** included gender as an independent variable. Ethnicity was based on self-reported ethnic identity and aggregated into subcategories of 1) main ethnic group and, 2) other ethnic groups. Ethnicity was used as an independent variable in all studies, except for **Study IV** where data was stratified by ethnicity. Marital status was included in **Study III** and status was categorized into 1) married or cohabiting, 2) single and, 3) widowed, separated or divorced. Education, included in all studies, was measured by the highest level of education obtained and was categorized as 1) tertiary (with 15–16 years of schooling on average), 2) upper secondary (10–14 years), and 3) lower secondary or less education. Due to cross-national variations in survey methodologies, data on years of full-time education were used for calculating an educational status variable for Finland in **Study II**. **Studies I, III** and **IV** included a measure of individual monthly net income presented as quartiles. In addition, socioeconomic status was characterized in **Studies III** and **IV** also by main occupational class during respondents working life. Occupation was coded using the ISCO-88 classification and dichotomized into categories of 1) non-manual, and 2) manual occupation. **Study II**, focusing on health-effects of economic changes, included a measure of economic activity dichotomized into categories of employed, and unemployed/non-active respondents. The latter category consisted of persons who were studying, were homemakers, retired and not working or were unemployed.

Several health-related covariates were used in the studies. A continuous variable of self-reported chronic or long-term illnesses (range 0–12) was included in **Study I** along with the variable of illness related limitations in daily activities, an index of functional limitations and measures of emotional distress and depression. The variable of illness-related limitations in daily activities was also included in **Studies III** and **IV**. **Study I** used Mini-International Neuropsychiatric Interview (M.I.N.I.5.0.0) (Sheehan et al. 1998) to assess if the respondent has ever had an episode of depression. A measure of depression in **Studies III** and **IV** assessed if a person had had depressive symptoms during the past 4 weeks preceding the interview. Depressive symptoms and emotional distress (in **Study I**), a state characterized by several disturbing negative emotions was measured by the Emotional State Questionnaire (Aluoja et al. 1999) consisting of 28 questions about depressiveness, general anxiety, panic, social-anxiety, tiredness, and insomnia experienced during the past four weeks and assessed on a scale ranging from 1 (not at all) to 5 (very often). The instrument's specific cut-off point of 63 was used to differentiate between respondents with and without substantial distress.

Studies III and **IV** included variables of smoking (ever vs. never) and body mass index (BMI) calculated from respondents' self-reported height and weight. BMI was categorized as 1) normal (BMI=18.5–24.9 kg/m²), 2) underweight (BMI<18.5 kg/m²), 3) overweight (BMI=25–29.9 kg/m²) and, 4) obese

($\text{BMI} \geq 30 \text{ kg/m}^2$). **Study III** also included variables on alcohol consumption and of having a preventative health check during the past 12 months at the time of the interview. Alcohol consumption (1 unit equals 8 grams of pure alcohol) during the past 4 weeks was categorized as 1) none, 2) 1–49 units, and 3) 50 or more units of alcohol.

Additionally, measures of well-being and locus of control were included in **Study I**. Well-being was assessed by four single-item questions covering the person's satisfaction with life in general, economic situation, physical shape and physical abilities, and close relatives. Locus of control refers to perceived roles of self vs. external factors in shaping life events and presents a continuous variable (range 0–3) with lower scores indicating a higher self-command.

2.3.3. Statistical analyses

Study I used multinomial logistic regression to analyze the associations between SRH and its determinants with “fair” SRH as the reference category. The results of age-adjusted and mutually adjusted models were presented as odds ratios (OR) together with 95% confidence intervals (CI) and p-values. **Study II** used age-standardized prevalence ratios with 95% CI and multi-variable logistic regression to assess the change in the prevalence of less-than-good SRH and the relative socio-demographic disparities in SRH during 2004–2010. The prevalence ratios were calculated using the direct method and the old European standard population with 5-year age groups. The results of fully adjusted multivariable logistic regression were presented as OR with 95% CI and as results from additional interaction analysis between study year and predictor variables. All analyses were performed separately for men and women. **Studies III, IIIa** and **IV** relied on survival analysis techniques for exploring the association between SRH and mortality. Survival times and survival curves from Kaplan-Meier analysis and hazard ratios (HR) with 95% CI from Cox proportional hazards regression models were used in both studies. For Cox models, the proportionality of all covariates was tested beforehand using log-minus-log survival plots (Bellera, MacGrogan et al. 2010). Several regression models adjusting for age, socioeconomic and health covariates were fitted. To demonstrate the mortality differences by the levels of SRH, **Study III** presented age-standardized mortality rates that were calculated using direct method and 2013 European standard population. Supplementary publication included SRH as an independent variable to the models that were fitted in **Study III** to compare the individual effects of SRH on mortality. All studies used IBM SPSS Statistics for Windows (Armonk, NY: IBM Corp) for statistical analyses.

3. FINDINGS OF THE ORIGINAL STUDIES

3.1. Study I: Variation in predictors of positive and negative self-rated health

Study I aimed to explore whether the predictors are different for positive and negative SRH categories contributing thereby to the further understanding of the evaluation mechanisms underlying subjective health assessment.

Several differences in predictors of good and poor SRH were found in **Study I**. In age adjusted analysis, all variables except gender were statistically significantly associated with positive SRH defined as good or very good SRH (Table 2, **Study I**). Younger respondents, ethnic Estonians, the higher educated and those with higher income were statistically significantly more likely to evaluate their health as being better than average. Also, the absence of chronic illnesses as well as lower scores in limitations in daily activities and of physical functioning were related to positive health ratings. Lack of depression, emotional distress and having higher self-command and higher satisfaction with all four aspects of one's life also predicted positive health. After mutual adjustment, the odds for positive SRH were slightly attenuated but remained statistically significant for all demographic (including gender), socioeconomic and physical health characteristics, and for emotional distress, locus of control and for variables on satisfaction with physique and close relatives. The effects of the latter were reversed compared to age-adjusted analysis indicating possible effect modification by other variables in the fully adjusted model (Figure 3).

Negative health assessments (bad or very bad SRH) were associated in age-adjusted models (Table 2, **Study I**) with older age, being female or non-Estonian, having lower education and lower income. Chronic illnesses, limitations in daily activities and in physical functioning as well as having had depression or emotional distress strongly increased the odds for reporting negative SRH. Negative SRH was also related to lower self-command, and lower satisfaction with all four items of general well-being. After mutual adjustment, the associations with negative SRH became statistically non-significant for age, ethnicity, education and income, but also for depression and some characteristics of well-being like satisfaction with economic situation and with close relatives (Figure 3).

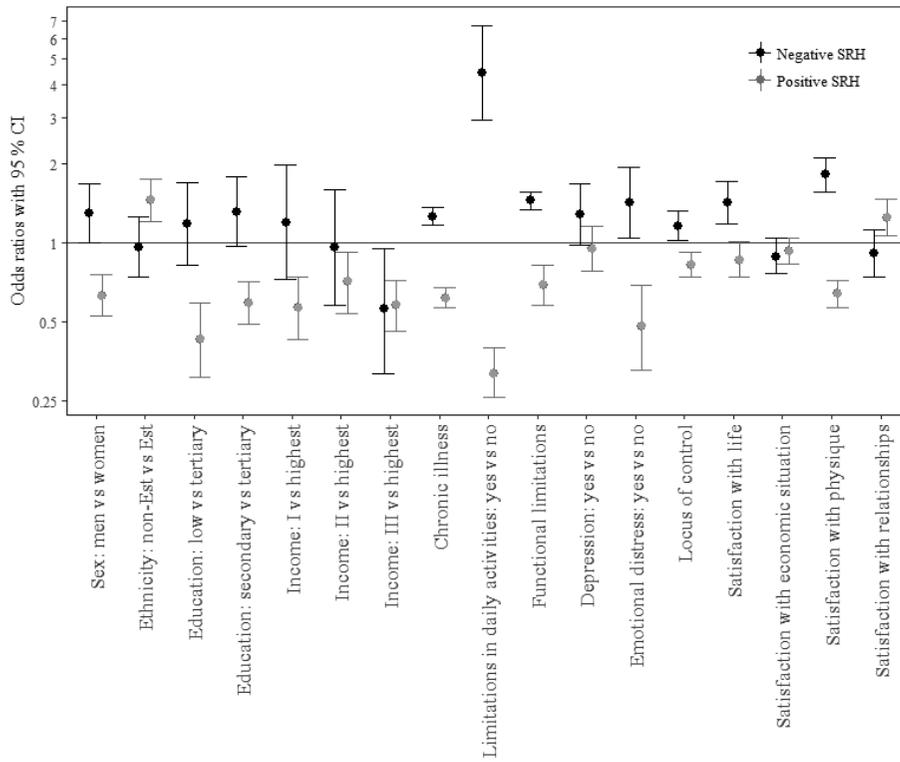


Figure 3. Predictors of positive and negative health assessment compared to average SRH, odds ratios with 95% CI derived from fully adjusted models of Tables 2 and 3 in **Study I**

3.2. Study II: Trends and inequalities in self-rated health during macroeconomic changes

Study II aimed to analyze the possible effect of the late-2000s economic recession on the trends and inequalities in SRH comparatively in Estonia, Lithuania, and Finland. The changes in the prevalence and relative differences in less-than-good SRH were assessed for recession period 2008–2010 and were compared to those in 2004–2008 characterized by a rapid economic growth.

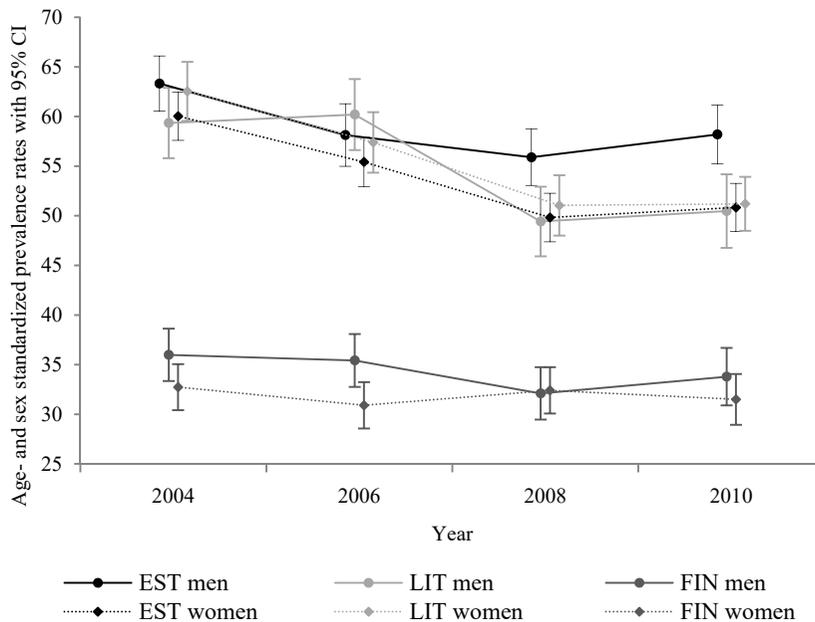


Figure 4. Age- and sex-standardized prevalence rates with 95% confidence intervals for less-than-good self-rated health, 2004–2010

The period of substantial economic growth in 2004–2008 was accompanied by considerable improvement of SRH in Estonia and Lithuania with the decline in the prevalence of less-than-good SRH ranging from 7.4% in Estonian men to 11.3% in Lithuanian women. The slight improvement in SRH observed for Finland was statistically not significant. Contrary to the previous trend of health improvement, the prevalence of less-than-good SRH increased between 2008 and 2010 from 50% to 52% in Estonia and from 47% to 48% in Lithuania. The change was more pronounced among men in all countries, whereas SRH even improved slightly for Finnish women (Tables 2 and 3, **Study II**). Although the increase was statistically insignificant, it marked the end of the previous strong positive trend of improving health status (Figure 4).

Multivariable regression (Table 4, **Study II**) analysis revealed similar sociodemographic gradients in all countries and study years. Both men and women who were older, less educated or not employed had higher odds for less-than-good SRH. Ethnic differences were significant for women (all countries) and Finnish men. In 2004–2008, the socio-demographic inequalities in SRH generally increased or remained the same among men in all countries. Among women there was a general tendency towards decreasing inequalities with the exception of women in Lithuania where the magnitude of inequalities grew by employment status and age. Between 2008 and 2010, the magnitude of inequalities among men generally decreased with statistically significant changes

found for employment status and education (low vs high education) in Lithuanian men and for ethnicity in Finnish men. Among women, the patterns were less consistent in 2008–2010 with some increase in health inequalities observed for education in Estonia and Lithuania, and by employment status in Finland.

3.3. Study III: Do predictors of mortality differ across the levels of self-rated health?

Study III explored the predictive power of SRH on subsequent all-cause mortality, focusing on the question whether different levels of SRH are unique predictors in terms of the mortality risk and which specific factors underpin that risk.

The mean survival times ranged from 17.5 years in women with good SRH to 9.9 years in men with poor SRH during the 18 years of follow-up in **Study III**. Supplementary publication, using the same data and models as in **Study III**, confirmed that SRH was an independent predictor of mortality. Those with poor SRH at the baseline had approximately 40% higher mortality risk compared to respondents with good SRH even after adjusting for wide range of covariates (Table 1, **Study IIIa**). Moreover, until introduction of health indicators, the hazard ratios for average and poor SRH were found to be different ($p < 0.05$) indicating a gradual association with mortality.

Study III found that different levels of baseline SRH had different predictors for subsequent mortality risk (Figure 5). In respondents with good SRH predicted higher mortality risk for respondents of older age, male sex, lower income, manual occupation, smoking and high alcohol consumption (≥ 50 units) in all models (Table 2, **Study III**). In respondents with average SRH, older age, male sex, lower income, presence of illness-related limitations, being underweight, smoking and alcohol consumption ≥ 50 units during the past 4 weeks were associated with an increased mortality risk in all models. For poor SRH, older age, male sex and having illness-related limitations were associated with an increased mortality risk in all models and after adjusting for all other covariates, also those never married respondents had elevated mortality risk (Table 2, **Study III**).

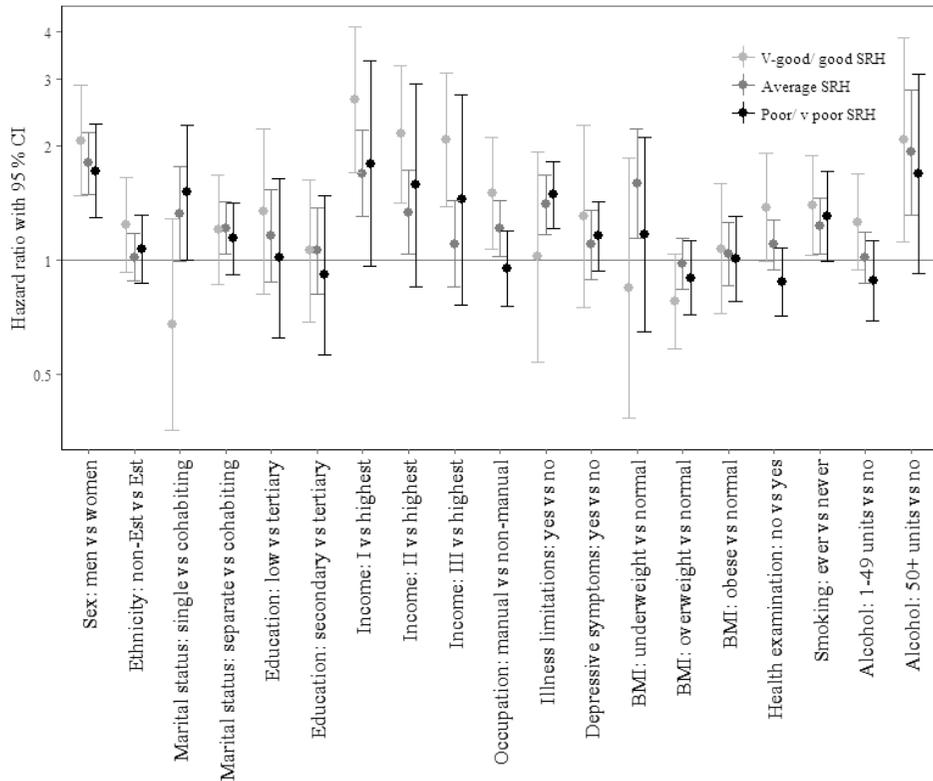


Figure 5. Mutually adjusted hazard ratios and 95% CI for all-cause mortality by self-rated health categories (Table 2, Study III)

3.4. Study IV: Social variation in self-rated health and mortality association: the case of ethnicity

Study IV aimed to analyze whether the association between SRH-mortality varies between ethnic Estonians and other ethnic groups in Estonia and which factors may explain the SRH-mortality association in both ethnic groups.

Differences in survival by SRH categories (Figure 6) were found to be statistically significant for both ethnic groups. Cox regression analysis indicated that SRH predicts subsequent mortality only among ethnic Estonians when other socioeconomic and health-related covariates were accounted for. Irrespective of gender, Estonians with bad or very bad baseline SRH had about 60% higher mortality risk compared to respondents with very good or good SRH even after adjustment for socioeconomic and health-related covariates (Tables 2 and 3, **Study IV**). Among non-Estonian women, the independent effect of poor SRH on mortality was significant until introduction of health variables in Model 3 (Table 3, **Study IV**).

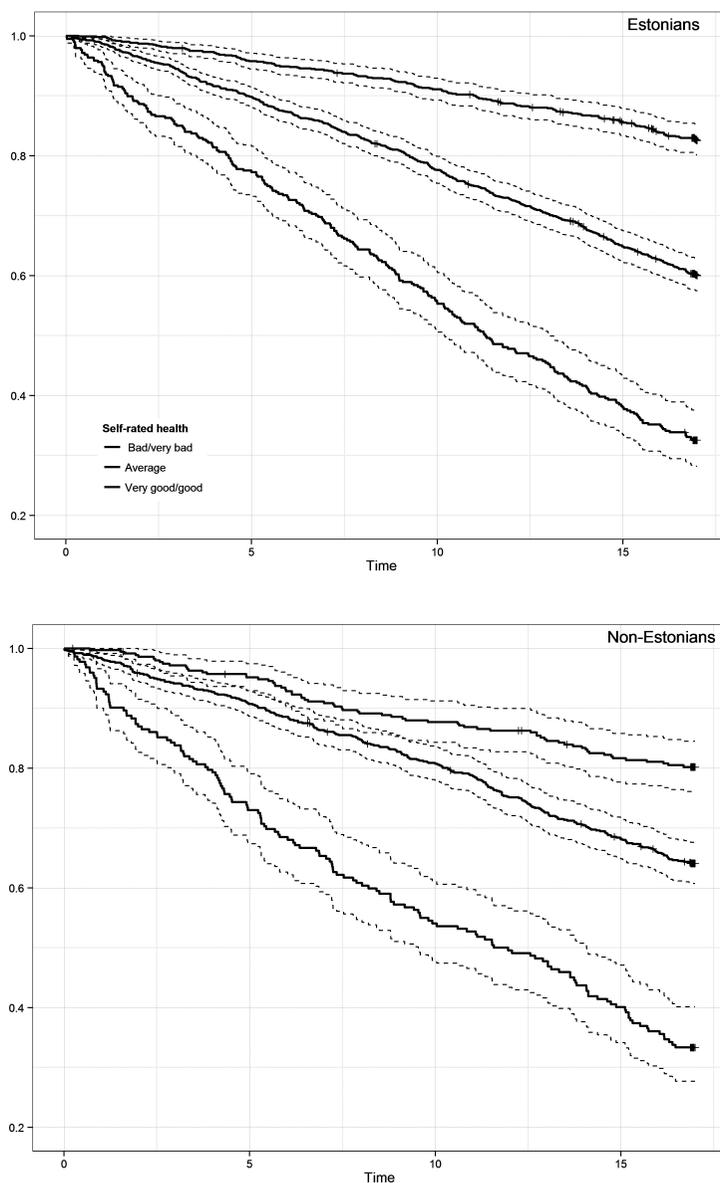


Figure 6. Differences in survival by the levels of SRH among Estonians and non-Estonians (**Study IV**)

Several differences in predictors of mortality by ethnicity and gender were found in mutually adjusted models (Tables 2 and 3, **Study IV**). Only older age and low personal income remained statistically significant predictors of mortality risk for both ethnic and gender groups. Estonian men and women in the

lowest income quartile had more than a twofold mortality risk compared to the highest income quartile. Income differences in respect to mortality were highest for non-Estonian women in the lowest income group with HR 3.53 (95% CI 1.25–9.95) compared to their highest income quartile counterparts. Educational gradient in mortality was found only among non-Estonian men, whereas manual occupation increased the mortality risk by 40% only among non-Estonian women. Having ever smoked was associated with increased mortality only among Estonians and the presence of limiting long-standing illness only among women in both ethnic groups. Also, slight reductions in mortality risk for overweight Estonian and non-Estonian women compared to those with normal BMI were found.

4. DISCUSSION

The following discussion interprets the main findings of **Studies I–IV** structured according to the aims of the thesis and in relation to relevant literature. It also highlights some methodological considerations of individual studies that relate to the interpretation of SRH in the context of these studies.

4.1. Exploring the evaluation mechanisms of self-rated health

SRH, commonly understood as a summary statement of ones' health, incorporates a wide range of health information. As the factors relevant for health assessments are likely to depend on health status, people at varying levels of health may base their health assessment on different health concepts. This claim is supported by findings from previous empirical studies (Smith, Shelley et al. 1994, Kaplan and Baron-Epel 2003, Shooshtari, Menec et al. 2007) that have suggested a possible conceptual differentiation between positive and negative health assessments whereas other studies (Mackenbach, van den Bos et al. 1994, Manderbacka, Lahelma et al. 1998) have reported a similar but mirrored pattern of associations for a wide range of predictors. **Studies I** and **III** aimed to contribute to the literature on the evaluation mechanisms of SRH by analyzing the potential variations in determinants for positive and negative health assessments further, and exploring whether the predictors of mortality vary across categories of SRH.

In **Study I**, the physical and psychological health characteristics presented a distinct, mirrored association with both positive and negative SRH. The strong associations between both ends of the SRH scale for chronic conditions, limitations in daily activities and in physical functioning draw a similar conclusion to Manderbacka and colleagues (1998), that these variables measure the same sort of qualities as SRH. Moreover, the psychological health characteristics in **Study I** displayed a consistent pattern across the SRH scale, with emotional distress and locus of control being associated with both positive and negative health ratings. Following Kaplan and Baron-Epel's (2003) notion that health assessments are based either on disease-oriented, emotional or function-related models, the largely mirrored pattern of association for health variables in relation to positive and negative SRH in our study possibly relates to illness-centered health evaluations. In this, SRH could be defined by the presence or the absence of ill-health, modified by the perceived intensity of the complaints and their impact on daily functioning.

Demographic and socioeconomic characteristics did not present a consistent pattern in their association with positive and negative SRH. Although older age is generally associated with increasing health complaints and higher disease prevalence, age was associated only with positive SRH after adjustment for

other covariates. This could be interpreted in terms of a reference scale shift implying that self-evaluations include age-adjustment by default as demonstrated in several studies (Groot 2000, Eriksson, Unden et al. 2001, Layes, Asada et al. 2012). Moreover, it has been shown that younger individuals use a broader set of factors to assess their health compared to older adults and that positive ratings of health are in general based on a wider range of criteria and conditions (Shooshtari, Menec et al. 2007). A similar explanation could account for gender differences with men having higher odds to report poor health at both ends of the SRH scale compared to women. Compared to women who consider a wide range for health-related and non-health related factors for SRH, men's health assessments can be considered less sensitive in terms of factors underlying health assessments and reflect mostly the presence or absence of illness symptoms, disease or infirmity (Benyamini, Leventhal et al. 2000). The independent and statistically significant association for ethnicity was found only with positive SRH, supporting the claim that there are cultural differences in health assessment frameworks (Jylha, Guralnik et al. 1998, Babones 2009). These may also have implications for cross-culture comparisons of SRH data (Brewer, Miyasato et al. 2013, Su, Wen et al. 2013, Lee and Schwarz 2014).

The socioeconomic variables of education and income were consistently associated with only positive SRH in **Study I**. Similar findings were also found in **Study III** that analyzed the predictors of mortality by the levels of SRH. While the beneficial effects of higher SES on health outcomes are well-known, the lack of any statistically significant socioeconomic status effect on mortality risk in the poor SRH group could relate to the finding that poor SRH mostly reflects the physiological aspects of ill health (i.e. the presence of illness or infirmity) as shown in **Study I**. In this case, it is likely that the biological aspects of ill health surpass the health-related effects of social status and account for higher mortality in respondents with poor SRH whereas the opposite is true for positive SRH. Thus, the graded association between SRH and mortality reflects both the seriousness of one's health status and the variation in health concepts and the determinants these self-ratings are based on.

Contrary to health-related variables, the demographic and socioeconomic indicators did not present consistent association with both positive and negative SRH in **Study I** and with mortality outcomes in **Study III**. These findings line with earlier studies (Smith, Shelley et al. 1994, Kaplan and Baron-Epel 2003, Shooshtari, Menec et al. 2007) that have suggested a possible conceptual differentiation between positive and negative health assessments that underlie SRH. In this, demographic and socioeconomic variables, while also having an independent effect on SRH, are important effect modifiers of the health component in SRH. This also corresponds to the previously discussed theoretical explanations of the role of social determinants in health, where individual health outcomes are shaped by societal characteristics along with the contributions from genetic, cultural and life-course related aspects (Brunner and Marmot 2001). This could imply that these factors reflect the differences in health concepts or modify how health status is perceived and evaluated.

4.2. The trends and social inequalities in self-rated health

The social model of health places health within a wider social and environmental context. The emphasis on the “social” indicates that in addition to physiological manifestations of illness and age-related physiological changes, health is also affected by the social characteristics at both individual and population level and that changes in the social environment might lead to changes in health. **Study II** explored comparatively the trends and socioeconomic inequalities in SRH in Estonia, Lithuania and Finland, in the context of the large-scale macroeconomic changes of the 2000s when consistent economic growth was replaced by a sharp decline in economic output and high levels of unemployment related to the onset of the global financial crisis (Åslund 2010).

Study II found that in the Baltic countries, the period of economic growth in 2004–2008 was characterized by a considerable improvement of SRH present in nearly all of the demographic and socioeconomic groups considered. During the years of economic crisis (2008–2010), the overall prevalence of less-than-good SRH increased, although only marginally, in all three countries. In Finland, the country with a substantial welfare system, the prevalence of less-than-good SRH was stable throughout the period. Similar results have been recently reported by Mayer and colleagues (Mayer and Foster 2015) who found that macroeconomic growth improved SRH in low-income nations but had no effect in high-income nations. Another study of 23 European countries using EU-SILC panel data from 2005 to 2011 (Abebe, Tøge et al. 2016) reported stable trends in fair and poor SRH in about half of the countries studied (including Finland), while the prevalence of fair and poor SRH increased in others (including Estonia and Lithuania) during the crisis. Studies from other countries severely affected by recession have also reported either small deterioration of SRH like in Greece (Kentikelenis, Karanikolos et al. 2011, Zavras, Tsiantou et al. 2012) or no changes in case of Ireland (Hessel, Vandoros et al. 2014) or Spain (Arroyo, Renart et al. 2015).

By now, there is ample evidence on the different health effects of the recent economic recession (Karanikolos, Heino et al. 2016, Mucci, Giorgi et al. 2016, Parmar, Stavropoulou et al. 2016). Systematic review by Parmar and colleagues (2016) reported an increase in suicide rates and deteriorating mental health whereas mixed evidence for SRH and other health outcomes during the crisis has been reported by others (Mayer and Foster 2015). For example, a recent analysis investigating the association between GDP and traffic accident mortality in OECD countries found that an increase in GDP leads to an immediate increase in traffic deaths, but the short-term negative effects of economic growth are outweighed by long-term protective effects, especially evident in data from mid 1970s onwards (Dadgar and Norström 2017). Several earlier studies (Neumayer 2004, Ruhm 2005, Tapia Granados and Ionides 2008) have also reported declining mortality rates after increases in unemployment levels. One potential explanation for these positive changes in population health could relate to individual resource-conserving behaviors. The limited financial re-

sources during the recessions have been associated with fewer traffic-related injuries, alcohol related deaths and hospital admissions (Ruhm 2003, Ruhm 2005). These arguments are supported by studies reporting improvement in health behaviors including smoking, drinking and unhealthy eating after 2008 financial crisis in Iceland (Ásgeirsdóttir, Corman et al. 2014) and from England (Harhay, Bor et al. 2013) where the recession was associated with less hazardous drinking among the general population. Although **Study II** did not address health behavior, the faster increase in average life-expectancy following the crisis in Baltic countries (Kristjuhan and Taidre 2012) could potentially be explained by changing lifestyles and an improvement in health behaviors.

Although the overall health impact of the recent recession has been well documented, the health effects in different population groups are much less studied. Reflecting on previous studies, Suhrcke and Stuckler (2012) suggested that negative health effects of economic change are generally greater among disadvantaged groups. In the context of Eastern Europe, another parallel to the health effects can be drawn from the crisis related to the fall of Soviet Union in the early 1990s and the following economic, political and social upheaval. These changes affected those in a lower social position disproportionately and led to the widening health disparities in Eastern Europe (Bobak, Pikhart et al. 2000, Leinsalu, Stirbu et al. 2009) and to systematically higher health inequalities in Eastern Europe compared to other European regions (Kunst, Bos et al. 2005, Mackenbach, Stirbu et al. 2008, Leinsalu, Stirbu et al. 2009, Kulhánová, Hoffmann et al. 2014, Mackenbach, Kulhánová et al. 2015, Hu, van Lenthe et al. 2016).

Study II reported differences in less-than-good SRH for socio-demographic groups measured by age, education, employment status and ethnicity in all three countries, yet the health inequalities were considerably larger in the Baltic countries than in Finland. During 2004–2008, the inequalities in SRH among men increased or remained the same in all countries. For the following period, relative inequalities in health were slightly reduced, driven mostly by the improvement in health status among lower educated and non-employed men whereas the opposite was happening for the higher educated and employed. Among women the patterns of health inequalities were less consistent; mostly decreasing socio-demographic inequalities in 2004–2008 were followed by a slight increase in health inequalities observed for education in Estonia and Lithuania, and by employment status in Finland during 2008–2010.

Previous evidence suggests that higher wealth, educational level and occupational status are associated with more favorable trajectories of SRH in general (Cullati, Rousseaux et al. 2014). One of the most common pathways to deteriorating health during recession is unemployment and resulting decline in income (Kaplan 2012, Suhrcke and Stuckler 2012). The profound effects of negative life events on SRH were demonstrated by Strully (2009) who found both an increase in less-than-good SRH after enterprise closures and increased odds for health condition reporting in respondents with no pre-existing health problems. Counterintuitively, **Study II** found a slight decline in SRH among

employed respondents. These findings could possibly be explained by the health-effects of psychosocial rather than financial mechanisms that reflect higher work demands, financial insecurity and general uncertainty about the future among employees. This claim is supported by earlier findings that employed workers experienced increased risk of developing hypertension and diabetes and had more somatic and psychological symptoms during recessions (Modrek and Cullen 2013). Moreover, as the recent crisis in the Baltic countries was mostly driven by the mortgage bubble (Åslund 2010, Brixiova, Vartia et al. 2010) it is likely that the crisis had a considerable effect on the relatively well-off groups who due to existing housing loans could be more vulnerable to the consequences of a shrinking job market (Lau and Leung 2014). Another possible explanation of larger health improvements among disadvantaged groups during the recession could relate to changing behaviors and particularly to decreased consumption of alcohol related to the tax increase (Lai and Habicht 2011). Although **Study II** did not include health behavior measures to confirm this, it is plausible that pricing policies may have been relatively more effective among economically disadvantaged groups, who, as known from previous studies have much higher mortality from alcohol related causes (Leinsalu, Vågerö et al. 2004, Baburin, Lai et al. 2011, Mackenbach, Kulhánová et al. 2015).

Differences in national wealth and public health expenditures, but also the differences in social safety nets and other policy related aspects (Kaplan 2012, Suhrcke and Stuckler 2012) could explain between-country variation in SRH and its change during the study period. As a result of the financial crisis, all three countries considered in **Study II** experienced reductions in funding and coverage of health services (Mladovsky, Srivastava et al. 2012) but the scope of the reductions in health policies remained limited, compared to cutbacks in Greece (Kentikelenis, Karanikolos et al. 2011) or in Spain (Legido-Quigley, Otero et al. 2013). In addition to health care, general social safety mechanisms may serve as a “cushion” against rapid economic changes. Sacker and colleagues (2011) found that the trajectories of health for socioeconomically disadvantaged individuals were poorer compared to “average” individuals with the largest differences in the countries with lower levels of public transfers. Similarly, the protective effects of welfare regimes in the context of recession were demonstrated in a recent study (Norström and Grönqvist 2015) where the negative effects of unemployment on suicides were more pronounced in the case of less generous welfare models. Therefore, it is likely that the national differences in SRH trajectories observed in **Study II** could at least partly be attributed to welfare policies.

4.3. The predictive validity of self-rated health on mortality and its social variations

The validity of SRH as a measure of general health is often established empirically in relation to future health outcomes. Among those, the association with mortality has received special attention as the latter is of key interest for several academic disciplines such as demography and epidemiology.

Studies III and **IV** used longitudinal data to explore the association between SRH and mortality in the Estonian Health Interview Study 1996 cohort. SRH was associated with all-cause mortality during a follow-up after more than 18 years. In age-adjusted analysis, poor SRH at the baseline resulted in an almost two-fold increase in the relative risk for subsequent all-cause mortality compared to those with good SRH. After adjustment for socioeconomic and health-related covariates, poor SRH still represented approximately 40% higher mortality. These findings are in accordance with the evidence from previous systematic reviews (Idler and Benyamini 1997, DeSalvo, Bloser et al. 2006) that highlight the strong association between SRH and mortality outcomes. Moreover, the levels of SRH presented gradual association with mortality as previously reported by Bopp and colleagues (2012).

SRH-mortality association has received extensive research interest over the last decades. Several, mutually non-exclusive explanations for this finding have been proposed (Idler and Benyamini 1997, Benyamini 2011). First, SRH predicts mortality because it forms a comprehensive summary statement of health that incorporates biological but also psychological, social, behavioral, and other aspects of health (Idler and Benyamini 1997, Jylha 2009). In this, SRH is more inclusive than other health measures that are often used in health surveys. For example, SRH has appeared to be a better predictor of mortality than the type or number of symptoms experienced (Elliott, Hannaford et al. 2006), physician-rated health (Giltay, Vollaard et al. 2012) or health-related quality of life measures (Kaplan, Berthelot et al. 2007). Secondly, SRH represents a dynamic evaluation of ones' health that rather than reflecting a current health status, accounts for the present and past experiences and knowledge. While this aspect is difficult to empirically confirm, past research indicates that SRH responds to both changes of symptoms and positive and negative affects (Winter, Lawton et al. 2007, Segerstrom 2014). Given the sensitivity of the measure, the choice of the reference scale also matters with stronger associations reported for global rather than age-peer or self-comparative SRH measures (Sargent-Cox, Anstey et al. 2010). Other potential explanations of SRH-mortality association relate to the self-evaluation processes, prompted in the context of SRH assessment that could lead to a change in health behaviors, and to different resources that affect ones' ability to cope with health threats (Benyamini, Blumstein et al. 2011 819).

Despite the almost universal association between SRH and mortality, considerable variations in predictive SRH-mortality association have been observed for different age-groups (Zajacova and Woo 2015), gender (Deeg and Kriegsman 2003), ethnicity (Assari, Lankarani et al. 2016) and for indicators of SES

(Dowd and Zajacova 2007, Dowd and Zajacova 2010). **Study IV** found ethnic difference in SRH-mortality association with SRH predicting subsequent mortality only among ethnic Estonians after mutual adjustment. Several explanations to ethnic differences in SRH-mortality association were proposed. First, reporting heterogeneity as the social and cultural differences in defining and assessing health could account for some ethnic variation in SRH as shown by Dowd and Todd (Dowd and Todd 2011). The ethnic/racial variation between SRH and subsequent mortality has previously been associated with the differences in the “fair” SRH and to a lesser extent by the “poor” SRH (Su, Wen et al. 2013). The higher prevalence of “fair/average” SRH among non-Estonians in **Study III** could indicate that the gradation from positive to negative health is less discriminative among non-Estonians. This is supported by findings from two recent study from United States (Assari, Lankarani et al. 2016, Woo and Zajacova 2016) where the SRH ratings of Black and Hispanic respondents were less predictive of their subsequent mortality risk compared to Whites due to less distinctive differences between excellent and lower SRH categories. If reporting heterogeneity is present, the SRH levels would systematically differ for a given level of “true health” and result in over- or underestimation of ones’ health status, which would then lead to variations in predictive validity of SRH.

Ethnic differences in cause-specific mortality could possibly also explain the ethnic differences found in SRH-mortality association. Previous research has shown considerable ethnic variations in cause-specific mortality in Estonia (Leinsalu, Vågerö et al. 2004) with preventable causes of death explaining about 60% of the total ethnic life expectancy gap (Baburin, Lai et al. 2011). Smoking (Jensen-Urstad, Viigimaa et al. 2014) and alcohol related mortality (Rahu, Pärna et al. 2009) are the main contributors to ethnic differences in cause-specific mortality. These risk-behaviors are closely associated with mortality from external causes (Ringmets, Tuusov et al. 2012) that may result in deaths at younger ages. In this case, higher mortality from external causes which may not have been preceded by ill-health, could explain why SRH was not associated with overall mortality among non-Estonians in this study. Similar findings were demonstrated in an earlier study (Perlman and Bobak 2008) that found association between smoking and alcohol consumption and mortality but not with worse subjective health as frequent drinkers reported better health on average than moderate consumers.

Socioeconomic variation in SRH and mortality outcomes is generally considered as a manifestation of health inequalities in which unequal health-related opportunities and resources lead to a social gradient in health. **Studies III** and **IV** both demonstrated socioeconomic differences, most notably by income in relation to all-cause mortality. Although several previous studies have demonstrated steep educational gradients in mortality by education (Leinsalu, Vågerö et al. 2003, Mackenbach, Kulhánová et al. 2015), these studies did not adjust for other socioeconomic variables that explain the lack of independent effects of education on mortality in **Studies III** and **IV**. The observed health advantage of the highest income group in Estonian data is likely to derive from

the generally low levels of income in the mid-1990's and only those with greater income have access to resources with a long-term health impact. This claim is supported by the earlier findings that emphasize the negative health effects of overall material deprivation in post-Soviet countries (Bobak, Pikhart et al. 2000). The income gradient in mortality risk was present irrespective of gender or ethnicity of the respondent (**Study IV**) but when predictors were stratified by levels of SRH (**Study III**) the income was associated with mortality risk for average or good SRH categories.

Another line of argument attributes these variations to systematic differences in health assessment process. Dowd and Zajacova (2007) have explained the socioeconomic disparities in mortality risk for the same SRH category with differences in health awareness. In this, the same SRH category does not reflect the same health state. Similar evidence has been found for ethnicity and race with minority groups often having worse baseline SRH but similar risk of mortality compared to ethnic majorities (Franks, Gold et al. 2003, Suresh, Sabanayagam et al. 2011, Su, Wen et al. 2013). Social class differences in health behaviors and varying exposition to health hazards could also contribute to the social variation in SRH and mortality.

4.4. Methodological considerations

Potential limitations related to individual studies were addressed in detail in respective papers. Nevertheless, some methodological considerations arising from the data and/or analytical methods used require further discussion as they relate to the way SRH is operationalized or measured in **Studies I–IV**.

Studies I and II used cross-sectional data that does not allow for determining causality. In this context, the use of the term “determinants” in **Study I** refers to the statistical association rather than temporal relationship. Similarly, for **Study II**, the macroeconomic changes during 2004–2010 are only one possible interpretation for the observed variance in SRH and related health inequalities. Although longitudinal data instead of repeated cross-sectional data, especially in case of **Study II** would have been preferable, publications where individual trajectories of SRH in the context of recession have been followed, have just recently become available (Abebe, Tøge et al. 2016).

As only the baseline measurements of the Estonian Health Interview Study 1996 cohort were available in **Studies III–IV**, it is likely that some individual characteristics may have changed during the follow-up. In the context of rapid societal changes since the 1990s in Estonia, there could have been considerable changes in respondents' socioeconomic status, measured by income, education, and occupational class in our data. Several variables used in **Studies I–IV**, e.g. weight, smoking status, and alcohol consumption measures as well as social status indicators could be subject to social desirability bias in an interview setting (Bowling 2005). Although these variables (except for education) were associated with subsequent mortality, the potential misclassification bias cannot

be entirely excluded from the results. Similarly, SRH cannot be considered as a static measure; as many as 40% of respondents have reported changing their health-rating over a follow-up period (Nery Guimaraes, Chor et al. 2012). Despite the potential volatility of SRH, **Studies III–IV** found significant association between SRH at the baseline and all-cause mortality. This association proved to be robust in preliminary analyses of **Study IV** when also 5- and 10-year follow-up periods were tested.

SRH is often regarded as a multifactorial composite score of ones' health status that is based on a complex set of determinants. Although the social model of health that acknowledges the contributions of biological, behavioral, and psychosocial factors served as the analytical framework for **Studies I–IV**, only a limited number of explanatory variables were included in the analysis (Table 2). While both positive and negative health assessments rely heavily on physical and psychological health characteristics, the majority of behavioral and health indicators used in **Studies I–IV** can be termed as risk factors. Given the claim that positive SRH is a more complex phenomenon than just the lack of ill-health, the choice of explanatory variables could have influenced the results. But as the pattern of association between SRH and of various demographic, socioeconomic and health-related variables was similar across **Studies I–IV**, the overall results can be considered as coherent.

Operationalization of subjective health explains some of the differences between **Study I** and previous studies exploring the predictors of positive and negative health assessments. For example, Mackenbach and colleagues (1994) used an aggregate measure that combined SRH, chronic conditions and a checklist of health complaints for the dependent variable, whereas **Study I** focused solely on SRH. Also, other authors (Smith, Shelley et al. 1994, Manderbacka 1998) have used “excellent/good” health as the reference category whereas “fair” SRH, marking the mid-point of SRH scale was used as the reference category in **Study I**. “Fair” SRH was the most prevalent category in datasets used for **Studies I–IV** (Table 1) and has been considered as a nondescript state of usual health status in the Eastern Europe setting in several comparative studies (Kasmel, Helasoja et al. 2004, Babones 2009). A recent study (Põld, Pärna et al. 2016) describing the trends in SRH found that although the prevalence of good SRH increased considerably during 1996–2014, the prevalence of poor SRH (up to 4.1% of men and 3.8% of women) was rather stable during the whole study period in Estonia. Similar findings were observed in a preliminary data analysis of **Study II** when a different categorization of SRH was used. In this context, both the improvement and the latter deterioration of health could be seen as relative changes in average and better-than-average SRH categories rather than an increase of severe health conditions. Moreover, as indicated in **Studies I** and **IV**, varying levels of SRH can refer to different health concepts or the magnitude of health complaints people experience.

Previous chapters have highlighted the issue of reporting heterogeneity in SRH i.e. the systematic discrepancy between the true health status and the reporting behavior of SRH. The effects of reporting heterogeneity could be

reduced by merging the SRH levels into a binary variable with some loss in the detail (Etile and Milcent 2006). Merging the categories of SRH in **Studies I–IV** (Table 1) may thus have accounted for some of the measurement-related variation in SRH between population groups. The additional analysis in **Study I** that used the original 5-point scale of SRH and preliminary analysis with the 3-point scale for **Study II** yielded fairly similar results. Therefore, while being fully aware of the sensitivity of the measure, a different categorization of SRH would have affected the results only marginally.

For **Study III**, the SRH level-stratified analysis does not allow to assess the statistical significance of the variance in predictors between the categories of SRH *per se*. Distinguishing respondents by their baseline SRH results in considerable variance in several parameters across subgroups, most notably for age and gender but also in several health status variables. As their inclusion in the model only adjusts for the variation within the subgroup, we tested the robustness of our conclusions by additional analysis (both for SRH-stratified and total dataset) with interaction terms for SRH, age and gender. While the estimates varied slightly depending on the model, the main conclusions remained unaltered.

CONCLUSIONS

The overall aim of this sociological study of health and health measurement was to analyze the mechanisms underlying the subjective health evaluations. More specifically, the thesis focused on SRH, a subjective summary measure of health that bears a significant importance for interdisciplinary research on population health, by studying its determinants and social variation, adaptiveness to macro level societal changes and its predictive power regarding mortality outcomes.

The findings support the existing evidence that SRH is a valid and responsive indicator of individual health that rests on a wide range of determinants. Also, the original studies confirmed the distinct socioeconomic patterning of SRH and its independent association with all-cause mortality that persisted after the adjustment for demographic, social and health-related covariates. Additionally, this study made the following novel contributions to the understanding of health assessment processes and SRH related social variation:

- The predictors of SRH differ for positive and negative health evaluations (**Study I**);
- SRH at the population level is responsive to macroeconomic changes (**Study II**);
- Inequalities in SRH are likely to increase during an economic growth period whereas they decrease during recession (**Study II**);
- SRH predicts subsequent mortality, but the factors underpinning the mortality risk vary by levels of SRH (**Study III, IIIa**);
- Ethnic differences in predictive validity of SRH indicate social variation in health assessments (**Study IV**).

It can be concluded that SRH is influenced by a wide range of factors, not necessarily limited to those directly related to biological constitution. The social determinants affect health outcomes but are also the source of social variation in health assessments as they influence how health is conceptualized and evaluated. In this, health can be interpreted essentially as a social phenomenon that in the context of subjective health measures requires careful interpretation.

SUMMARY IN ESTONIAN

Tervise enesehinnang: hindamine, sotsiaalne variatiivsus ja seos suremusega

Tervis on tähendusrikas mõiste, mille aluseks võivad olla erinevad arusaamad tervisest. Nii on tervis latentne nähtus, mille operatsionaliseerimine mõõtmise kontekstis on viinud arvukate tervisemõõdikute tekkeni. Üheks küsitlusuuringutes sagedasti kasutatavaks instrumendiks on tervise enesehinnang (ingl *self-rated health*; SRH). See tavaliselt üksikküsimusena “Milline on Teie tervis üldiselt” sõnastatud mõõdik on oma lihtsuses muutunud üheks levinumaks tervise seisundi indikaatoriks. Tervise enesehinnangu lähtekohaks on subjektsus, st arusaam, et indiviid suudab oma tervist mõtestada ja tõlgendada ning erinevate tegurite ja tegevuste kaudu ka mõjutada. Mitmed teoreetilised käsitlused (Knauer and Turner 2003, Jylha 2009) tõlgendavad subjektiivse tervise hindamist kognitiivse protsessina, kus valitud hindamisraamides kombineeritakse individuaalselt olulised tervise aspektid ühtseks koondhinnanguks. Varasemates empiirilistes uuringutes leitud seosed tervise enesehinnangu ja suremuse (DeSalvo, Bloser et al. 2006), haigestumuse ning tervishoiuteenuste kasutusega (Chan, Teh et al. 2015, Waller, Janlert et al. 2015) kinnitavad instrumendi valiidsust rahvastiku terviseseisundite hindamisel ning tervisetulemite prognoosimisel.

Doktoritöö teoreetiline osa tutvustab tervise mõõtmise aluseks olevate tervise ja haiguse käsitluste olemust ja nende muutumist ühiskondlike mõjurite kontekstis. Töö analüütiliseks raamistikuks on tervise sotsiaalne mudel (ingl *the social model of health*) (Solar and Irwin 2010), tervisemõjurite ja tervisetulemite seoseid selgitav käsitlus, mis seab rõhuasetuse tervisemõjurite sotsiaalsele aspektidele ja selgitab tervisenäitajate sotsiaalmajanduslikku variatiivsust. Tervise ebavõrdsus on olukord, kus madalam ühiskondlik positsioon on reeglina seotud halvema tervisega (Silventoinen and Lahelma 2002, Mackenbach, Stirbu et al. 2008, Mackenbach, Kulhánová et al. 2015). Doktoritöö teoreetiline osa kirjeldab tervise enesehinnangu mõjureid ja käsitleb peamisi tervise mõõtmisega seotud meetodilisi küsimusi, andes ülevaate tervise enesehinnangu tõlgendamist mõjutavatest metodoloogiliste aspektidest. Kuigi senine tõendus kinnitab tervise enesehinnangu head ennustusväärtust edasise suremuse suhtes (DeSalvo, Bloser et al. 2006), on uuringud leidnud, et vastaja demograafiline (Groot 2000, Ziebarth 2010) ja sotsiaalmajanduslik taust (Etile and Milcent 2006, Bago d’Uva, O’Donnell et al. 2008, Dowd and Zajacova 2010, Dowd and Todd 2011) väljendub süstemaatilise vastamisnihkes, nii et tervise enesehinnangut saab käsitleda “tegeliku tervise” ja vastamiskäitumise summana (Jürges 2007, Laves, Asada et al. 2012). Sarnased leiud tervise enesehinnangu ja suremuse seostes (Franks, Gold et al. 2003, Suresh, Sabanayagam et al. 2011, Su, Wen et al. 2013) rõhutavad, et tervise enesehinnangu korrektseks tõlgendamiseks on oluline mõista selle subjektiivse tervisemõõdiku hindamismehhanisme ja nende sotsiaalset variatiivsust.

Eesmärk

Doktoritöö üldeesmärkideks oli analüüsida tervise enesehinnangu aluseks olevaid tegureid ja nende seoste sotsiaalset variatiivsust. Töö põhineb neljal rahvusvahelistes eelretsenseeritavates ajakirjades aastatel 2013–2017 ilmunud teadusartiklil, mis kirjeldasid tervise enesehinnangu ja suremuse determinante (I ja III artikkel), tervise enesehinnangu trende ja sotsiaal-majanduslikku ebavõrdsust makromajanduslike muutuste kontekstis (II artikkel), ning tervise enesehinnangu ja suremuse seoseid (III, IIIa ja IV artikkel).

Uurimistöö metoodika

Doktoritöö kasutab sekundaarandmeid kolmest Eestis ja lähiriikides läbiviidud rahvastikupõhisest tervise ja tervisekäitumise uuringust. I artikli aluseks olid andmed 2006. aasta Eesti Terviseuuringust (Oja, Matsi et al. 2008) ning multinomiaalse logistilise regressioonanalüüsiga uuriti positiivse (SRH kategooriad “väga hea” ja “hea”) ja negatiivse („halb” ja “väga halb”) tervise enesehinnangu demograafilisi, sotsiaalmajanduslikke ning tervise ja heaoluga seotud predikto-reid võrdluses keskmise tervise enesehinnanguga. Analüüs põhines 4512 vastaja (2127 meest ja 2385 naist vanuses 25–74 aastat) andmetel.

II artikkel kasutab andmeid FinBalt Health Monitori tervisekäitumise uurin-gutest, kaasates perioodil 2004–2010 läbilõikelise postiküsitlusena Eestis (ana-lüüsi 10 966 vastaja andmed vanuses 20–64 a), Leedus (n=7249) ja Soomes (n=11 602) kogutud andmeid. Makromajanduslike muutuste mõju tervise enesehinnangu trendidele hinnati vanusele standarditud levimusmääradega (koos 95% CI-ga). Tervise enesehinnangu sotsiaalmajandusliku variatiivsuse hinda-miseks kasutati logistilist regressioonanalüüsi, kaasates kirjeldavatest tunnustest vanuse, haridustaseme, tööhõive staatuse ja rahvuse tunnused. Analüüsid teos-tati iga riigi jaoks meestel ja naistel eraldi.

III ja IV artikkel kasutasid longituudset andmestikku, kus Eesti tervise-uuringu 1996. a vastajate kohordi elulemust jälgiti retrospektiivselt enam kui 18 aasta vältel. Eesti terviseuuring 1996 (Leinsalu, Grintšak et al. 1998) oli läbi-lõikeline rahvastikupõhine küsitlusuuring, mille valimisse kuulusid 15–79 aasta vanused Eesti alalised elanikud. Uuringus osalenud 4711 inimese (kohandatud vastamismäär 84,3%) kirjetele lisati rahvastikuregistrist saadud surma või emigreerumise staatus ja kuupäev. III artiklis kasutati jälgimisandmed seisuga 31. juuli 2015 ja IV artikkel (valmis varem, kuid sai publitseeritud pärast III artikli ilmumist) seisuga 31. detsember 2013. Mõlemas uuringus oli peamiseks analüüsimeetodiks Cox'i võrdeliste riskide mudelit kasutav elulemusanalüüs, kuhu kaasati rida demograafilisi, sotsiaalmajanduslikke ning terviseseisundi- ja käitumise tunnuseid. III artiklis kirjeldati üldsuremust prognoosivaid tegureid tervise enesehinnangu kategooriate võrdluses. Neid tulemusi täiendab toimetaja-kirjana avaldatud lisaanalüüs (IIIa artikkel), kus sama andmestikku ja mudeleid kasutades hinnati tervise enesehinnangu seoseid üldsuremusega. Uuringus IV, kus keskenduti tervise enesehinnangu ja suremuse seoste etniliste erisuste analüüsimisele, kihitati andmeid rahvuse ja sootunnuse järgi. Kõigis artiklites kasutatud andmestikud olid anonümiseeritud; alusuuringud ning III ja IV

artiklites teostatud andmete linkimised olid kooskõlastatud Tallina Meditsiini-uuringute Eetikakomiteega.

Peamised tulemused ja arutelu

Tervise enesehinnangu hindamismehhanisme ja determinante käsitlevate I ja III artikli lähtekohaks oli ebakõla mitmete varasemate uuringute tulemustes. Mõned autorid (Mackenbach, van den Bos et al. 1994, Manderbacka 1998, Breidablik, Meland et al. 2008) on leidnud, et tervist mõjutavad tegurid on skaala mõlemas otsas sarnased (kuid vastassuunalises seoses), samas kui teised autorid (Smith, Shelley et al. 1994, Kaplan and Baron-Epel 2003, Shooshtari, Menec et al. 2007) on leidnud erinevusi positiivse ja negatiivse terviseseisundi mõjurites ning järeldanud, et tervise enesehinnangu skaala käsitleb erinevaid tervisekontseptsioone. Uuringus I selgus, et negatiivset tervise enesehinnangut prognoosisid eelkõige füüsilise ja psühholoogilise tervise näitajad, samas kui positiivne tervise enesehinnang oli lisaks seotud demograafiliste, sotsiaalmajanduslike, heaolu ning ka füüsilise ja psühholoogilise tervise teguritega.

Tulemus, et positiivse ja negatiivse tervise enesehinnangu mõjurid varieeruvad, viitab erinevatele tervisekontseptsioonidele. Sellest tulenevalt saab eeldada, et positiivse tervise enesehinnanguga seotud mõjurid selgitavad tervise enesehinnangu ja suremuse bioloogilisi seoseid vähem kui otsesed (halva) terviseseisundi indikaatorid, mis on omased madalale tervise enesehinnangule. Arvestades teaduskirjanduses kinnitatud tugevat seost tervise enesehinnangu ja edasise suremuse vahel (DeSalvo, Bloser et al. 2006), jätkas artikkel III eelnevat arutluskäiku ning analüüsis suremust prognoosivad tegureid tervise enesehinnangu kategooriate lõikes. III artikli tulemused näitasid, et negatiivse tervise enesehinnanguga korral oli suremusrisk suurem vanematel, meessoost vastajatel ning samuti neil, kel oli igapäevategevustes haigustega seotud piiranguid. Keskmise ja hea tervise enesehinnangu korral mõjutasid suremusrisi nii demograafilised, sotsiaalmajanduslikud kui tervisekäitumisega seotud tegurid. Doktoritöö arutelu osa käsitleb artiklite I ja III tulemusi varasema kirjanduse kontekstis ning arutleb positiivse ja negatiivse tervise enesehinnangu aluseks olevate tervisekontseptsioonide ning nende sotsiaalse variatiivsuse üle.

II artikkel analüüsis tervise enesehinnangu trende ja tervise sotsiaalmajanduslikku ebavõrdsust hiljutise majanduskriisi ning sellele eelnenud majanduskasvu kontekstis. Majanduskriisi makromajanduslik ja ka sotsiaalne mõju oli eriti tugev Balti riikides, kus perioodil 2008–2009 vähenes SKP enam kui 20% ning töötuse määr kolmekordistus. Kriisi negatiivsed mõjud olid tuntavad ka Soomes, kuid võrreldes Balti riikidega, kus majanduslangusele eelnes kiire kasvu periood, polnud muutus nii reljeefne. Analüüsist selgus, et majanduskriisi markeerivatel 2008–2010. aastal kasvas vanus-standarditud madalama kui hea tervise enesehinnangu levimus 52%-ni Eestis (2008. a 50%) ja 48%-ni Leedus (2008. a 47%). Kuigi muutus ei olnud statistiliselt oluline, siis eelneva majanduskasvu ajal toimunud kiire tervisehinnangu paranemisega võrreldes (7–11% Eestis ja Leedus) on muutus üldises trendis märgatav; Soomes püsis tervise enesehinnang aastatel 2004–2010 stabiilne.

Majanduslanguse aegne madalama kui hea tervise enesehinnangu levimuse tõus (statistiliselt mitteoluline) ilmes meestel kaasatud sotsiaalmajanduslike rühmade lõikes kõigis võrreldavates riikides, samas kui naistel langes tervise enesehinnang (muutus statistiliselt mitteoluline) vaid Eestis ja Leedus. Suhteline ebavõrdsus kriisi perioodil vähenes, tulenedes tervise enesehinnangu paranemisest eelkõige madalama haridusega ning mitte-hõivatud meestel, samas kui tervise enesehinnang kõrgharidusega ning töötavatel meestel pigem halvenes. Üheks võimalikuks teoreetiliseks seletuseks on hiljutise kriisi seos sellele eelnenud kinnisvarahindade tõusu ja laenubuumiga, mis avaldas disproportsionaalset mõju erinevates ühiskonnakihtides (Åslund 2010, Brixiova, Vartia et al. 2010). Doktoritöös käsitletakse majanduskriisi tervisemõju varasema teaduskirjanduse kontekstis, analüüsides makromajanduslike muutuste tervisemõjude mehhanisme ja võimalikke variatsioone tervise enesehinnangu ja teiste tervisemõõdikute vahel.

Tervise enesehinnangu üheks valiidsuse kriteeriumiks on sageli peetud seost edasise suremusriskiga (Idler and Benyamini 1997, DeSalvo, Bloser et al. 2006). III ja IV artikkel on teadaolevalt esimesed jälgimisandmetel põhinevad tervise enesehinnangu ja suremuse seoste analüüsid Eestis. III artiklis ning sellega seotud lisapublikatsioonis leiti, et halva või väga halva tervise enesehinnangu (kohandatult soole, vanusele, rahvusele ning perekonnaseisule) algtaase 1996/1997. aastal oli seotud ligi kahekordse suremusriskiga enam kui 18-aastase jälgimisaja jooksul. Seosekordaja nõrgenes pärast sotsiaalmajanduslike ja tervisetegurite arvesse võtmist, kuid halva tervise enesehinnanguga vastajatel oli võrreldes hea tervise enesehinnanguga vastajatega ligi 40% suurem suremusrisk. Seejuures oli kuni tervisetegurite lisamiseni suremusrisk hea, keskmise ja halva tervise enesehinnangu tasemetel statistiliselt oluliselt erinev, mis kinnitas varasemaid samalaadseid tulemusi (nt Bopp, Braun et al. 2012). IV artikkel käsitles tervise enesehinnangu ja suremuse seose etnilist variatiivsust. Kui sõltumata soost oli halb tervise enesehinnang eestlastel seotud ligi 60% kõrgema edasise suremusriskiga, siis mitte-eestlastel statistiliselt olulist seost tervise enesehinnangu ja suremuse vahel ei leitud. IV artikli tulemused, kus vaid kõrgem vanus ja madalam sissetulek prognoosisid mõlemas etnilises rühmas suuremat suremust, demonstreerivad olulist sotsiaalset variatiivsust tervise enesehinnangu ja suremuse vahel.

Doktoritöö arutelu osa käsitleb tulemuste teoreetilisi seletusi, sh võimalikku etnilist erinevust surma põhjustes ja vastamisstiilidest tulenevat etnilist erisust tervise enesehinnangus. Tervise enesehinnang on terviklik terviseseisundi mõõdik, mida kasutatakse uuringutes terviseseisundi, tervise ebavõrdsuse ning teiste tervise ja heaoluga seotud näitajate jälgimiseks. Kuigi tervise enesehinnang on valiidne terviseseisundi ja ka tervise kaugtulemite indikaator, seab selle subjektiivne olemus võrdlevatele tõlgenduste piiranguid. Doktoritöö arutelu osas käsitletakse detailselt tervise enesehinnangu metodoloogilisi tugevusi ja piiranguid, mis tulenevad nii I–IV artiklis kasutatud andmetest kui tervise tõlgendamise ja hindamise variatsioonidest.

Järeldused

Siinse tervise mõõtmist käsitleva sotsioloogilise uurimuse üldeesmärgiks oli analüüsida tervise enesehinnangu formuleerimise protsessi ja selle aluseks olevaid tegureid ning nende seoste sotsiaalset variatiivsust. Tulemused toetavad varasemat tõendust, et tervise enesehinnang on valideerne terviseseisundi mõõdik. Tervise enesehinnang on mõjutatud paljudest, mitte üksnes vahetult haiguse või halva tervise olemasoluga piiratud teguritest ja selle sotsiaal-majanduslik gradatsioon peegeldab tervise ebavõrdsust. Samuti kinnitas analüüs, et tervise enesehinnang on seotud üldsuremusega ka pärast terviseseisundi ja tervisekäitumise ning demograafiliste ja sotsiaal-majanduslike tegurite arvesse võtmist. Töö peamine uudne panus tervise enesehinnangut käsitlevasse teaduskirjandusse on järgmine:

- Subjektive tervise mõjurid erinevad positiivse ja negatiivse tervisehinnangu korral (I artikkel);
- Tervise enesehinnang on rahvastiku tasandil mõjutatud makromajanduslike muutustest (II artikkel);
- Majanduskriisi ajal ebavõrdsus tervise enesehinnangus mõnevõrra vähenes, mis viitab majanduskriisi mõjude erinevusele eri sotsiaal-majanduslikes rühmades (II artikkel);
- Tervise enesehinnang prognoosib edasist suremust, kuid selle mõjurid varieeruvad sõltuvalt tervise enesehinnangu tasemest (III artikkel ja IIIa artikkel);
- Etnilised erinevused tervise enesehinnangu ja suremuse seostes viitavad sotsiaal-demograafilisele variatiivsusele tervise hindamisel (IV artikkel).

Analüüsist järeldub, et tervise enesehinnang varieerub lisaks tervisega seotud teguritele ka demograafiliste, sotsiaal-majanduslike ning psühholoogiliste tegurite lõikes. Need tegurid mõjutavad nii terviseseisundit kui ka selle tõlgendamist ja hindamist tervise enesehinnangu kontekstis. Seega saab tervist käsitleda eelkõige sotsiaalse nähtusena, mis subjektive tervise-mõõdikute kontekstis vajab ettevaatlikku tõlgendust.

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PUBLICATIONS

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Reile, R., Stickley, A., Leinsalu, M (2017). Re: Letter to the Editor of Public
Health in response to ‘Large variation in predictors of mortality by levels of
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Nahkur, O., Männik, A., Suuroja, T., Juus, E., Võrno, T., Reile, R., Kiivet, R-A
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DISSERTATIONES SOCIOLOGICAE UNIVERSITATIS TARTUENSIS

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