ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Bachelor Thesis Econometrics and Operations Research

The causal relationship between subjective social status and different health outcomes

Author name:

Stance Lamers

Student ID number:

451001

Supervisor:

Prof. R. L. Lumsdaine

Second accessor:

Prof. M. van der Wel

Date final version: July 5, 2020

Abstract

Subjective social status (SSS) has been considered as an important measure of socioeconomic status (SES) to better understand circumstances of people at an older age. This thesis follows up on Demakakos et al. (2008), who used a single wave of the English Longitudinal Survey of Ageing (ELSA) to examine the relationship between SSS and health and how objective indices of social status, namely education, occupational class and wealth, affected these relationships. In this thesis, their research is partly replicated and extended by performing longitudinal analysis and investigating whether ethnicity, childhood socioeconomic conditions and indices of subjective well-being (life satisfaction and quality of life) are significant predictors of SSS and whether they affect the relationship between SSS and different health outcomes. Both indices of subjective well-being (SWB) are statistically significant predictors of SSS independent of gender, even when adding all four variables. For ethnicity this also holds in women. The relationship between SSS and all health outcomes can be accounted for by the indices of SWB when also adjusting for the control variables and objective indices of SES. From longitudinal analysis it is found that there is a significant causal relationship between SSS and the health outcomes that use only a self-perceived measure in both men and women.

The views stated in this thesis are those of the author and not necessarily those of the supervisor, second assessor, Erasmus School of Economics or Erasmus University Rotterdam.

Acknowledgements

In the process of writing this thesis, my supervisor, professor R.L. Lumsdaine, provided me with a lot of support and feedback. Every time we met she made me more enthusiastic about the project. I would hereby like to thank her for her guidance during this process.

Table of contents

1 Introduction

An increasing amount of studies focus on health at an older age and how older people assess their health as well as other circumstances in their life. Researchers have considered different factors to be associated with health. One of those factors is socioeconomic status (SES), which has been widely examined and associated with health. This relationship appears to occur at all levels of health, not only for poor health (Adler et al., 1994). Often only objective measures are used as indicators for SES, such as income, wealth, occupation and education, but there has been a growing interest in a subjective measure for SES. Health inequalities resulting from a subjective measure of SES are said to be more important than the objective measures of SES (Wilkinson, 1997). Subjective social status (SSS) refers to the "*individual's perception of his own position in the status hierarchy*" (Jackman and Jackman, 1973). Although it has been compared to the objective measures of SES and associated with different health outcomes in previous research, more research can be done to broaden our knowledge about how people in late adulthood assess their social status and how that perception is related to their health.

This thesis follows up on Demakakos et al. (2008), where the association between SSS and health is investigated for individuals in late adulthood. In this thesis, part of their research will be replicated and extended. Demakakos et al. (2008) performed gender-specific analysis and considered whether the relationship between SSS and health changed when taking the objective measures education, occupational class and wealth into account, both separately and together. They used the English Longitudinal Study of Ageing (ELSA), which consists of cross-sectional data from individuals over the age of 50.[1] Its aim is to understand the aspects of ageing in England. This data study will also be used in this thesis. It allows for longitudinal analysis, which has not been done by Demakakos et al. (2008). Longitudinal analysis combines both cross-section and time series data which enables us to study a causal relationship between SSS and health. The main research question of this thesis is therefore defined as follows: "*Does the effect of SSS on different health outcomes change when performing longitudinal analysis compared to cross-sectional analysis?*"

In the statistical analyses that were carried out, Demakakos et al. (2008) adjusted their models

[1] As a condition of use I note that: "*The data were made available through the UK Data Archive. English Longitudinal Study of Ageing (ELSA) was developed by a team of researchers based at University College London, the Institute of Fiscal Studies and the National Centre for Social Research. The funding is provided by the National Institute on Aging in the United States (grants 2RO1AG7644-01A1 and 2RO1AG017644) and a consortium of UK government departments coordinated by the Office for National Statistics. JN and MM are supported by the ESRC through its funding of the project 'Inequalities in health in an ageing population: patterns, causes and consequences' (RES-000-23-0590). MM is supported by a Medical Research Council Research Professorship. The developers and funders of ELSA and the Archive do not bear any responsibility for the analyses or interpretations presented here.*"

for the demographic control variables age and marital status, but not for ethnicity, although previous research has indicated that both the relationship between (1) SSS and objective measures of SES and (2) SSS and health, can vary between ethnic groups. For example, Jackman and Jackman (1973) illustrated that among African Americans there is no relationship between SSS and objective measures of SES, but among whites there is.

Furthermore, it is still unclear how individuals assess their social status. Objective indices of SES only explain part of this assessment. It is likely that individuals do not only consider current SES, but also their past and future prospects (Singh-Manoux et al., 2003), such as their childhood socioeconomic conditions (CSC). Also, since SSS is based on self-reporting, it is possible that it strongly correlates with other self-reported measures, such as subjective well-being (SWB). In previous research, the relationship between SWB and objective measures has been examined, but not many studies have investigated the relationship between SSS and SWB.

As an addition to performing longitudinal analysis, this thesis examines whether ethnicity, CSC and indices of SWB are significant predictors of SSS and whether they affect the relationship between SSS and different health outcomes. In women, ethnicity was a significant predictor of SSS. Both indices of SWB (life satisfaction and quality of life) were significant predictors of SSS independent of gender, even when adjusting for all four variables. When the indices of SWB were included in the models, the relationship between SSS and all health outcomes did not remain significant when also adjusting for the control variables and objective indices of SES, independent of gender. Performing longitudinal analysis showed a statistically significant causal relationship between SSS and self-rated health when adjusting for the control variables and objective indices of SES independent of gender.

This thesis is organized as follows. First, the relevant literature is described in Section 2. Then, the ELSA data are further explained in Section 3 together with the explanatory and dependent variables that are included in this thesis. In Section 4, the regression models for both cross-sectional and longitudinal analyses are discussed. Finally, Section 5 presents and discusses the results and Section 6 provides a conclusion with some limitations of this thesis and recommendations for further research.

2 Literature review

A subjective measure of SES to associate with health is important in the research of health inequalities in older people. It can aid the understanding of the relationship between social inequalities and health beyond the objective measures of SES (Demakakos et al., 2018). Also, unlike the objective indices of SES, it is a summary measure, which makes it easier to compute. When individuals are asked to rank their social status, it can be expected that objective indices of SES play a big role in this evaluation. It has been illustrated that the objective measures of SES form the basis of SSS (Demakakos et al., 2008). Hence, in the association of SSS and health, most studies control for the objective measures to show that SSS independently relates to health (Ostrove et al., 2000). Furthermore, SSS can be more consistent and strongly related to health factors than objectives measures of SES. For example, Adler et al. (2000) demonstrated that SSS (r=-.44) was more strongly correlated to sleep latency than objective SES (r=-.17). These stronger correlations could be obtained because SSS can capture subtle aspects of social status more accurately than the objective indicators (Operario et al., 2004; Franzini and Fernandez-Esquer, 2006). For example, getting a degree from a more respected college instead of a regular college can result in a difference in the individuals' life opportunities, although, when measuring education, these would be coded as the same.

Although objective measures of SES form the basis of SSS, SSS is a more extensive measure of individuals' social status (Singh-Manoux et al., 2005). It is still unclear which other factors are strong predictors of SSS and which affect the relationship between SSS and health. Therefore in this thesis the relationship between SSS and ethnicity, CSC and indices of SWB is examined, which has not been done in many other studies investigating SSS.

2.1 Ethnicity

Some studies showed differences between ethnic groups in (1) the correlation between SSS and objective indices of SES and (2) the relationship between SSS and health. Ostrove et al. (2000) demonstrated that the correlations between SSS and objective measures of SES were stronger among whites than among African Americans. Furthermore, SSS was found to independently predict self-rated health among white and Chinese-American women, but not among African-American and Latina women. On the other hand, Wolff et al. (2010b) reported no ethnic differences in the relationship between SSS and health. This indicates that it might depend on the nature of the data set that is used whether ethnic differences can be found. The distinction between the studies mentioned above and this thesis is that they all use an US sample, while this thesis uses an English sample.

2.2 CSC

When individuals rate their social status, they can include their past achievements in these evaluations (Singh-Manoux et al., 2003). It has been shown that CSC can affect adult health (Van de

Mheen et al., 1998). Moreover, Demakakos et al. (2012) illustrated that CSC was one of the strongest predictors of developing diabetes at older ages in women. Still, not many studies investigating SSS included CSC in their analyses, hence this will be further investigated in this thesis.

Although ethnicity and CSC have not been included often in studies investigating SSS, a lot of other potential predictors of SSS have been considered. Using data from the Whitehall study of British civil servants, Singh-Manoux et al. (2003) showed that on top of the objective indicators for SES, a feeling of financial security was also a good predictor of SSS. Psychological well-being measures, such as hopelessness, control at work, mental health and optimism, did not independently predict SSS. Franzini and Fernandez-Esquer (2006) illustrated that social trust and perceived opportunities are positively associated with SSS. Often negative affect has been associated with SSS, which can be measured by a subjective ranking how much individuals tend to feel negative emotions (Adler et al., 2000). It has been shown that negative affect might have a role on the association between SSS and health (Operario et al., 2004).

2.3 Subjective well-being

Subjective well-being (SWB) is a self-reported measure of individuals' circumstances as well as SSS. It can be split up into hedonic and eudemonic well-being. Hedonic well-being refers to "*the idea of pleasure maximisation*" and is often measured with life satisfaction. On the other hand, eudemonic well-being is seen as "*more than pleasure or happiness*" and is often measured with quality of life (Jivraj and Nazroo, 2014). The relationship between SWB and SES has been examined using different indices of SWB and SES. Some studies illustrated that socioeconomic status only weakly predicts SWB (Anderson et al., 2012), while others suggested that there is a strong relationship for some of the measures of SES. For example, individuals that live in wealthier nations tend to have a higher quality of life (Diener and Diener, 1995). Howell and Howell (2008) used a sample of multiple economically developing countries and demonstrated that the relationship between SES and SWB was strongest when using wealth and life satisfaction as indicators for SES and SWB respectively. In examining the relationship between SSS and health, life satisfaction has also been included in some studies to adjust for reporting bias due to negative affect (Singh-Manoux et al., 2003; Miyakawa et al., 2012). Still, the relationship between SWB and SSS can be further examined, which will be part of this thesis.

2.4 MacArthur scale

To measure SSS, the MacArthur Scale of Subjective Social Status is used in this thesis introduced by Adler et al. (2000). It has been shown that the performance of this scale is better among older people (Giatti et al., 2012). A debated aspect in studies of SSS is the reference group for comparison of SSS. The reference group that is chosen for comparison might affect how people assess their social status (Wolff et al., 2010a). In a study using a nationally representative US sample, different reference groups were considered and it was demonstrated that using the reference group of others in American society provided the best model (Wolff et al., 2010b). In the ELSA data, the reference group of others is considered as well, but here in an English society. Hereby it is assumed that this still provides the best model.

2.5 Relationship between SSS and different health outcomes

In associating SSS with health, different health outcomes have been considered. When both objective SES and SSS were included in the model, only SSS was a significant predictor of health and change in health status (Singh-Manoux et al., 2005). Operario et al. (2004) illustrated that SSS was a stronger independent predictor of self-rated health than objective measures of SES. Another research demonstrated that SSS was related to incident diabetes in men even after adjusting for other covariates, such as risk factors (Demakakos et al., 2012). The association between SSS and self-rated health has been frequently examined, also for some with performing longitudinal analysis. In a sample of healthcare personnel in parts of the US, Thompson et al. (2014) examined the relationship between SSS and self-rated health. Self-rated health was both weekly and globally measured, while SSS was only measured twice, seven months apart. Healthcare personnel who rated themselves on the bottom levels of the SSS ladder were four times more likely to decrease their self-rated health status than healthcare personnel who rated themselves on the higher levels of the ladder. To the best of my knowledge, in most studies that investigated the relationship between SSS and health, only cross-sectional analysis has been carried out. Longitudinal analysis is needed to infer a causal relationship. Furthermore, most studies consider only self-perceived health outcomes, while here both self-perceived and clinical health outcomes are considered for longitudinal analysis.

3 Data

Since part of the research by Demakakos et al. (2008) is replicated in this thesis, the same data set is used here, namely the English Longitudinal Study of Ageing (ELSA) (Clemens et al., 2019). It contains, among others, information about health trajectories, disability and healthy life expectancy (Steptoe et al., 2013). It is designed as a companion study to the Health and Retirement Study (HRS) in the US. The ELSA study considers people aged 50 and over and their partners, living in private households in England (NatCen Social Research, 2018a). The ELSA surveys started in 2002-2003 and every two years the sample is followed up, where every two years refers to a wave.

In this section, first the waves from ELSA that are used in this thesis are discussed. Second, the concept of weighting in survey data is explained and how it is accounted for in this research. Then, the included explanatory variables of interest and control variables are described. Later, all the health outcomes used as dependent variables in the models are discussed and finally the descriptive statistics are presented.

3.1 Included waves from ELSA

Only the second wave (2004-2005) is used by Demakakos et al. (2008) and therefore this wave will be used here as well for cross-sectional analysis to replicate part of their research. For longitudinal analysis, not only the second wave but also the third (2006-2007), fourth (2008-2009), fifth (2010-2011) and sixth wave (2012-2013) are used. The first wave is not included since this wave does not contain a SSS measure which is essential in this research. The first wave is only used to obtain information about CSC of the respondents. In this thesis only core members are included ($N =$ 8780) and since SSS is the main variable of interest, individuals missing SSS are excluded ($N =$ 1347).

Some of the health outcomes are obtained from a special ELSA data set called nurse data. This data set presents nurse visits where, for example, individuals' blood samples are taken, their height, weight and waist circumference (NatCen Social Research, 2018b). Participants are asked after the main interview whether they want to take part in a nurse visit. On average, only 78.5% of the individuals that participated in the main interview agree to take part in the nurse interview. Hence, there are fewer observations for health outcomes with clinical measures. These nurse visits are only taken every other wave, namely waves 2, 4 and 6. Therefore, when performing longitudinal analysis, these have a bigger time interval between the observations. As a robustness check, the most recent measurement of the health outcomes using nurse data is used in the waves with no nurse data. Then these results will be compared and the differences will be considered.

3.2 Weighting for non-response

Unlike some other complex sample designs, ELSA does not use weights to correct for the sampling design, since it did not over-sample for ethnic or sexual minority groups (Kapteyn, 2010; Lee et al., 2016). However, it contains cross-sectional weights to correct for non-response. It is recommended to conduct analyses on weighted data if possible, since this will help to minimize the bias from differential non-response among key sub groups (NatCen Social Research, 2018a). Including weights adjusts the responding sample such that it gives a more accurate representation of the population of interest. Furthermore, it prevents biased estimates in favor of the people who were more likely to participate.

The ELSA study also contains longitudinal weights, which are only defined for individuals who took part in all the waves, up to and including the current wave (NatCen Social Research, 2018a). This means that individuals who took part in the second and later waves but not in the first would be omitted, although the first wave is not included in this thesis. Fortunately, the final sample did not include any individuals for which this was true, so there were no unnecessary deletions when using weighted data.

Solon et al. (2015) give some motives for using weights as well, namely: (1) to correct for heteroskedasticity, (2) to correct for endogenous sampling, and (3) to identify average partial effects when heterogeneity is present. They also recommend to always perform both weighted and unweighted analyses. Hence, in this thesis both weighted and unweighted longitudinal analyses are performed to explore how much these differ.

3.3 Explanatory variables

The explanatory variables are split up into three categories: subjective and objective measures of SES, key variables of interest (ethnicity, CSC and indices of SWB) and control variables (age and marital status). Furthermore, gender-specific analysis is performed, since Demakakos et al. (2008) showed gender-differences in their results and also other studies demonstrated differences when distinguishing by gender (Singh-Manoux et al., 2005; Demakakos et al., 2012).

3.3.1 Measures of SES

To capture SSS, the MacArthur Scale of Subjective Social Status is used, which is a ladder of ten rungs and presents where people rank themselves in the English society (Adler et al., 2000). Participants are asked to answer the following question: *"Think of this ladder as representing where people stand in our society. At the top of the ladder are the people who are the best off – those who* *have the most money, most education and best jobs. At the bottom are the people who are the worst off – who have the least money, least education, and the worst jobs or no jobs. The higher up you are on this ladder, the closer you are to the people at the very top and the lower you are, the closer you are to the people at the very bottom. Please mark a cross on the rung on the ladder where you would place yourself."* (Adler et al., 2000). When participants rank themselves in between two rungs, they are assigned to the highest one of those rungs. As measures for objective social status education level, occupational class and wealth are used. For education level, dummy variables are used for each level, indicating 1 for the highest level of education that participants completed. Occupational class is measured using the National Statistics Socio-Economic Classification scheme (NS-SEC). Individuals that have never worked or were long-term unemployed ($N = 100$) are not included, as was done by Demakakos et al. (2008). The long-term unemployed includes individuals that are unemployed, but have been seeking work for one year or more. For wealth, quintiles of total net wealth are used which are measured at household level. This indicator for SES is said to be one of the most appropriate measures of SES in studies involving older people (Demakakos et al., 2012).

3.3.2 Key variables of interest

For the extended model, ethnicity is added as a dichotomous variable indicating white versus non-white people. As an indicator for CSC, the occupation of individuals' father when they were 14 is used. It is split up into four categories: higher (managerial, professional and administrative occupations or business owners), intermediate (skilled trade and services-related occupations), lower (manual and casual jobs including including unemployed and sick/disabled) and other occupations (including armed forces and retired) (Demakakos et al., 2012). This information was partly obtained from the first wave. Hereby it is assumed that nothing changed over these waves in the capability of respondents to remember these events. As indicators for SWB, life satisfaction and quality of life are used (Jivraj and Nazroo, 2014). To measure life satisfaction, the reversed Satisfaction With Life Scale (SWLS) is used, introduced by Diener et al. (1985). It includes five items, which can be found in Appendix A, and is often used as a measure of SWB (Pavot and Diener, 2008). The items are rated on a 7-item scale ranging from 'strongly disagree' to 'strongly agree'. The overall score for life satisfaction is then obtained by summing up these items which results in a score between 5 and 35, where 5 indicates very low life satisfaction and 35 very high life satisfaction. To measure quality of life, the 19-item CASP scale is used, which is specially designed to measure quality of life at an older age (Hyde et al., 2003; Jivraj and Nazroo, 2014). The nineteen items can be found in Appendix B and these are categorized per life domain. The items are rated on a 4-point scale ranging from 'often' to 'never'. Because a lot of individuals missed one or more of these items ($N = 809$), per life domain the missing value is imputed as rounding up the average of that life domain, under the condition that this life domain had more than half of the items available. If this condition did not hold, the CASP score was set to missing. Hereby it is expected that individuals use a similar rating for the items that are in the same domain. The overall score is obtained by summing up these items, resulting in a score between 19 and 76. The higher the score, the better the quality of life.

3.3.3 Key control variables

As control variables, age and marital status are used, as was done by Demakakos et al. (2008). Age is split up into seven categories with each 5-year intervals except the first and last one representing '52-54 years old' and '80 years or older', respectively. Marital status is treated as a dichotomous variable indicating 1 for partnered individuals.

3.4 Dependent variables

As dependent variables, the following self-perceived and clinical health outcomes are considered: self-rated health, long-standing illness or disability, depression, hypertension, diabetes, central obesity, HDL-cholesterol and triglycerides. Only diabetes and hypertension use both self-perceived and clinical measures. Individuals with missing information on a health outcome were excluded from the analysis of that specific health outcome.

3.4.1 Health outcomes with only self-perceived measures

For self-rated health, a dichotomous variable is considered indicating 1 for 'poor or fair health'. In all the used waves, except the third wave, the following categories are used: 'poor', 'fair', 'good', 'very good' and 'excellent'. The third wave used: 'very bad', 'bad', 'fair', 'good' and 'very good'. In this thesis it is assumed that individuals do not change in their rating behavior due to this difference in categories, although this might not be a valid assumption (Lumsdaine and Exterkate, 2013). Furthermore, Bowling and Windsor (2008) illustrated that more individuals rated their health status as optimal ('excellent' or 'very good') with the version that used 'excellent'. On top of that, this version showed smaller ceiling effects. Long-standing illness or disability is represented by a binary variable indicating 1 for participants that answered the following question with 'yes': *"Do you have any longstanding illness, disability or infirmity? By long-standing I mean anything that has troubled you over a period of time, or that is likely to affect you over a period of time"* (Demakakos et al., 2008). To measure depression, the Center of Epidemiological Studies-Depression

(CES-D) scale is used with a cut-off point of four or more depressive symptoms (Radloff, 1977).

3.4.2 Health outcomes with clinical measures

For hypertension and diabetes binary variables are used, indicating 1 for individuals that reported being diagnosed with it in the current wave or confirmed still being diagnosed with it from the previous wave. As for the clinical measures, individuals with a mean of the systolic and diastolic hypertension $\geq$ 140/90 mmHg are said to be hypertensive and for diabetes individuals with a glycated haemoglobin (HbA1c) value $\geq$ 6% (American Diabetes Association, 2006). Waist circumference is used as an indicator for central obesity. The cut-off point for men is 94 cm and for women 80 cm. The cut-off points for HDL-cholesterol are <1 mmol/L for men and < 1.3 mmol/L for women and for triglycerides <1.7 mmol/L for both genders (Alberti et al., 2006).

3.5 Descriptive statistics

Table 1 presents the demographic characteristics of the sample. The sample includes more women (53.5%) than men (46.5%). Also for both genders, more than half of the participants are partnered and only a small proportion (<2.0%) is non-white. As for the objective indices of SES, a large proportion has no educational qualifications, for women (42.8%) this is bigger than for men (32.9%). Occupational class shows quite some differences by gender, for example the proportion of men working in higher managerial and professional occupations is much bigger (14.9%) than for women (3.3%). Although the research by Demakakos et al. (2008) was replicated, some differences were obtained in the characteristics. In Appendix C the characteristics of this thesis can be compared to theirs. Mostly, small differences are found, which could be obtained because the ELSA waves are refreshed every time a new wave comes out (NatCen Social Research, 2018a). Small modifications to the data set can be made if mistakes in the previous version were found. Table 1 also shows the average values for SSS, SWLS and CASP. Independent of gender, partnered individuals and whites have a higher (or equal for SSS in men) average SSS, SWLS and CASP compared to unpartnered individuals and non-whites respectively. Also individuals with higher levels of the objective indices and CSC have a higher average SSS, SWLS and CASP, in comparison with individuals in lower levels. The descriptive statistics of the merged data set, which includes all the used waves for longitudinal analysis, can be found in Appendix D. Although mostly the same observations can be made as mentioned for Table 1, a remarkable difference can be found in the percentage of individuals in each age group. Since only individuals are included in the merged sample who participated in every wave, there are less individuals in the younger age groups and more in the older ones.

Table 1: Descriptive statistics by gender of the ELSA sample of 2004-2005 version 4

	Females				Males			
	N(%)	SSS[a]	SWLS	CASP	N(%)	SSS	SWLS	CASP
Total	4066(53.5)	5.9	26.1	61.7	3367(46.5)	6.0	26.4	61.4
Age								
52-54	352 (9.6)	5.9	25.9	61.7	307 (10.9)	6.4	26.1	61.8
55-59	904 (21.8)	5.9	25.5	62.1	750 (23.8)	6.0	25.3	61.3
60-64	731 (17.3)	6.0	26.5	63.1	583 (17.0)	6.1	26.2	62.1
65-69	664 (15.6)	5.9	26.7	62.6	587 (16.7)	5.9	26.7	62.0
70-74	541 (12.8)	5.7	26.4	61.6	492 (13.1)	5.8	27.3	61.6
75-80	466 (11.9)	5.7	26.2	60.3	398 (11.3)	5.9	27.2	61.1
>80	408 (11.0)	5.8	25.4	57.6	250 (7.2)	5.9	26.9	57.4
Marital status								
Partnered	2481 (62.2)	6.1	27.4	62.8	2632 (77.7)	6.1	27.0	61.7
Unpartnered	1585 (37.8)	5.5	24.1	59.8	735 (22.3)	5.5	24.2	60.0
Education level[b]								
Degree or equivalent	372 (8.5)	6.9	26.8	64.3	573 (16.0)	7.2	27.4	63.9
Higher education or equivalent	432 (10.0)	6.4	26.2	62.8	496 (13.9)	6.3	26.6	62.8
General certificate of education: advanced level or equivalent	231 (5.5)	6.2	25.8	62.9	278 (8.0)	6.1	25.7	61.7
General certificate of education: ordinary level or equivalent	789 (18.9)	6.0	25.8	62.6	540 (15.9)	5.9	26.2	61.9
Certificate of secondary education or equivalent	82 (2.1)	5.6	26.4	61.2	270 (8.1)	5.7	26.4	60.1
Foreign or other type of qualifications	499 (12.2)	5.8	26.5	62.3	174 (5.2)	5.8	26.2	61.2
No qualification	1659 (42.8)	5.4	26.0	59.9	1034 (32.9)	5.3	26.0	59.2
Occupational class[c]								
Higher managerial and professional occupations	146 (3.3)	6.9	27.0	64.9	546 (14.9)	7.0	27.6	64.0
Lower managerial and professional occupations	889 (21.1)	6.3	26.5	63.1	789 (22.1)	6.4	26.9	62.8
Intermediate occupations	878 (21.8)	6.0	26.4	62.5	183 (5.3)	5.8	25.3	60.5
Small employers and own account workers	312 (7.7)	6.3	26.4	62.5	478 (14.3)	5.9	26.4	60.6
Lower supervisory and technical occupations	261 (6.8)	5.7	26.1	60.9	528 (16.6)	5.6	26.0	59.9
Semi-routine occupations	942 (24.7)	5.5	25.6	60.4	362 (11.6)	5.3	25.3	60.2
Routine occupations	548 (14.6)	5.1	25.8	59.8	468 (15.2)	5.3	25.8	59.4
Wealth[d]								
1	689 (18.1)	4.9	24.0	56.9	465 (15.3)	4.8	23.1	56.0
2	787 (19.6)	5.4	25.0	60.0	616 (18.9)	5.3	25.5	59.1
3	836 (21.1)	5.8	26.1	62.2	692 (20.8)	5.9	26.9	61.9
4	833 (20.6)	6.1	27.0	63.0	751 (22.3)	6.3	26.8	62.5
5	864 (20.6)	6.8	28.0	65.0	808 (22.7)	7.0	28.0	64.5
Ethnicity								
White	4011 (98.6)	5.9	26.2	61.7	3313 (98.1)	6.0	26.4	61.4
Non-white	53 (1.4)	5.0	23.3	57.7	53 (1.9)	6.0	26.2	59.9
CSC: Occupation of father when 14[e]								
Higher	1301 (31.0)	6.3	26.6	62.8	950 (27.5)	6.5	26.9	62.5
Intermediate	1261 (31.3)	5.8	25.9	61.5	1133 (34.1)	5.9	26.4	61.7
Lower	522 (13.2)	5.4	25.8	60.4	428 (13.3)	5.4	25.6	59.9
Other	962 (24.5)	5.7	25.9	61.0	835 (25.1)	5.8	26.1	60.4

[a] The values given for SSS, SWLS and CASP are mean values.

[b] The category 'no educational qualifications' is used as a reference category in the models.

[c] Professions in the category 'routine occupations' are used as a reference category in the models.

[d] Wealth in category 1 is used as a reference category in the models.

[e] Professions in the category 'other' are used as a reference category in the models.

Note: All proportions are weighted for non-response, while counts are not.

4 Methodology

In this section, first the cross-sectional analysis is described. Then, the different models used for longitudinal analysis are explained. All statistical analyses are carried out with Stata version 15.1 and distinguish by gender.

4.1 Cross-sectional analysis

Part of the research by Demakakos et al. (2008) is replicated by using the same data set and methods they used. First, the correlations between all measures of SES and the key variables of interest are examined. Second, OLS regression is performed using SSS as a dependent variable with adjusting for the objective indices of SES and the control variables. The key variables of interest are then both separately and together included to investigate whether they are significant predictors of SSS. Then multivariate logistic regression models are estimated with the health outcomes as dependent variables. Different models are considered, the first only adjusts for the control variables age and marital status. The other models also adjust for the objective indices of SES separately and together. On top of that, the key variables of interest are included in the models to investigate whether they affect the relationship between SSS and health.

The results are presented in odds ratios. In logistics regressions, the odds ratio can be calculated by taking the exponent of the estimated coefficient (Szumilas, 2010). It can be interpreted as follows: take a continuous covariate X and a binary dependent variable Y, if X has an odds ratio of 1.08, then, holding all other covariates at fixed value, for a one-unit increase in X, it is expected to have about 8% increase in the odds of having $Y = 1$. This increase is independent of the value of X (STATA, FAQ, 2010).

4.2 Longitudinal analysis

To answer the main research question, longitudinal analysis is performed, also called panel analysis. It is performed on both weighted and unweighted data. If these differ, it might be better to use weighted data, since this indicates that there may be attrition bias.

There are two dimensions in panel analysis, a cross-sectional dimension, indicated by subscript i, and a time series dimension, indicated by subscript t (Hsiao, 2007). A distinction can be made between time-varying and time-invariant covariates, where the first can change over time, such as wealth, and the values for the latter stay the same, such as ethnicity and gender (Jones et al., 2013). Only a few individuals (<10) show a change in one of the time-invariant variables over time in the used data set, but for most only in one wave. This is probably due to mistakes when filling in the interview. Since there are only a few, these observations are omitted.

There are two types of panel models: random effects (RE) and fixed effects (FE). Both have their pros and cons. The RE model allows for including time-invariant covariates, which are present in the used data set and these covariates could have an effect on the health outcomes. However, the RE model does not allow for correlation between individual-specific effects and explanatory variables which could be present in this thesis. The FE model does allow for correlation, but it removes observations that do not change at all over time. Due to this property, more than half of the observations are removed for most health outcomes. The correlated RE model does not have this property, but as well as the FE model it allows for correlation. Therefore, the FE model is not included here. As an addition, another variant of the standard RE model, namely the hybrid model, is included as well.

4.2.1 RE model

The RE model can be represented as follows:

$$y_{it} = \beta_0 + \beta_1 x_{it} + \beta_2 c_i + \alpha_i + \varepsilon_{it} \tag{1}$$

$$\alpha_i \sim iid(0,\, \sigma_\alpha^2), \quad \varepsilon_{it} \sim iid(0,\, \sigma_\varepsilon^2) \tag{2}$$

for individual i at wave t, where $i = 1, \ldots, N$ and $t = 2, \ldots, 6$. Here, β_0 is the intercept, x_{it} are the covariates that can vary between and within clusters (time-varying) and c_i the covariates that vary only between clusters (time-invariant) (Schunck, 2013). The term α_i is the time-invariant individual-specific term, which could be referred to as the "*individuals' unobserved ability*" (Baltagi, 2008). The RE estimator is only consistent when the individual-specific effect is uncorrelated with the covariates ($E(\alpha_i|x_{it}, c_i) = 0$). In this thesis, this seems unlikely to hold. For example, unobserved parameters such as income of parents can be correlated with education level obtained by individuals. In this model, α_i is treated as random. Furthermore, ε_{it} is the usual error-term and the dependent variable y_{it} is one of the health outcomes. The RE estimator is said to be a weighted average of the between and within estimators (William, 2010).

4.2.2 Hybrid model

The hybrid model can estimate both the within and between effects. It can be represented as follows (Allison, 2009):

$$y_{it} = \beta_0 + \beta_1(x_{it} - \overline{x}_i) + \beta_2 c_i + \beta_3 \overline{x}_i + \alpha_i + \varepsilon_{it} \tag{3}$$

where the term β_1 gives the within effect estimate, which is the same as the fixed effect estimate (Mundlak, 1978). Here, $\overline{x}_i$ is the cluster mean and the between effect is estimated with β_3. With β_2 the effects of the time-invariant covariates can be estimated, but the condition of no correlation still has to hold. With this hybrid model the equivalence of the within and between estimates can be tested (Schunck, 2013). It has been stated that this model is strictly better than both the RE and FE model, since it allows to estimate both time-invariant effects and within effects (Bell and Jones, 2015).

4.2.3 Correlated RE (CRE) model

The hybrid model is said to be closely related to the CRE model (Wooldridge, 2010), first proposed by Mundlak (1978). For the standard RE model, α_i is not allowed to correlate with any of the explanatory variables. The CRE model gives an relaxation of this condition. The CRE model can be represented as follows:

$$y_{it} = \beta_0 + \beta_1 x_{it} + \beta_2 c_i + \phi \overline{x}_i + v_i + \varepsilon_{it} \tag{4}$$

where it introduces the assumption $\alpha_i = \phi \overline{x}_i + v_i$, where it allows α_i to depend on observed characteristics. Here, v_i is the independent part of the individual-specific effect. The term β_1 is the fixed effects estimate and is identical to the one from Equation (3), but the estimated effect of $\overline{x}_i$ will differ in these two models. In the CRE model, this is the difference of the between and within effects, that is; $\phi = \beta_3 - \beta_1$ (Schunck, 2013).

5 Results

In this section first the cross-sectional results are discussed, including the replication of Demakakos et al. (2008) and an extension to their research. Then, the results from longitudinal results are discussed to show whether there is a causal relationship between SSS and the used health outcomes.

5.1 Results from cross-sectional analyses

Table 2 presents the bivariate correlations between all indices of SES and the key variables of interest. It shows that ethnicity is significantly correlated with education (-0.05) and wealth (0.03). Occupation of the father is more strongly correlated with the objective indices of SES than with SSS. For life satisfaction and quality of life the reverse is true. Both also show a high positive significant correlation with wealth, which was also shown by Howell and Howell (2008) for life satisfaction. All key variables of interest, except ethnicity, are positively significantly correlated with SSS. This shows that the higher the individuals' SSS, the better was their father's occupation when they were 14, the higher their life satisfaction and the better their quality of life.

Table 2: Correlation coefficients with significance levels of the bivariate correlations between the subjective and objective measures of SES and the key variables of interest

	SSS	Education level	Occupational class	Wealth
Ethnicity	0.03	−0.05**	0.00	0.03*
Occupation of the father	0.17**	0.26**	0.22**	0.26**
SWLS	0.37**	0.04**	0.09**	0.23**
CASP	0.38**	0.16**	0.17**	0.30**

Note: All correlations are weighted for non-response. **p <0.01, *p <0.05.

Table 3 presents the coefficients and R^2 of the models where the key variables of interest are considered as predictors of SSS. They are included both separately and together, where all models are adjusted for the objective indices of SES and control variables. It shows that ethnicity in women and both indices of SWB for both genders are significant predictors of SSS. Furthermore, they remain significant when all key variables of interest are included. They all have positive coefficients, indicating that white people or individuals with higher SWB tend to have a higher SSS than non-white people and individuals with lower SWB respectively. Occupation of the father is not a significant predictor of SSS for both genders.

The R^2 is the proportion of the variance in the dependent variable which can be predicted from the explanatory variables. When life satisfaction or quality of life is included, the most increase in the R^2 is found, although this value remains relatively low (<0.35). This indicates that there is still a large portion of variance that is not explained by the included covariates.

Table 3: Coefficients with significance levels of the OLS regression model predicting SSS and adjusting for the objective indices of SES and control variables age and marital status

		Ethnicity	Occupation of father	Life satisfaction	Quality of life	All
Ethnicity	male	0.22				0.13
	female	0.76**				0.55*
Occupation of father	male					
	lower		−0.15			−0.12
	intermediate		0.00			−0.02
	higher		0.12			0.11
	female					
	lower		−0.13			−0.12
	intermediate		0.02			0.02
	higher		0.07			0.06
Life satisfaction	male			0.09**		0.06**
	female			0.07**		0.05**
Quality of life	male				0.04**	0.03**
	female				0.03**	0.02**
R^2-value[a]	male	0.2573	0.2598	0.3424	0.3355	0.3614
	female	0.1931	0.1910	0.2649	0.2537	0.2798

[a] The R^2 of the model without key variables of interest was 0.2571 for men and 0.1893 for women.

Note: All presented results are weighted for non-response. **p <0.01, *p <0.05.

Table 4 presents the odds ratios of SSS in the regression models for the different health outcomes. Five models are used, the first adjusts for the control variables and the following models adjust this model for the objective indices education, occupational class and wealth separately (model 2 - 4) and together (model 5). Both the results of (1) this thesis and (2) the paper by Demakakos et al. (2008) are presented. Overall, most of the results are similar, but for the health outcomes hypertension, diabetes and HDL-cholesterol, some differences can be found. These differences could possibly be explained by the differences in descriptive statistics as mentioned before. Furthermore, for diabetes and hypertension, in this thesis it is checked whether individuals confirm still being diagnosed with it from the previous wave, although it is not clear whether Demakakos et al. (2008) did that as well. As an extension, both indices of SWB were included in models 1 and 5. The models that include ethnicity or CSC are not shown here, since they did not affect the relationship between SSS and most of the health outcomes. However, these results can be found in Appendix E together with the key variables of interest included in the other models. Since gender-specific analyses were performed, the results for men and women are discussed separately.

Table 4: The odds ratios with significance levels of SSS of the logistic regressions for the different health outcomes for both (1) this thesis and (2) the paper by Demakakos et al. (2008)

		Model 1[a]		Model 1e[b]	Model 2		Model 3		Model 4		Model 5		Model 5e
Type of measure	Health outcome	1	2		1	2	1	2	1	2	1	2	
Self-perceived	Self-rated health												
	male	0.73**	0.73**	0.90**	0.77**	0.77**	0.76**	0.76**	0.81**	0.81**	0.83**	0.83**	0.99
	female	0.78**	0.78**	0.93*	0.82**	0.82**	0.83**	0.83**	0.86**	0.86**	0.90**	0.90**	1.05
	Depression												
	male	0.72**	0.72**	1.00	0.72**	0.73**	0.72**	0.73**	0.76**	0.77**	0.76**	0.76**	1.01
	female	0.76**	0.76**	0.96	0.78**	0.78**	0.79**	0.79**	0.79**	0.80**	0.81**	0.82**	1.00
	Long-standing illness												
	male	0.83**	0.83**	0.97	0.84**	0.84**	0.84**	0.84**	0.89**	0.88**	0.88**	0.88**	1.00
	female	0.87**	0.87**	0.97	0.87**	0.87**	0.89**	0.89**	0.91**	0.90**	0.91**	0.91**	0.99
Both	Hypertension												
	male	0.91**	0.91**	0.95	0.93**	0.93**	0.91**	0.92**	0.93*	0.95	0.93*	0.96	0.97
	female	0.93**	0.95*	0.96	0.94*	0.97	0.94*	0.96	0.97	1.00	0.97	0.99	0.99
	Diabetes												
	male	0.91**	0.90**	0.98	0.94	0.92*	0.93	0.92*	0.97	0.97	0.98	0.97	1.03
	female	0.88**	0.84**	0.92*	0.89**	0.85**	0.90**	0.86**	0.92*	0.87**	0.93	0.90*	0.97
Clinical	Central obesity												
	male	0.98	0.97	1.01	1.01	1.00	0.98	0.98	1.01	0.99	1.01	1.00	1.04
	female	0.90**	0.90**	0.93*	0.93**	0.93**	0.92**	0.92**	0.94*	0.93*	0.97	0.96	0.98
	HDL-cholesterol												
	male	0.84**	0.89**	0.90	0.88*	0.92*	0.85**	0.89**	0.90	0.93	0.92	0.94	0.96
	female	0.84**	0.84**	0.89**	0.86**	0.86**	0.86**	0.87**	0.90*	0.90**	0.91*	0.91*	0.96
	Triglycerides												
	male	0.95	0.96	0.96	0.98	0.99	0.95	0.97	0.99	1.01	1.00	1.01	1.00
	female	0.90**	0.91**	0.92**	0.93**	0.93**	0.93**	0.93**	0.95	0.95	0.97	0.97	0.97

[a] Model 1 adjusts for the control variables age and marital status. Model 2, 3, 4 and 5 adjust model 1 for education level, occupational class, wealth and all of them, respectively.

[b] With e, the model is adjusted for the indices of SWB, namely life satisfaction and quality of life.

Note: All presented results are weighted for non-response. ** $p < 0.01$, * $p < 0.05$.

In men, there is a statistically significant association between SSS and all health outcomes, except central obesity and triglycerides, when only adjusting for the control variables. When this model is additionally adjusted for both indices of SWB, only the association between SSS and self-rated health remains significant. Adjusting the first model for education or wealth decreases the significance level for diabetes and HDL-cholesterol. For wealth this also holds for hypertension. When adjusting for occupational class, the association between SSS and diabetes does not remain significant. When all objective indices of SES are included in the model, only the association between SSS and hypertension and all self-perceived health outcomes remains significant. When this model is adjusted for both indices of SWB, all associations do not remain significant.

In women, for the model that is only adjusted for the control variables, there is a statistically significant association between SSS and all health outcomes. With additional adjustment for the indices of SWB, it remains significant for all clinical health outcomes, diabetes and self-rated health. Adjusting the first model for education or occupational class does not decrease the significance level of SSS, except for hypertension. For adjustment for wealth, the relationship between SSS and health outcomes hypertension and triglycerides does not remain significant. Furthermore, there is a decrease in the significance level of diabetes, central obesity and HDL-cholesterol. In previous research it has also been shown that adjusting for wealth leads to a decrease in the significance of SSS as a predictor of diabetes (Demakakos et al., 2012). In the model that is adjusted for the control variables and all objective indices of SES, only the association between SSS and all self-perceived health outcomes remains statistically significant. When this model is adjusted for both indices of SWB, all the associations are not statistically significant anymore.

A remarkable result that is found for both men and women, is that when all the objective indices of SES are included in the models, SSS remains statistically significant for all the health outcomes that only use a self-perceived measure. This does not hold for most of the other health outcomes, which could be because both SSS and the self-perceived health outcomes are based on self-reports and therefore can include some unobserved individual heterogeneity. For self-rated health this has also been shown by other studies (Singh-Manoux et al., 2005; Franzini and Fernandez-Esquer, 2006). When adding both indices of SWB to this model, there is no association that remains significant, which indicates that life satisfaction and quality of life affect the relationship between SSS and health.

5.2 Results from longitudinal analyses

Longitudinal analyses were performed for four of the models used for cross-sectional analyses, namely models 1, 1e, 5 and 5e, also shown in Table 4. The models were performed on both weighted and unweighted data. There were some differences, indicating that there may be attrition bias. Therefore, the results of the weighted model are discussed here and these are presented in Table 5. The estimated between-within effect from the CRE model is not discussed here, but can be found in Appendix F. In Appendix G the results for the unweighted models are presented.

The hybrid and CRE model estimate the same (within) effects of the time-varying variables (Schunck, 2013). In the hybrid model, the interpretation of the odds ratios of the SSS within and between effects can be compared for additional insight (Schunck, 2013). For example, in model 1 for self-rated health, the odds ratio of the SSS within effect (0.88) can be interpreted as follows: for each unit increase in SSS (a step higher on the ladder), there is a decrease of 12% in the odds of having poor/fair self-rated health. The odds ratio of the SSS between effect (0.45) means that the odds of having poor/fair self-rated health for individuals with a certain SSS is expected to decrease with 55% compared to those with a one-unit lower SSS. In this example, and also for some other health outcomes, the odds ratios of the within and between effects differ a lot, where the within effect is a lot closer to one than the between effect. An explanation for this could be that SSS is correlated with other individual-specific unobserved variables that have an indirect effect on self-rated health. Therefore, the between effect and the estimated effect from the RE model would overestimate the effect of SSS. Although the estimated between effect is biased, it can explain how much of the association between SSS and health is caused by unobserved heterogeneity between each rung of SSS (Schunck, 2013). The within and between effects can be interpreted in the same way for the other health outcomes. The comparison of the longitudinal results with the cross-sectional results is presented with differentiating by gender. Here, the association between SSS and a health outcome is said to be significant if at least two of the estimated effects of SSS (effect from RE, within and between effects) are statistically significant.

In men, there is a significant association between SSS and self-rated health, depression and long-standing illness or disability, when only adjusting for the control variables. On the other hand, this also held for hypertension, diabetes and HDL-cholesterol in cross-sectional analysis. When this model is adjusted for all the objective indices of SES, the same significant associations remain to hold. Adjusting these models for both indices of SWB, the same conclusions can be made as for cross-sectional analysis. That is, there is only a significant relationship between SSS and self-rated health when adjusting for control variables and indices of SWB. When also adjusting for all objective indices of SES, all associations are not significant anymore.

Table 5: The odds ratios with significance levels of SSS of the RE, hybrid and CRE models for the different health outcomes

			Model 1[a]	Model 1e[b]	Model 5	Model 5e				Model 1	Model 1e	Model 5	Model 5e
Self-rated health	male						Diabetes	male					
		SSS from RE	0.71**	0.83**	0.79**	0.91*			SSS from RE	0.97	1.01	1.00	1.04
		SSS within	0.88*	0.91	0.89*	0.92			SSS within	0.99	0.99	0.99	1.00
		SSS between	0.45**	0.78**	0.55**	0.93			SSS between	0.87**	0.90	0.95	0.98
	female							female					
		SSS from RE	0.75**	0.91**	0.82**	0.97			SSS from RE	0.93**	0.96	0.94*	0.97
		SSS within	0.90*	0.95	0.91*	0.95			SSS within	1.04	1.07	1.04	1.07
		SSS between	0.56**	0.95	0.71**	1.12			SSS between	0.84**	0.85**	0.88*	0.89*
Depression	male						Central obesity	male					
		SSS from RE	0.67**	0.91	0.69**	0.94			SSS from RE	1.01	1.03	1.07	1.09
		SSS within	0.84*	0.95	0.84*	0.96			SSS within	1.06	1.08	1.06	1.08
		SSS between	0.49**	0.94	0.47**	0.98			SSS between	0.93	0.96	1.18*	1.19*
	female							female					
		SSS from RE	0.76**	1.04	0.80**	1.06			SSS from RE	0.84**	0.86**	0.92	0.93
		SSS within	0.89*	0.98	0.88**	0.96			SSS within	0.97	0.97	0.95	0.95
		SSS between	0.60**	1.16**	0.67**	1.22**			SSS between	0.66**	0.69**	0.88*	0.90
Long-standing illness	male						HDL-cholesterol	male					
		SSS from RE	0.85**	0.96	0.89**	0.99			SSS from RE	0.89	0.94	1.00	1.05
		SSS within	0.95	0.99	0.96	0.99			SSS within	1.21	1.14	1.25	1.19
		SSS between	0.66**	1.00	0.73**	1.12			SSS between	0.72*	0.84	0.86	1.02
	female							female					
		SSS from RE	0.89**	0.99	0.93*	1.01			SSS from RE	0.85**	0.88	0.93	0.96
		SSS within	0.97	0.99	0.98	1.00			SSS within	1.02	1.03	1.01	1.04
		SSS between	0.74**	1.09	0.86*	1.21**			SSS between	0.70**	0.78**	0.87	0.95
Hypertension	male						Triglycerides	male					
		SSS from RE	0.96	1.00	1.01	1.08			SSS from RE	0.90**	0.91*	0.94	0.95
		SSS within	1.02	1.06	1.01	1.04			SSS within	0.89	0.91	0.88	0.90
		SSS between	0.66**	1.35**	1.10	1.64**			SSS between	0.91	0.94	1.01	1.03
	female							female					
		SSS from RE	0.83**	0.86**	0.89*	0.91			SSS from RE	0.88**	0.87**	0.97	0.95
		SSS within	0.92	0.93	0.91	0.92			SSS within	1.00	0.97	0.99	0.97
		SSS between	0.65**	0.74**	0.82*	0.89			SSS between	0.78**	0.80**	0.96	0.98

[a] Model adjusts for the control variables age and marital status, model 5 adjusts model 1 for all the objective indices of SES.

[b] With e, the model is adjusted for the indices of SWB, namely life satisfaction and quality of life.

Note: All presented results are weighted for non-response. $**p < 0.01$, $*p < 0.05$.

In women, when adjusting for the control variables in both longitudinal and cross-sectional analyses, there is a statically significant association between SSS and all health outcomes. When adjusting this model for all the objective indices of SES in longitudinal analyses, it does not remain significant for central obesity, HDL-cholesterol and triglycerides. Adjusting the first model for indices of SWB, it only remains significant for hypertension, central obesity and triglycerides. On the other hand, in cross-sectional analyses it did not remain significant for hypertension, but did for self-rated health and diabetes. Adjusting for control variables, objective indices of SES and both indices of SWB results in no statistically significant association between SSS and any of the health outcomes in both longitudinal and cross-sectional analyses.

Thus, for both genders, there is a significant causal relationship between SSS and the health outcomes with only self-perceived measures, even when adjusting for control variables and objective indices of SES. Furthermore, when including both indices of SWB in this model, all the associations do not remain significant. This means that SWB can account for the relationship between SSS and all health outcomes, when also adjusting for the control variables and objective indices of SES.

With longitudinal analysis, it can be investigated how individuals change their SSS over time and what range of the ladder is used by them. In Appendix I, the proportions are given for the transition of SSS in the previous wave to SSS in the current wave. It can be found that there are quite some transitions made, where for most rungs the range of these transitions is quite large. Although this is not further investigated in this thesis, it would be interesting to look further into this and find out what factors affect the difference in the range that individuals use or their minimum and maximum SSS ratings (Bassett and Lumsdaine, 2001).

5.2.1 Robustness check

As a robustness check in longitudinal analysis, the most recent measurement of the health outcomes including nurse data was used in the waves with no nurse data. Then, longitudinal analyses were performed the model that adjusts for the control variables. The results are presented in Appendix H. For most health outcomes, the significance level slightly decreased for the unweighted data. For the weighted data less differences are found. Since some differences are obtained, it might be better to use a measure that not only considers the most recent measurement but also from other waves.

6 Conclusion

In this thesis the relationship between SSS and health was further examined using ELSA data. Part of the research by Demakakos et al. (2008) was replicated and extended. It is still unclear which factors are taken into account by individuals in assessing their SSS. Hence, this thesis adds to the existing literature in SSS by considering four variables as potential predictors of SSS that have not often been considered, namely ethnicity, occupation of individuals' father when they were 14 and indices of SWB (life satisfaction and quality of life). Ethnicity in women and both indices of SWB for both genders were significant predictors of SSS, also after including the other variables. In existing research, these factors have not often been included, but the results of this thesis show the importance of including them. On the other hand, the model that adjusts for the control variables, objective indices of SES and all key variables of interest, still has a relatively small R^2. This indicates that there is still a large proportion of the variance in SSS that is not explained yet.

Also, it was investigated whether these variables affected the relationship between SSS and different health outcomes. They were included both separately and together in logistic regression models which also adjusted for the control variables age and marital status and the objective indices. Both ethnicity and occupation of the father did not affect the relationship between SSS and most of the health outcomes. On the other hand, when both indices of SWB were included, the relationship between SSS and all health outcomes did not remain significant for both genders. Thus, in these models, the relationship between SSS and health can be accounted for by the indices of SWB.

Most existing studies of SSS only perform cross-sectional analysis. This thesis contributes to existing studies by performing longitudinal analysis to investigate the causal relationship between SSS and health. Three longitudinal models were performed, namely the random effects (RE), hybrid and correlated RE model. For both men and women, there was a significant causal relationship between SSS and the health outcomes that only used self-perceived measures, when adjusting for the control variables and objective indices of SES. That SSS remained significant could be explained by some unobserved individual heterogeneity in self-reported measures, which can not be measured in the objective indices of SES. For the other health outcomes with clinical measures, it was showed that the relationship between SSS and those health outcomes was accounted for by all the objective indices of SES.

Since there is still a large proportion of the variance in SSS that is not explained, a future research suggestion would be to investigate further which factors predict SSS. Also, it can be examined what range of the SSS ladder individuals use and which factors influence this. Moreover, cross-country differences could not be measured here, but it would be interesting to look into this as well. A limitation of this research is that it did not account for the different versions used for rating self-rated health, although previous research has illustrated differences.

References

Adler, N. E., Boyce, T., Chesney, M. A., Cohen, S., Folkman, S., Kahn, R. L., and Syme, S. L. (1994). Socioeconomic status and health: the challenge of the gradient. *American Psychologist*, 49(1):15–24.

Adler, N. E., Epel, E. S., Castellazzo, G., and Ickovics, J. R. (2000). Relationship of subjective and objective social status with psychological and physiological functioning: preliminary data in healthy, white women. *Health Psychology*, 19(6):586–592.

Alberti, K. G. M. M., Zimmet, P., and Shaw, J. (2006). Metabolic syndrome — a new world-wide definition. A consensus statement from the international diabetes federation. *Diabetic Medicine*, 23(5):469–480.

Allison, P. D. (2009). *Fixed effects regression models*, volume 160. SAGE publications, London, UK.

American Diabetes Association (2006). Standards of medical care in diabetes. *Diabetes Care*, 29(1):S4–S42.

Anderson, C., Kraus, M. W., Galinsky, A. D., and Keltner, D. (2012). The local-ladder effect: social status and subjective well-being. *Psychological Science*, 23(7):764–771.

Baltagi, B. (2008). *Econometric analysis of panel data*. John Wiley & Sons, New York, US, 4th edition.

Bassett, W. F. and Lumsdaine, R. L. (2001). Probability limits: are subjective assessments adequately accurate? *Journal of Human Resources*, 36(2):327–363.

Bell, A. and Jones, K. (2015). Explaining fixed effects: random effects modeling of time-series cross-sectional and panel data. *Political Science Research and Methods*, 3(1):133–153.

Bowling, A. and Windsor, J. (2008). The effects of question order and response-choice on self-rated health status in the English Longitudinal Study of Ageing (ELSA). *Journal of Epidemiology & Community Health*, 62(1):81–85.

Clemens, S., Phelps, A., Oldfield, Z., Blake, M., Oskala, A., Marmot, M., Rogers, N., Banks, J., Steptoe, A., and Nazroo, J. (2019). English Longitudinal Study of Ageing: Waves 0-8, 1998-

2017. [data collection]. 30th Edition. *UK Data Service*. SN: 5050, http://doi.org/10.5255/UKDA-SN-5050-17.

Demakakos, P., Biddulph, J. P., de Oliveira, C., Tsakos, G., and Marmot, M. G. (2018). Subjective social status and mortality: the English Longitudinal Study of Ageing. *European Journal of Epidemiology*, 33(8):729–739.

Demakakos, P., Marmot, M., and Steptoe, A. (2012). Socioeconomic position and the incidence of type 2 diabetes: the ELSA study. *European Journal of Epidemiology*, 27(5):367–378.

Demakakos, P., Nazroo, J., Breeze, E., and Marmot, M. (2008). Socioeconomic status and health: the role of subjective social status. *Social Science & Medicine*, 67(2):330–340.

Diener, E. and Diener, C. (1995). The wealth of nations revisited: income and quality of life. *Social Indicators Research*, 36(3):275–286.

Diener, E., Emmons, R. A., Larsen, R. J., and Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1):71–75.

Franzini, L. and Fernandez-Esquer, M. E. (2006). The association of subjective social status and health in low-income Mexican-origin individuals in Texas. *Social Science & Medicine*, 63(3):788–804.

Giatti, L., do Valle Camelo, L., de Castro Rodrigues, J. F., and Barreto, S. M. (2012). Reliability of the MacArthur scale of subjective social status - Brazilian Longitudinal Study of Adult Health (ELSA-Brasil). *BMC Public Health*, 12(1):1096.

Howell, R. T. and Howell, C. J. (2008). The relation of economic status to subjective well-being in developing countries: a meta-analysis. *Psychological Bulletin*, 134(4):536–560.

Hsiao, C. (2007). Panel data analysis — advantages and challenges. *TEST*, 16(1):1–22.

Hyde, M., Wiggins, R. D., Higgs, P., and Blane, D. B. (2003). A measure of quality of life in early old age: the theory, development and properties of a needs satisfaction model (CASP-19). *Aging & Mental Health*, 7(3):186–194.

Jackman, M. R. and Jackman, R. W. (1973). An interpretation of the relation between objective and subjective social status. *American Sociological Review*, 38(5):569–582.

Jivraj, S. and Nazroo, J. (2014). Determinants of socioeconomic inequalities in subjective well-being in later life: a cross-country comparison in England and the USA. *Quality of Life Research*, 23(9):2545–2558.

Jones, A. M., Rice, N., d'Uva, T. B., and Balia, S. (2013). *Applied Health Economics*. Routledge, Abingdon, UK.

Kapteyn, A. (2010). Comparison between SHARE, ELSA, and HRS. *First results from the Survey of Health, Ageing and Retirement in Europe (2004–2007). SHARE project.*, 26.

Lee, D. M., Nazroo, J., O'Connor, D. B., Blake, M., and Pendleton, N. (2016). Sexual health and well-being among older men and women in England: findings from the English Longitudinal Study of Ageing. *Archives of Sexual Behavior*, 45(1):133–144.

Lumsdaine, R. L. and Exterkate, A. (2013). How survey design affects self-assessed health responses in the Survey of Health, Ageing, and Retirement in Europe (SHARE). *European Economic Review*, 63:299–307.

Miyakawa, M., Magnusson Hanson, L. L., Theorell, T., and Westerlund, H. (2012). Subjective social status: its determinants and association with health in the Swedish working population (the SLOSH study). *The European Journal of Public Health*, 22(4):593–597.

Mundlak, Y. (1978). On the pooling of time series and cross section data. *Econometrica: Journal of the Econometric Society*, 46:69–85.

NatCen Social Research (2018a). ELSA - user guide to the main interview datasets. `http://doc.ukdataservice.ac.uk/doc/5050/mrdoc/pdf/5050_waves_1-8_interviewer_data_user_guide_v01.pdf`. Last checked on June 8, 2020.

NatCen Social Research (2018b). ELSA - user guide to the nurse visit datasets. `http://doc.ukdataservice.ac.uk/doc/5050/mrdoc/pdf/5050_waves_2-4-6-8_nurse_data_user_guide_v01.pdf`. Last checked on June 8, 2020.

Operario, D., Adler, N. E., and Williams, D. R. (2004). Subjective social status: reliability and predictive utility for global health. *Psychology & Health*, 19(2):237–246.

Ostrove, J. M., Adler, N. E., Kuppermann, M., and Washington, A. E. (2000). Objective and subjective assessments of socioeconomic status and their relationship to self-rated health in an ethnically diverse sample of pregnant women. *Health Psychology*, 19(6):613–618.

Pavot, W. and Diener, E. (2008). The satisfaction with life scale and the emerging construct of life satisfaction. *The Journal of Positive Psychology*, 3(2):137–152.

Radloff, L. S. (1977). The CES-D scale: a self-report depression scale for research in the general population. *Applied Psychological Measurement*, 1(3):385–401.

Schunck, R. (2013). Within and between estimates in random-effects models: advantages and drawbacks of correlated random effects and hybrid models. *The Stata Journal*, 13(1):65–76.

Singh-Manoux, A., Adler, N. E., and Marmot, M. G. (2003). Subjective social status: its determinants and its association with measures of ill-health in the Whitehall II study. *Social Science & Medicine*, 56(6):1321–1333.

Singh-Manoux, A., Marmot, M. G., and Adler, N. E. (2005). Does subjective social status predict health and change in health status better than objective status? *Psychosomatic Medicine*, 67(6):855–861.

Solon, G., Haider, S. J., and Wooldridge, J. M. (2015). What are we weighting for? *Journal of Human Resources*, 50(2):301–316.

STATA, FAQ (2010). How do I interpret odds ratios in logistic regression? `http://doc.ukdataservice.ac.uk/doc/5050/mrdoc/pdf/5050_waves_2-4-6-8_nurse_data_user_guide_v01.pdf`. Last checked on June 25, 2020.

Steptoe, A., Breeze, E., Banks, J., and Nazroo, J. (2013). Cohort profile: the English Longitudinal Study of Ageing. *International Journal of Epidemiology*, 42(6):1640–1648.

Szumilas, M. (2010). Explaining odds ratios. *Journal of the Canadian Academy of Child and Adolescent Psychiatry*, 19(3):227.

Thompson, M. G., Gaglani, M. J., Naleway, A., Thaker, S., and Ball, S. (2014). Changes in self-rated health and subjective social status over time in a cohort of healthcare personnel. *Journal of Health Psychology*, 19(9):1185–1196.

Van de Mheen, H., Stronks, K., Looman, C., and Mackenbach, J. (1998). Does childhood socioeconomic status influence adult health through behavioural factors? *International Journal of Epidemiology*, 27(3):431–437.

Wilkinson, R. G. (1997). Socioeconomic determinants of health: health inequalities: relative or absolute material standards? *British Medical Journal*, 314(7080):591–595.

William, G. (2010). Between estimators. `https://www.stata.com/support/faqs/statistics/between-estimator/`. Last checked on June 23, 2020.

Wolff, L. S., Acevedo-Garcia, D., Subramanian, S., Weber, D., and Kawachi, I. (2010a). Subjective social status, a new measure in health disparities research: do race/ethnicity and choice of referent group matter? *Journal of Health Psychology*, 15(4):560–574.

Wolff, L. S., Subramanian, S. V., Acevedo-Garcia, D., Weber, D., and Kawachi, I. (2010b). Compared to whom? Subjective social status, self-rated health, and referent group sensitivity in a diverse US sample. *Social Science & Medicine*, 70(12):2019–2028.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data.* MIT press, Cambridge, MA, 2nd edition.

A The five SWLS items in ELSA

Table 6: The five SWLS items in ELSA

1.	In most ways my life is close to my ideal
2.	The conditions of my life are excellent
3.	I am satisfied with my life
4.	So far I have gotten the important things I want in life
5.	If I could live my life over I would change almost nothing

B The nineteen CASP items in ELSA

Table 7: The CASP-19 items per life domain in ELSA

Domain	Statements by domain
Control	
1.	My age prevents me from doing the things I would like to do
2.	I feel that what happens to me is out of my control
3.	I feel free to plan for the future
4.	I feel left out of things
Autonomy	
5.	I can do the things I want to do
6.	Family responsibilities prevent me from doing the things I want to do
7.	I feel that I can please myself with what I do
8.	My health stops me from doing the things I want to do
9.	Shortage of money stops me from doing things I want to do
Pleasure	
10.	I look forward to each day
11.	I feel that my life has meaning
12.	I enjoy the things that I do
13.	I enjoy being in the company of others
14.	On balance, I look back on my life with a sense of happiness
Self-realisation	
15.	I feel full of energy these days
16.	I choose to do things that I have never done before
17.	I feel satisfied with the way my life has turned out
18.	I feel that life is full of opportunities
19.	I feel that the future looks good for me

C Comparison of the descriptive statistics

Table 8: Descriptive statistics of (1) this thesis and (2) the paper by Demakakos et al. (2008)

	Females (%)		Males (%)		Total (%)	
	1	2	1	2	1	2
Age						
Median (years)	66	66	66	65		
52-54	352 (9.6)	352 (9.4)	307 (10.9)	307 (10.8)	659 (10.2)	659 (10.1)
55-59	904 (22.2)	904 (21.9)	750 (23.8)	750 (23.8)	1654 (23.0)	1654 (22.8)
60-64	731 (17.3)	731 (16.9)	583 (16.9)	583 (17.0)	1314 (17.1)	1314 (16.9)
65-69	664 (15.5)	664 (15.3)	587 (16.7)	587 (16.7)	1251 (16.1)	1251 (16.0)
70-74	541 (12.7)	541 (12.5)	492 (13.2)	493 (13.2)	1033 (12.9)	1034 (12.9)
75-80	466 (11.8)	467 (12.2)	398 (11.3)	397 (11.3)	864 (11.6)	864 (11.8)
>80	408 (10.9)	406 (11.7)	250 (7.2)	251 (7.2)	658 (9.1)	657 (9.6)
Gender	4066 (52.8)	4065 (53.4)	3367 (47.2)	3368 (46.6)	7433 (100.0)	7433 (100.0)
Marital status						
Partnered	2481 (62.5)	2480 (61.5)	2632 (77.8)	2633 (77.8)	5113 (69.7)	5113 (69.1)
Unpartnered	1585 (37.5)	1585 (38.5)	735 (22.2)	735 (22.2)	2320 (30.3)	2320 (30.9)
Education						
Degree or equivalent	372 (8.5)	371 (8.3)	573 (16.0)	574 (16.1)	945 (12.1)	945 (11.9)
Higher education or equivalent	432 (10.1)	432 (9.9)	496 (14.0)	496 (14.0)	928 (11.9)	928 (11.8)
General certificate of education: advanced level or equivalent	231 (5.5)	231 (5.4)	278 (8.0)	278 (8.0)	509 (6.6)	509 (6.6)
General certificate of education: ordinary level or equivalent	789 (18.9)	789 (18.5)	540 (16.0)	540 (15.9)	1329 (17.5)	1329 (17.3)
Certificate of secondary education or equivalent	82 (2.1)	82 (2.1)	270 (8.0)	270 (8.0)	352 (4.9)	352 (4.9)
Foreign or other type of qualifications	499 (12.3)	499 (12.1)	174 (5.2)	174 (5.2)	673 (9.0)	673 (8.9)
No qualification	1659 (42.6)	1659 (43.7)	1034 (32.8)	1034 (32.8)	2693 (38.0)	2693 (38.6)
Occupational class						
Higher managerial and professional occupations	146 (3.3)	152 (3.4)	546 (14.9)	559 (15.3)	692 (8.8)	711 (9.0)
Lower managerial and professional occupations	889 (21.1)	902 (21.5)	789 (22.0)	811 (22.6)	1678 (21.5)	1713 (22.0)
Intermediate occupations	878 (21.6)	877 (21.6)	183 (5.4)	176 (5.2)	1061 (13.9)	1053 (13.8)
Small employers and own account workers	312 (7.8)	308 (7.7)	478 (14.3)	470 (14.1)	790 (10.9)	778 (10.7)
Lower supervisory and technical occupations	261 (6.8)	265 (6.9)	528 (16.7)	532 (16.8)	789 (11.5)	797 (11.6)
Semi-routine occupations	942 (24.6)	926 (24.2)	362 (11.6)	349 (11.2)	1304 (18.5)	1275 (18.1)
Routine occupations	548 (14.8)	544 (14.7)	468 (15.1)	458 (15.0)	1016 (14.9)	1002 (14.8)

Note: All proportions are weighted for non-response, while counts are not.

D Descriptive statistics of the merged data set

Table 9: Descriptive statistics by gender of the merged data set using ELSA waves 2, 3, 4, 5 and 6

	Females				Males			
	N(%)	SSS[a]	SWLS	CASP	N(%)	SSS	SWLS	CASP
Total	8635(53.2)	5.9	25.8	61.4	6950(46.8)	6.2	26.3	61.4
Age								
52-54	202 (2.7)	6.1	26.0	62.0	185 (3.4)	6.6	26.6	63.0
55-59	1298 (16.8)	6.1	25.5	62.2	1078 (18.8)	6.4	25.4	61.7
60-64	2120 (23.8)	6.0	26.0	62.6	1687 (24.6)	6.2	25.9	61.7
65-69	1826 (20.5)	6.0	26.2	62.1	1435 (19.2)	6.2	26.8	62.2
70-74	1434 (15.2)	5.8	25.8	61.1	1158 (14.6)	6.1	27.0	61.6
75-80	1141 (12.9)	5.7	25.5	59.6	924 (12.3)	5.9	26.7	60.5
>80	614 (8.1)	5.8	25.0	57.5	483 (7.1)	6.1	25.7	57.2
Marital status								
Partnered	4743 (57.5)	6.1	27.1	62.6	4909 (70.6)	6.3	27.0	61.9
Unpartnered	3892 (42.5)	5.7	24.3	60.0	2041 (29.4)	5.8	24.6	60.0
Education level[b]								
Degree or equivalent	1080 (11.1)	6.8	26.7	63.5	1662 (21.2)	7.1	26.8	62.7
Higher education or equivalent	1132 (12.2)	6.4	26.1	62.2	1376 (18.9)	6.3	26.4	61.8
General certificate of education: advanced level or equivalent	634 (7.1)	6.2	25.7	62.3	575 (8.3)	6.0	25.7	61.4
General certificate of education: ordinary level or equivalent	1945 (22.1)	5.9	25.4	61.5	1195 (17.5)	6.0	26.3	61.6
Certificate of secondary education or equivalent	158 (2.0)	5.4	24.5	58.8	473 (7.0)	5.6	26.9	60.7
Foreign or other type of qualifications	1267 (14.8)	5.8	26.0	61.3	479 (7.4)	6.1	26.3	61.5
No qualification	2408 (30.7)	5.4	25.7	60.0	1178 (19.7)	5.3	25.5	58.8
Occupational class[c]								
Higher managerial and professional occupations	354 (3.6)	6.9	27.2	64.3	1336 (17.2)	7.0	26.7	62.8
Lower managerial and professional occupations	2077 (22.6)	6.5	26.4	62.9	1755 (23.7)	6.6	26.7	62.2
Intermediate occupations	2004 (23.0)	5.9	25.9	61.9	409 (5.7)	5.8	24.9	60.1
Small employers and own account workers	794 (9.1)	6.1	26.2	61.9	985 (14.4)	6.1	26.5	61.2
Lower supervisory and technical occupations	543 (6.6)	5.6	25.3	60.6	1012 (15.6)	5.7	25.9	60.1
Semi-routine occupations	1871 (23.4)	5.5	25.2	60.2	659 (10.8)	5.5	25.8	60.3
Routine occupations	930 (11.7)	5.1	25.2	58.7	764 (12.6)	5.4	26.1	60.4
Wealth[d]								
1	1072 (13.5)	4.9	23.3	57.2	641 (11.1)	4.9	23.4	56.7
2	1544 (18.3)	5.3	24.6	59.0	1071 (16.2)	5.4	25.4	59.1
3	1856 (21.8)	5.7	25.6	61.2	1449 (21.1)	6.0	26.3	61.0
4	1935 (22.8)	6.1	26.3	62.5	1762 (25.0)	6.3	26.4	61.7
5	2096 (23.6)	6.8	27.7	64.4	1952 (26.6)	7.1	27.6	64.1
Ethnicity								
White	8590 (99.4)	5.9	25.9	61.4	6855 (98.4)	6.2	26.3	61.4
Non-white	45 (0.6)	5.0	22.4	57.2	90 (1.6)	6.0	26.1	60.5
CSC: Occupation of father when 14[e]								
Higher	3130 (34.9)	6.3	26.6	62.7	2170 (29.6)	6.6	26.4	62.0
Intermediate	2500 (29.2)	5.8	25.4	61.1	2400 (35.4)	6.1	26.4	61.6
Lower	975 (12.1)	5.5	25.9	60.6	775 (12.1)	5.6	25.8	59.6
Other	1990 (23.8)	5.7	25.2	60.3	1575 (22.9)	6.0	26.2	60.9

[a] The values given for SSS, SWLS and CASP are mean values.

[b] The category 'no educational qualifications' is used as a reference category in the models.

[c] Professions in the category 'routine occupations' are used as a reference category in the models.

[d] Wealth in category 1 is used as a reference category in the models.

[e] Professions in the category 'other' are used as a reference category in the models.

Note: All proportions are weighted for non-response, while counts are not.

E Extensive results of the extended models

Table 10: The odds ratios with confidence intervals and p-values of SSS of the logistic regressions for the different health outcomes

	Model 1[a]		Model 1a[b]		Model 1b		Model 1c		Model 1d		Model 1e	
	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value
Self-rated health												
male	0,73(0.69, 0.77)	0,000	0,73(0.69, 0.77)	0,000	0,74(0.70, 0.78)	0,000	0,82(0.78, 0.87)	0,000	0,87(0.82, 0.92)	0,000	0,90(0.85, 0.96)	0,001
female	0,78(0.74, 0.82)	0,000	0,78(0.74, 0.82)	0,000	0,80(0.76, 0.84)	0,000	0,85(0.81, 0.90)	0,000	0,92(0.87, 0.97)	0,004	0,93(0.87, 0.98)	0,014
Depression												
male	0,72(0.67, 0.77)	0,000	0,72(0.67, 0.77)	0,000	0,72(0.67 0.78)	0,000	0,91(0.84 1.00)	0,041	0,88(0.81 0.95)	0,002	1,00(0.92 1.10)	0,926
female	0,76(0.72, 0.81)	0,000	0,77(0.72, 0.81)	0,000	0,77(0.72, 0.81)	0,000	0,88(0.83, 0.94)	0,000	0,89(0.84, 0.95)	0,000	0,96(0.90, 1.03)	0,222
Long-standing illness												
male	0,83(0.80, 0.87)	0,000	0,83(0.80, 0.87)	0,000	0,83(0.80, 0.87)	0,000	0,91(0.87, 0.95)	0,000	0,96(0.91, 1.00)	0,070	0,97(0.93, 1.02)	0,286
female	0,87(0.84, 0.91)	0,000	0,87(0.83, 0.90)	0,000	0,87(0.84, 0.91)	0,000	0,92(0.88, 0.96)	0,000	0,97(0.92, 1.01)	0,130	0,97(0.93, 1.02)	0,249
Hypertension												
male	0,91(0.87, 0.96)	0,000	0,91(0.87, 0.96)	0,000	0,92(0.87, 0.96)	0,000	0,94(0.89, 0.99)	0,012	0,94(0.90, 0.99)	0,025	0,95(0.90, 1.01)	0,077
female	0,93(0.89, 0.98)	0,004	0,94(0.89, 0.98)	0,006	0,94(0.90, 0.99)	0,021	0,95(0.90, 1.00)	0,057	0,95(0.91, 1.00)	0,069	0,96(0.91, 1.01)	0,154
Diabetes												
male	0,91(0.85, 0.98)	0,007	0,91(0.86, 0.98)	0,007	0,91(0.85, 0.98)	0,008	0,95(0.89, 1.02)	0,177	0,96(0.90, 1.03)	0,297	0,98(0.91, 1.05)	0,534
female	0,88(0.81, 0.95)	0,001	0,88(0.82, 0.95)	0,001	0,89(0.82, 0.96)	0,002	0,90(0.83, 0.97)	0,009	0,91(0.84, 0.98)	0,015	0,92(0.85, 1.00)	0,044
Central obesity												
male	0,98(0.94, 1.03)	0,516	0,98(0.93, 1.03)	0,497	0,99(0.94, 1.04)	0,672	0,99(0.94, 1.05)	0,822	1,00(0.94, 1.06)	0,924	1,01(0.95, 1.07)	0,844
female	0,90(0.85, 0.95)	0,000	0,90(0.85, 0.95)	0,000	0,91(0.86, 0.96)	0,001	0,90(0.85, 0.96)	0,001	0,92(0.87, 0.98)	0,008	0,93(0.87, 0.98)	0,012
HDL-cholesterol												
male	0,84(0.76, 0.93)	0,001	0,84(0.76, 0.93)	0,001	0,85(0.77, 0.94)	0,002	0,88(0.78, 0.98)	0,023	0,89(0.80, 0.98)	0,019	0,90(0.80, 1.01)	0,062
female	0,84(0.78, 0.90)	0,000	0,84(0.78, 0.90)	0,000	0,85(0.79, 0.91)	0,000	0,86(0.80, 0.94)	0,000	0,88(0.82, 0.95)	0,001	0,89(0.82, 0.96)	0,004
Triglycerides												
male	0,95(0.91, 1.00)	0,059	0,95(0.91, 1.00)	0,057	0,96(0.92, 1.01)	0,154	0,96(0.91, 1.01)	0,123	0,97(0.92, 1.02)	0,230	0,96(0.91, 1.02)	0,204
female	0,90(0.86, 0.95)	0,000	0,90(0.86, 0.95)	0,000	0,92(0.87, 0.97)	0,001	0,90(0.85, 0.95)	0,000	0,93(0.88, 0.98)	0,005	0,92(0.87, 0.97)	0,003

	Model 2		Model 2a		Model 2b		Model 2c		Model 2d		Model 2e	
	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value
Self-rated health												
male	0,77(0.73, 0.81)	0,000	0,77(0.73, 0.81)	0,000	0,77(0.73, 0.82)	0,000	0,88(0.83, 0.94)	0,000	0,91(0.85, 0.97)	0,002	0,95(0.89, 1.02)	0,138
female	0,82(0.78, 0.87)	0,000	0,82(0.78, 0.87)	0,000	0,83(0.79, 0.87)	0,000	0,91(0.86, 0.97)	0,002	0,96(0.90, 1.01)	0,127	0,97(0.91, 1.03)	0,332
Depression												
male	0,72(0.67, 0.78)	0,000	0,73(0.67, 0.79)	0,000	0,73(0.67, 0.79)	0,000	0,94(0.86 1.03)	0,171	0,88(0.81 0.95)	0,002	1,02(0.93 1.12)	0,726
female	0,78(0.74, 0.83)	0,000	0,79(0.74, 0.84)	0,000	0,78(0.74, 0.83)	0,000	0,92(0.86, 0.99)	0,019	0,90(0.84, 0.96)	0,001	0,98(0.91, 1.05)	0,570
Long-standing illness												
male	0,84(0.80, 0.88)	0,000	0,84(0.80, 0.88)	0,000	0,84(0.80, 0.88)	0,000	0,92(0.88, 0.97)	0,002	0,96(0.91, 1.01)	0,125	0,98(0.93, 1.03)	0,384
female	0,87(0.83, 0.91)	0,000	0,87(0.83, 0.91)	0,000	0,87(0.84, 0.91)	0,000	0,92(0.88, 0.96)	0,001	0,95(0.91, 1.00)	0,053	0,96(0.91, 1.01)	0,103
Hypertension												
male	0,93(0.88, 0.98)	0,005	0,93(0.88, 0.98)	0,005	0,93(0.88, 0.98)	0,007	0,96(0.91, 1.01)	0,125	0,96(0.91, 1.01)	0,116	0,97(0.92, 1.03)	0,318
female	0,94(0.90, 0.99)	0,023	0,95(0.90, 1.00)	0,033	0,95(0.90, 1.00)	0,048	0,97(0.92, 1.02)	0,217	0,96(0.91, 1.02)	0,172	0,97(0.92, 1.03)	0,354
Diabetes												
male	0,94(0.87, 1.01)	0,076	0,94(0.87, 1.01)	0,091	0,93(0.87, 1.00)	0,064	0,98(0.91, 1.06)	0,661	0,98(0.91, 1.06)	0,651	1,00(0.93, 1.09)	0,949
female	0,89(0.82, 0.96)	0,003	0,89(0.82, 0.96)	0,003	0,89(0.82, 0.96)	0,004	0,91(0.84, 0.99)	0,034	0,92(0.85, 0.99)	0,034	0,93(0.85, 1.01)	0,087
Central obesity												
male	1,01(0.96, 1.07)	0,755	1,01(0.95, 1.06)	0,792	1,01(0.96, 1.07)	0,708	1,02(0.96, 1.09)	0,431	1,02(0.96, 1.09)	0,481	1,03(0.97, 1.10)	0,289
female	0,93(0.88, 0.98)	0,008	0,93(0.88, 0.98)	0,009	0,93(0.88, 0.99)	0,015	0,93(0.88, 0.99)	0,021	0,95(0.89, 1.01)	0,098	0,95(0.89, 1.01)	0,100
HDL-cholesterol												
male	0,88(0.79, 0.98)	0,021	0,88(0.79, 0.98)	0,021	0,88(0.80, 0.98)	0,024	0,93(0.82, 1.05)	0,217	0,92(0.83, 1.03)	0,143	0,94(0.83, 1.06)	0,323
female	0,86(0.79, 0.92)	0,000	0,86(0.79, 0.92)	0,000	0,86(0.80, 0.93)	0,000	0,89(0.81, 0.96)	0,005	0,89(0.83, 0.97)	0,006	0,91(0.83, 0.98)	0,020
Triglycerides												
male	0,98(0.93, 1.03)	0,383	0,98(0.93, 1.03)	0,390	0,98(0.93, 1.04)	0,492	0,98(0.93, 1.04)	0,570	0,99(0.93, 1.05)	0,663	0,99(0.93, 1.05)	0,662
female	0,93(0.88, 0.98)	0,004	0,92(0.87, 0.97)	0,002	0,93(0.88, 0.98)	0,009	0,92(0.87, 0.98)	0,006	0,94(0.89, 1.00)	0,045	0,94(0.88, 0.99)	0,029

	Model 3		Model 3a		Model 3b		Model 3c		Model 3d		Model 3e	
	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value
Self-rated health												
male	0,76(0.72, 0.80)	0,000	0,76(0.72, 0.80)	0,000	0,76(0.72, 0.81)	0,000	0,86(0.81, 0.91)	0,000	0,89(0.84, 0.95)	0,000	0,92(0.87, 0.99)	0,017
female	0,83(0.79, 0.88)	0,000	0,83(0.79, 0.88)	0,000	0,84(0.80, 0.88)	0,000	0,92(0.87, 0.97)	0,004	0,97(0.91, 1.03)	0,268	0,98(0.92, 1.04)	0,572
Depression												
male	0,72(0.67, 0.78)	0,000	0,72(0.67, 0.78)	0,000	0,72(0.67, 0.78)	0,000	0,93(0.85 1.01)	0,098	0,87(0.80 0.94)	0,001	1,00(0.91, 1.10)	0,958
female	0,79(0.74, 0.84)	0,000	0,79(0.75, 0.84)	0,000	0,79(0.74, 0.84)	0,000	0,93(0.86, 0.99)	0,026	0,91(0.85, 0.97)	0,004	0,99(0.92, 1.06)	0,704
Long-standing illness												
male	0,84(0.80, 0.88)	0,000	0,84(0.80, 0.88)	0,000	0,84(0.80, 0.88)	0,000	0,92(0.87, 0.97)	0,001	0,95(0.91, 1.01)	0,080	0,97(0.92, 1.02)	0,292
female	0,89(0.85, 0.92)	0,000	0,89(0.85, 0.92)	0,000	0,89(0.85, 0.93)	0,000	0,94(0.89, 0.98)	0,005	0,97(0.93, 1.02)	0,272	0,98(0.93, 1.03)	0,391
Hypertension												
male	0,91(0.86, 0.95)	0,000	0,90(0.86, 0.95)	0,000	0,91(0.86, 0.96)	0,000	0,93(0.88, 0.98)	0,007	0,93(0.88, 0.99)	0,013	0,94(0.89, 1.00)	0,038
female	0,94(0.90, 0.99)	0,025	0,95(0.90, 0.99)	0,031	0,95(0.91, 1.00)	0,069	0,96(0.91, 1.01)	0,120	0,96(0.91, 1.01)	0,154	0,97(0.92, 1.02)	0,229
Diabetes												
male	0,93(0.87, 1.00)	0,056	0,93(0.87, 1.00)	0,061	0,93(0.86, 1.00)	0,044	0,97(0.90, 1.05)	0,499	0,98(0.91, 1.05)	0,562	0,99(0.92, 1.08)	0,897
female	0,90(0.83, 0.97)	0,009	0,90(0.83, 0.97)	0,009	0,90(0.83, 0.98)	0,012	0,93(0.85, 1.01)	0,066	0,93(0.86, 1.01)	0,078	0,94(0.87, 1.02)	0,162
Central obesity												
male	0,98(0.93, 1.03)	0,433	0,98(0.93, 1.03)	0,414	0,98(0.93, 1.04)	0,503	0,99(0.93, 1.05)	0,749	0,99(0.93, 1.05)	0,782	1,00(0.94, 1.06)	0,990
female	0,92(0.87, 0.97)	0,004	0,92(0.87, 0.98)	0,004	0,93(0.88, 0.98)	0,011	0,93(0.87, 0.98)	0,013	0,94(0.89, 1.00)	0,057	0,95(0.89, 1.01)	0,075
HDL-cholesterol												
male	0,85(0.76, 0.94)	0,002	0,85(0.76, 0.94)	0,002	0,86(0.77, 0.95)	0,004	0,89(0.79, 1.00)	0,054	0,89(0.80, 0.99)	0,035	0,91(0.80, 1.02)	0,108
female	0,86(0.80, 0.93)	0,000	0,86(0.80, 0.93)	0,000	0,87(0.81, 0.94)	0,001	0,89(0.82, 0.97)	0,009	0,91(0.84, 0.98)	0,015	0,91(0.84, 1.00)	0,038
Triglycerides												
male	0,95(0.90, 1.01)	0,085	0,95(0.90, 1.01)	0,083	0,96(0.91, 1.02)	0,158	0,96(0.91, 1.02)	0,157	0,97(0.92, 1.02)	0,261	0,96(0.91, 1.02)	0,232
female	0,93(0.88, 0.98)	0,005	0,92(0.87, 0.97)	0,003	0,93(0.89, 0.99)	0,014	0,93(0.87, 0.98)	0,009	0,95(0.89, 1.00)	0,050	0,94(0.89, 1.00)	0,041

[a] Model 1 adjusts for the control variables age and marital status. Model 2, 3 and 4 adjust model 1 for education level, occupational class and wealth, respectively. Model 5 adjusts model 1 for all objective indices of SES.

[b] With a-e, the model is adjusted for ethnicity, CSC, life satisfaction, quality of life and the last two together, respectively.

Note: All presented results are weighted for non-response.

Table 10: The odds ratios with confidence intervals and p-values of SSS of the logistic regressions for the different health outcomes (continued)

	Model 4[a]		Model 4a[b]		Model 4b		Model 4c		Model 4d		Model 4e	
	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value
Self-rated health												
male	0,81(0.77, 0.86)	0,000	0,81(0.77, 0.86)	0,000	0,81(0.77, 0.86)	0,000	0,91(0.85, 0.97)	0,003	0,93(0.88, 1.00)	0,035	0,97(0.91, 1.03)	0,326
female	0,86(0.82, 0.91)	0,000	0,86(0.82, 0.91)	0,000	0,87(0.82, 0.91)	0,000	0,94(0.89, 1.00)	0,046	0,99(0.94, 1.05)	0,820	1,01(0.94, 1.07)	0,872
Depression												
male	0,76(0.70, 0.82)	0,000	0,76(0.70, 0.82)	0,000	0,76(0.70, 0.82)	0,000	0,95(0.87 1.04)	0,253	0,89(0.81 0.96)	0,005	1,01(0.92 1.11)	0,773
female	0,79(0.75, 0.84)	0,000	0,80(0.75, 0.85)	0,000	0,80(0.75, 0.85)	0,000	0,91(0.85, 0.98)	0,009	0,90(0.85, 0.96)	0,002	0,97(0.91, 1.04)	0,400
Long-standing illness												
male	0,89(0.85, 0.93)	0,000	0,89(0.85, 0.93)	0,000	0,88(0.84, 0.93)	0,000	0,96(0.91, 1.02)	0,178	0,99(0.94, 1.05)	0,787	1,01(0.96, 1.07)	0,630
female	0,91(0.87, 0.95)	0,000	0,91(0.87, 0.95)	0,000	0,91(0.87, 0.95)	0,000	0,95(0.91, 1.00)	0,055	0,99(0.94, 1.03)	0,554	0,99(0.94, 1.04)	0,750
Hypertension												
male	0,93(0.89, 0.99)	0,013	0,93(0.89, 0.99)	0,013	0,94(0.89, 0.99)	0,015	0,95(0.90, 1.01)	0,107	0,96(0.90, 1.01)	0,119	0,97(0.91, 1.02)	0,251
female	0,97(0.92, 1.02)	0,189	0,97(0.92, 1.02)	0,229	0,97(0.92, 1.02)	0,273	0,98(0.93, 1.03)	0,468	0,98(0.93, 1.04)	0,522	0,99(0.93, 1.04)	0,654
Diabetes												
male	0,97(0.90, 1.04)	0,394	0,97(0.90, 1.05)	0,420	0,96(0.89, 1.04)	0,322	1,00(0.92, 1.09)	0,978	1,00(0.93, 1.08)	0,928	1,02(0.94, 1.10)	0,666
female	0,92(0.85, 0.99)	0,035	0,92(0.85, 0.99)	0,036	0,91(0.84, 0.99)	0,031	0,94(0.86, 1.02)	0,146	0,94(0.87, 1.02)	0,147	0,95(0.88, 1.04)	0,274
Central obesity												
male	1,01(0.95, 1.07)	0,847	1,00(0.95, 1.06)	0,870	1,01(0.95, 1.06)	0,857	1,02(0.96, 1.09)	0,474	1,01(0.95, 1.08)	0,645	1,03(0.97, 1.10)	0,365
female	0,94(0.89, 1.00)	0,046	0,94(0.89, 1.00)	0,047	0,95(0.89, 1.00)	0,057	0,95(0.89, 1.01)	0,077	0,96(0.91, 1.02)	0,221	0,96(0.90, 1.03)	0,245
HDL-cholesterol												
male	0,90(0.81, 1.01)	0,073	0,90(0.81, 1.01)	0,072	0,91(0.81, 1.01)	0,079	0,94(0.83, 1.06)	0,316	0,94(0.84, 1.05)	0,267	0,95(0.84, 1.08)	0,437
female	0,90(0.83, 0.98)	0,011	0,90(0.83, 0.98)	0,010	0,91(0.84, 0.98)	0,015	0,93(0.86, 1.02)	0,111	0,93(0.86, 1.01)	0,096	0,95(0.87, 1.03)	0,220
Triglycerides												
male	0,99(0.94, 1.05)	0,743	0,99(0.94, 1.05)	0,744	1,00(0.94, 1.05)	0,865	1,00(0.94, 1.06)	0,940	1,00(0.94, 1.06)	1,000	1,00(0.94, 1.06)	1,000
female	0,95(0.90, 1.01)	0,093	0,95(0.90, 1.00)	0,062	0,96(0.91, 1.01)	0,108	0,95(0.90, 1.01)	0,090	0,97(0.91, 1.03)	0,274	0,96(0.91, 1.02)	0,219
	Model 5		Model 5a		Model 5b		Model 5c		Model 5d		Model 5e	
	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value	OR(95% Conf. Interval)	p-value
Self-rated health												
male	0,83(0.78, 0.88)	0,000	0,83(0.78, 0.88)	0,000	0,83(0.78, 0.88)	0,000	0,93(0.87, 1.00)	0,046	0,95(0.89, 1.01)	0,120	0,99(0.92, 1.06)	0,786
female	0,90(0.85, 0.95)	0,000	0,90(0.85, 0.95)	0,000	0,90(0.86, 0.95)	0,000	1,00(0.94, 1.06)	0,985	1,03(0.97, 1.09)	0,415	1,05(0.98, 1.12)	0,155
Depression												
male	0,76(0.70, 0.82)	0,000	0,76(0.70, 0.82)	0,000	0,76(0.70, 0.82)	0,000	0,96(0.87, 1.05)	0,343	0,88(0.80, 0.96)	0,003	1,01(0.92, 1.12)	0,761
female	0,81(0.76, 0.87)	0,000	0,82(0.77, 0.87)	0,000	0,82(0.76, 0.87)	0,000	0,95(0.89, 1.02)	0,185	0,91(0.85, 0.98)	0,009	1,00(0.93, 1.07)	0,904
Long-standing illness												
male	0,88(0.84, 0.93)	0,000	0,89(0.84, 0.93)	0,000	0,88(0.84, 0.93)	0,000	0,96(0.91, 1.01)	0,141	0,99(0.93, 1.04)	0,649	1,00(0.95, 1.06)	0,896
female	0,91(0.87, 0.95)	0,000	0,91(0.87, 0.95)	0,000	0,91(0.87, 0.95)	0,000	0,96(0.91, 1.01)	0,087	0,98(0.94, 1.03)	0,520	0,99(0.94, 1.04)	0,621
Hypertension												
male	0,93(0.88, 0.99)	0,016	0,93(0.88, 0.99)	0,017	0,94(0.88, 0.99)	0,018	0,96(0.90, 1.02)	0,146	0,96(0.90, 1.01)	0,129	0,97(0.91, 1.03)	0,290
female	0,97(0.92, 1.02)	0,291	0,97(0.92, 1.03)	0,335	0,98(0.93, 1.03)	0,376	0,98(0.93, 1.04)	0,582	0,99(0.93, 1.04)	0,601	0,99(0.93, 1.05)	0,722
Diabetes												
male	0,98(0.90, 1.06)	0,551	0,98(0.91, 1.06)	0,604	0,97(0.90, 1.05)	0,481	1,02(0.93, 1.11)	0,724	1,01(0.93, 1.10)	0,771	1,03(0.95, 1.12)	0,491
female	0,93(0.86, 1.01)	0,083	0,93(0.86, 1.01)	0,090	0,92(0.85, 1.00)	0,059	0,95(0.87, 1.04)	0,299	0,95(0.88, 1.04)	0,266	0,97(0.88, 1.05)	0,429
Central obesity												
male	1,01(0.95, 1.08)	0,677	1,01(0.95, 1.07)	0,701	1,01(0.95, 1.07)	0,712	1,03(0.97, 1.10)	0,319	1,02(0.96, 1.09)	0,482	1,04(0.97, 1.11)	0,246
female	0,97(0.91, 1.02)	0,243	0,97(0.91, 1.03)	0,257	0,97(0.91, 1.03)	0,283	0,97(0.91, 1.03)	0,350	0,98(0.92, 1.05)	0,571	0,98(0.92, 1.05)	0,615
HDL-cholesterol												
male	0,92(0.82, 1.03)	0,132	0,92(0.82, 1.03)	0,132	0,92(0.82, 1.03)	0,133	0,95(0.84, 1.08)	0,451	0,95(0.85, 1.06)	0,370	0,96(0.85, 1.09)	0,559
female	0,91(0.84, 0.99)	0,030	0,91(0.84, 0.99)	0,027	0,92(0.85, 1.00)	0,045	0,95(0.87, 1.04)	0,234	0,95(0.87, 1.03)	0,186	0,96(0.88, 1.05)	0,363
Triglycerides												
male	1,00(0.94, 1.05)	0,856	1,00(0.94, 1.05)	0,867	1,00(0.94, 1.06)	0,925	1,00(0.94, 1.07)	0,962	1,00(0.95, 1.06)	0,918	1,00(0.94, 1.07)	0,914
female	0,97(0.91, 1.02)	0,253	0,96(0.91, 1.02)	0,192	0,97(0.91, 1.02)	0,264	0,96(0.91, 1.03)	0,265	0,98(0.92, 1.04)	0,488	0,97(0.91, 1.04)	0,415

[a] Model 1 adjusts for the control variables age and marital status. Model 2, 3 and 4 adjust model 1 for education level, occupational class and wealth, respectively. Model 5 adjusts model 1 for all objective indices of SES.

[b] With a-e, the model is adjusted for ethnicity, CSC, life satisfaction, quality of life and the last two together, respectively.

Note: All presented results are weighted for non-response.

F Results for longitudinal analyses on weighted data

Table 11: The odds ratios with significance levels of SSS of the RE, hybrid and CRE models for the different health outcomes on weighted data

			Model 1[a]	Model 1e[b]	Model 5	Model 5e
Self-rated health	male					
		SSS from RE	0.71**	0.83**	0.79**	0.91*
		SSS within	0.88*	0.91	0.89*	0.92
		SSS between	0.45**	0.78**	0.55**	0.93
		SSS between-within	0.52**	0.86	0.62**	1.02
	female					
		SSS from RE	0.75**	0.91**	0.82**	0.97
		SSS within	0.90*	0.95	0.91*	0.95
		SSS between	0.56**	0.95	0.71**	1.12
		SSS between-within	0.62**	1.00	0.78**	1.17
Depression	male					
		SSS from RE	0.67**	0.91	0.69**	0.94
		SSS within	0.84*	0.95	0.84*	0.96
		SSS between	0.49**	0.94	0.47**	0.98
		SSS between-within	0.58**	0.98	0.57**	1.02
	female					
		SSS from RE	0.76**	1.04	0.80**	1.06
		SSS within	0.89*	0.98	0.88**	0.96
		SSS between	0.60**	1.16**	0.67**	1.22**
		SSS between-within	0.68**	1.19*	0.76**	1.27**
Long-standing illness	male					
		SSS from RE	0.85**	0.96	0.89**	0.99
		SSS within	0.95	0.99	0.96	0.99
		SSS between	0.66**	1.00	0.73**	1.12
		SSS between-within	0.69**	1.01	0.77**	1.30
	female					
		SSS from RE	0.89**	0.99	0.93*	1.01
		SSS within	0.97	0.99	0.98	1.00
		SSS between	0.74**	1.09	0.86*	1.21**
		SSS between-within	0.76**	1.10	0.88	1.21**
Hypertension	male					
		SSS from RE	0.96	1.00	1.01	1.08
		SSS within	1.02	1.06	1.01	1.04
		SSS between	0.66**	1.35**	1.10	1.64**
		SSS between-within	0.63**	1.25	1.10	1.58**
	female					
		SSS from RE	0.83**	0.86**	0.89*	0.91
		SSS within	0.92	0.93	0.91	0.92
		SSS between	0.65**	0.74**	0.82*	0.89
		SSS between-within	0.70**	0.79*	0.90	0.97

			Model 1	Model 1e	Model 5	Model 5e
Diabetes	male					
		SSS from RE	0.97	1.01	1.00	1.04
		SSS within	0.99	0.99	0.99	1.00
		SSS between	0.87**	0.90	0.95	0.98
		SSS between-within	0.88	0.91	0.96	0.98
	female					
		SSS from RE	0.93**	0.96	0.94*	0.97
		SSS within	1.04	1.07	1.04	1.07
		SSS between	0.84**	0.85**	0.88*	0.89*
		SSS between-within	0.81**	0.80**	0.85*	0.83*
Central obesity	male					
		SSS from RE	1.01	1.03	1.07	1.09
		SSS within	1.06	1.08	1.06	1.08
		SSS between	0.93	0.96	1.18*	1.19*
		SSS between-within	0.88	0.88	1.20	1.10
	female					
		SSS from RE	0.84**	0.86**	0.92	0.93
		SSS within	0.97	0.97	0.95	0.95
		SSS between	0.66**	0.69**	0.88*	0.90
		SSS between-within	0.68**	0.71**	0.93	0.95
HDL-cholesterol	male					
		SSS from RE	0.89	0.94	1.00	1.05
		SSS within	1.21	1.14	1.25	1.19
		SSS between	0.72*	0.84	0.86	1.02
		SSS between-within	0.60**	0.73	0.68	0.86
	female					
		SSS from RE	0.85**	0.88	0.93	0.96
		SSS within	1.02	1.03	1.01	1.04
		SSS between	0.70**	0.78**	0.87	0.95
		SSS between-within	0.68**	0.75*	0.85	0.91
Triglycerides	male					
		SSS from RE	0.90**	0.91*	0.94	0.95
		SSS within	0.89	0.91	0.88	0.90
		SSS between	0.91	0.94	1.01	1.03
		SSS between-within	1.02	1.03	1.14	1.15
	female					
		SSS from RE	0.88**	0.87**	0.97	0.95
		SSS within	1.00	0.97	0.99	0.97
		SSS between	0.78**	0.80**	0.96	0.98
		SSS between-within	0.79**	0.83*	0.96	1.01

[a] Model 1 adjusts for the control variables age and marital status and model 5 adjusts model 1 for all the objective indices of SES.

[b] With e, the model is adjusted for the indices of SWB, namely life satisfaction and quality of life.

Note: All presented results are weighted for non-response. $^{**}p$ <0.01, $^{*}p$ <0.05.

G Results for longitudinal analyses on unweighted data

Table 12: The odds ratios with significance levels of SSS of the RE, hybrid and CRE models for the different health outcomes on unweighted data

			Model 1[a]	Model 1e[b]	Model 5	Model 5e
Self-rated health	male					
		SSS from RE	0.72**	0.85**	0.79**	0.93
		SSS within	0.91*	0.95	0.92	0.96
		SSS between	0.45**	0.78**	0.55**	0.95
		SSS between-within	0.49**	0.82*	0.61**	0.99
	female					
		SSS from RE	0.76**	0.91**	0.83**	0.98
		SSS within	0.92*	0.97	0.92*	0.97
		SSS between	0.55**	0.94	0.70**	1.12
		SSS between-within	0.60**	0.97	0.76**	1.15
Depression	male					
		SSS from RE	0.66**	0.92	0.69**	0.95
		SSS within	0.85**	0.97	0.85*	0.97
		SSS between	0.49**	0.93	0.48**	0.98
		SSS between-within	0.57**	0.96	0.57**	1.01
	female					
		SSS from RE	0.76**	1.04	0.80**	1.06
		SSS within	0.89*	0.98	0.89**	0.97
		SSS between	0.59**	1.15**	0.66**	1.22**
		SSS between-within	0.66**	1.17*	0.74**	1.25**
Long-standing illness	male					
		SSS from RE	0.85**	0.96	0.89**	1.00
		SSS within	0.96	0.99	0.96	0.99
		SSS between	0.67**	1.00	0.74**	1.12
		SSS between-within	0.70**	1.01	0.77**	1.24
	female					
		SSS from RE	0.90**	0.99	0.93*	1.01
		SSS within	0.98	1.00	0.99	1.01
		SSS between	0.73**	1.09	0.86*	1.21**
		SSS between-within	0.74**	1.09	0.86*	1.20*
Hypertension	male					
		SSS from RE	0.99	1.06	1.07	1.15
		SSS within	1.08	1.11	1.08	1.11
		SSS between	0.83	1.13	1.08	1.47*
		SSS between-within	0.76	1.02	1.00	1.32
	female					
		SSS from RE	0.83**	0.86*	0.89	0.91
		SSS within	0.92	0.94	0.91	0.93
		SSS between	0.65**	0.74**	0.83	0.90
		SSS between-within	0.71**	0.79	0.91	0.97

			Model 1	Model 1e	Model 5	Model 5e
Diabetes	male					
		SSS from RE	0.96	1.00	0.99	1.02
		SSS within	0.99	0.99	1.00	1.00
		SSS between	0.87**	0.90	0.93	0.97
		SSS between-within	0.88	0.91	0.94	0.96
	female					
		SSS from RE	0.93**	0.96	0.95*	0.97
		SSS within	1.03	1.06	1.03	1.06
		SSS between	0.84**	0.85**	0.89*	0.89*
		SSS between-within	0.82**	0.80**	0.86	0.83*
Central obesity	male					
		SSS from RE	1.03	1.04	1.08	1.10
		SSS within	1.07	1.09	1.07	1.09
		SSS between	0.95	0.98	1.16	1.19
		SSS between-within	0.89	0.91	1.09	1.09
	female					
		SSS from RE	0.85**	0.87*	0.92	0.93
		SSS within	0.97	0.98	0.96	0.96
		SSS between	0.66**	0.69**	0.88	0.90
		SSS between-within	0.68**	0.71**	0.92	0.94
HDL-cholesterol	male					
		SSS from RE	0.89	0.94	1.02	1.07
		SSS within	1.23	1.17	1.30	1.25
		SSS between	0.73**	0.83	0.86	1.01
		SSS between-within	0.60**	0.71	0.66*	0.81
	female					
		SSS from RE	0.83**	0.87*	0.92	0.96
		SSS within	1.02	1.04	1.01	1.04
		SSS between	0.68**	0.76**	0.86	0.94
		SSS between-within	0.67**	0.73*	0.86	0.91
Triglycerides	male					
		SSS from RE	0.91*	0.92	0.95	0.96
		SSS within	0.91	0.93	0.90	0.92
		SSS between	0.91	0.94	1.02	1.04
		SSS between-within	1.00	1.02	1.13	1.13
	female					
		SSS from RE	0.88**	0.88**	0.97	0.96
		SSS within	1.00	0.98	1.00	0.98
		SSS between	0.77**	0.79**	0.96	0.98
		SSS between-within	0.77**	0.81*	0.96	1.00

[a] Model 1 adjusts for the control variables age and marital status and model 5 adjusts model 1 for all the objective indices of SES.

[b] With e, the model is adjusted for the indices of SWB, namely life satisfaction and quality of life.

$**p < 0.01$, $*p < 0.05$.

H Robustness check panel data

Table 13: The odds ratios with significance levels of SSS of the RE, hybrid and CRE regression models for the different health outcomes[a]

			with unweighted data			with weighted data[b]		
			RE	Hybrid	CRE	RE	Hybrid	CRE
Hypertension	male							
		SSS	1.08		1.15	1.00		1.05
		SSS within		1.15			1.05	
		SSS between		0.86	0.75		0.58**	0.57**
	female							
		SSS	0.86**		0.94	0.85**		0.93
		SSS within		0.94			0.92	
		SSS between		0.46**	0.50**		0.27**	0.27**
Diabetes	male							
		SSS	0.99		0.98	0.98		0.96
		SSS within		0.98			0.96	
		SSS between		0.85*	0.86		0.85*	0.88
	female							
		SSS	0.93*		0.97	0.92**		0.97
		SSS within		0.97			0.97	
		SSS between		0.82**	0.84*		0.82**	0.85*
Central obesity	male							
		SSS	1.04		1.07	1.04		1.06
		SSS within		1.07			1.06	
		SSS between		0.95	0.89		0.88**	0.85
	female							
		SSS	0.87*		0.93	0.86**		0.91
		SSS within		0.93			0.91	
		SSS between		0.61**	0.66**		0.60**	0.66**
HDL-cholesterol	male							
		SSS	0.95		1.17	1.05		1.20
		SSS within		1.17			1.20	
		SSS between		0.57**	0.50**		0.72*	0.62**
	female							
		SSS	0.87*		1.01	0.91		1.01
		SSS within		1.01			1.01	
		SSS between		0.56**	0.56**		0.60**	0.60*
Triglycerides	male							
		SSS	0.89*		0.90*	0.88**		0.89*
		SSS within		0.90*			0.89*	
		SSS between		0.90	1.00		0.89	1.01
	female							
		SSS	0.91*		0.99	0.90**		0.99
		SSS within		0.99			0.99	
		SSS between		0.64**	0.65**		0.64**	0.65**

[a] As a robustness check, the most recent measurement of health outcomes with clinical measures is used in the waves with no nurse data. Then longitudinal analyses were performed in models that adjusts for the control variables age and marital status.

[b] These presented results are weighted for non-response.

**$p < 0.01$, *$p < 0.05$.

I Transition matrix of SSS

Table 14: Transition matrix of SSS in the previous wave to SSS in the current wave

Previous wave	Current wave									
	1st - Lowest[a]	2nd	3rd	4th	5th	6th	7th	8th	9th	10th - Highest
Male										
1st - Lowest	5.7	6.7	18.3	0.0	38.6	25.1	5.7	0.0	0.0	0.0
2nd	2.6	29.9	29.9	20.0	7.4	7.1	3.2	0.0	0.0	0.0
3rd	2.6	6.8	27.1	27.4	17.9	10.7	4.7	2.2	0.6	0.0
4th	0.6	2.4	14.2	33.9	25.1	15.4	6.2	2.1	0.2	0.0
5th	0.3	1.0	5.9	17.6	30.2	30.4	11.3	3.0	0.3	0.0
6th	0.1	0.5	2.6	9.0	20.7	36.6	22.4	7.4	0.5	0.2
7th	0.2	0.3	1.2	3.2	9.7	25.2	38.3	18.5	3.3	0.1
8th	0.0	0.1	0.2	1.5	4.1	11.2	26.6	47.3	8.3	0.6
9th	0.0	0.4	0.0	0.6	1.2	5.0	8.4	37.1	40.8	6.4
10th - Highest	0.0	0.0	0.0	0.0	3.1	5.3	5.7	21.2	37.3	27.4
Female										
1st - Lowest	29.2	20.0	18.0	8.8	11.3	5.2	7.5	0.0	0.0	0.0
2nd	9.8	7.8	35.2	22.2	15.5	8.2	0.0	1.4	0.0	0.0
3rd	3.1	9.5	27.4	28.2	19.4	9.0	2.5	0.7	0.0	0.2
4th	0.0	3.4	13.7	28.6	26.6	18.6	6.9	2.0	0.2	0.0
5th	0.1	1.4	5.3	16.1	38.4	27.3	9.2	1.8	0.2	0.1
6th	0.2	0.6	2.4	8.2	23.5	37.3	20.7	6.3	0.7	0.0
7th	0.1	0.2	0.8	2.7	12.7	28.9	33.6	18.7	1.9	0.4
8th	0.0	0.0	0.2	1.8	4.5	16.1	28.5	38.8	9.3	0.9
9th	0.0	0.0	1.0	0.5	2.9	7.5	14.8	40.0	26.4	6.9
10th - Highest	0.0	0.0	3.9	0.0	2.7	4.4	7.2	21.2	35.1	25.6

[a] Proportions are given for the transition of individuals with a certain SSS in the previous wave to SSS in the current wave.

Note: All proportions are weighted for non-response.

J Description of programming files

The programming files used in this thesis can be found in the supplementary files. It contains all Stata data sets and do-files needed to be able to replicate the results of this thesis. Here, a short description is given for each of the do-files:

1. **correlations** - estimates the correlations between the subjective and objective indices of SES and the key variables of interest ethnicity, occupation of the father, life satisfaction and quality of life with using corr_svy that allows for survey weights. The correlations can be found in Table 2.

2. **datacode_secondwave, datacode_thirdwave, datacode_fourthwave, datacode_fifthwave and datacode_sixthwave** - in these files the measures are obtained for all explanatory variables and dependent variables that are used, where every file does that for a different wave.

3. **datacode_merged_panel** - here, all the data from the different waves is merged together and this merged data set is. reshaped so that it can be used for panel analysis

4. **datacode_robustness_check** - Gives the most recent measurement for waves with no nurse data to the health outcomes with clinical measures.

5. **descriptive_statistics** - calculates the descriptive statistics for the cross-sectional analysis and the longitudinal analysis. The descriptive statistics can be found in Table 1 and Appendix C and D.

6. **estimation_extension** - performs all models for the cross-sectional analysis for both the replication and extension.

7. **main_cross_sectional** - health outcomes are one by one used as a dependent variable and then this file calls on estimation_extension to perform all the models. Results of these regressions can be found in Table 4 and Appendix E.

8. **main_longitudinal** - health outcomes are one by one used as a dependent variable and then this file calls on panel_analysis. Results of these regressions can be found in Table 5 and in Appendix F and G.

9. **main_previousSSS-currentSSS** - here the percentages of transition from SSS in the previous wave to SSS in the current wave are calculated. The transition matrix can be found in

Appendix I.

10. **main_robustness** - health outcomes are one by one used as a dependent variable and then this file calls on panel_analysis_robustness. The results of these regression can be found in Appendix H.

11. **panel_analysis** - performs all models for longitudinal analysis for both weighted and unweighted data.

12. **panel_analysis_robustness** - performs all models used for the robustness check for both weighted and unweighted data.

13. **predictors_SSS** - performs regression models using SSS as a dependent variable and the key variables of interest together with the control variables age and marital status and all the objective indices of SES are included as explanatory variables. The results of these regressions can be found in Table 3.