Aging in Good Health

Changes in self-reported health trajectories with focus on an ageing cohort from the Tromsø study

Geir Fagerjord Lorem
Department of Health and Care Sciences

Henrik Schirmer
Department of Clinical Medicine and Division of Cardiothoracic and Respiratory Medicine, University Hospital of Northern Norway

Nina Emaus
Department of Health and Care Sciences

/ BACKGROUND AND AIM

Self-Reported Health (SRH) is a known predictor of future health outcomes, health service use and mortality even in populations without known disease burden (1- 4). Knowledge of factors influencing SRH may guide measures to enhance public health and quality of health services (5). The Tromsø Study allows estimations of the impact of a broad range of factors in the general population, utilising surveys and physical examinations in a large representative sample (6).

We aimed to describe factors that affect self-reported health over time and to explain differences in trajectories in an ageing cohort according to comorbid diseases, mental health, physical condition, socio-economic status, and physical activity.

/ METHODS

The Tromsø Study consists of six repeated population health surveys (www.tromsoundersokelsen.no).
We included 18 209 subjects that participated in at least two of the four surveys administered between 1986 and 2008. We excluded subjects with missing SRH values from the analysis (n=1464). The present analysis thus included 8022 men and 8723 women.

The participants completed well-validated questionnaires that included questions on a broad range of diseases, symptoms, health behaviour, social conditions, education, and level of physical activity. SRH was reported by answering the survey question 'what is your current state of health?' in a range from Poor (1) to Very good (4).

/ STATISTICAL ANALYSIS

We considered a model that included Age_j and $Period_i$) as covariates as well as gender, pathology (comorbid diseases and mental health symptoms) physical examination measurements (resting heart rate, BMI, hypertension and hyperlipidaemia), social context (education, marital status and living alone) and health-related behaviour (smoking habits and physical exercise). We started by modelling the time as linear, then quadratic, cubic and quartic. We also modelled interaction between all covariates with age. Interaction coefficients with p>.05 were removed from the model one at a time until we reached the final model.

The table shows the results from the random-coefficient proportional odds model. Odds ratio below 1 estimates the probability that a subject would score their SRH lower as compared to the reference category.

We used latent trajectory models to assess how SRH changes over time. The model explicitly model the shape of trajectories of individual subjects over time, based on occasion- and subject-level covariates. The model thus also allows us to identify subgroups that have different trajectories and also which factors affect SRH over time at an individual level. By adding the age and the time of the measurements, we can analyze both the longitudinal change due to increasing age and the between-subject effects as a result of belonging to different groups.

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/ WHAT CAN WE TELL ABOUT AGING?

Ageing is an independent factor influencing SRH. Disease or mental illness symptoms are associated with lower SRH whenever in life they occur. Variations in SRH trajectories suggest that low BMI and exercise levels become increasingly important especially as the population ages.

The steepest decline of SRH was in midlife and when passing life expectancy. SRH decreased differently over time for men and women. The most important factors determining SRH was mental health symptoms (28%), specific medical conditions (23%) and age (21%), which in combination explained 54.1% of the variance.

The graph visualize the health trajectories according to the fully fitted model (figure 2).

/ PHYSICAL DISEASE AND RISK FACTORS

23%

Illness accounted for 23% of variation. It lowers SRH whenever in life it occurs. 2 or more comorbid diseases increases this effect.

/ MENTAL HEALTH SYMPTOMS

28%

Mental health accounted for 28% of the variation and is the most important factor for Significant symptoms lowers the SRH levels more than physical disease.

/ GENDER AND AGE

21%

It is actually age that is the most important as gender accounts for only 0.4%. The most interesting gender difference is that men report higher SRH at 25, but women remain at good health longer.

/ HEALTH RELATED BEHAVIOR

17%

Nothing can stop the age dependent SRH decline; however, even moderate exercise levels prolongs the period subjects are at good health by 10 years or more. Intensive training after 63 years of age was not beneficial

/ BODY WEIGHT

5%

BMI is not the most important factor as such explaining 5% of the variation. Obesity is not beneficial. However, the most significant finding is what happens to very lean persons as they get older.

/ SOCIO-ECONOMIC CONTEXT

16%

Accounting for 16%, higher education levels is beneficial. Living with others is generally also beneficial.

Figure 1 (above) show the importance of the different factors according to how much of the variance in the SRH scores each category explains.

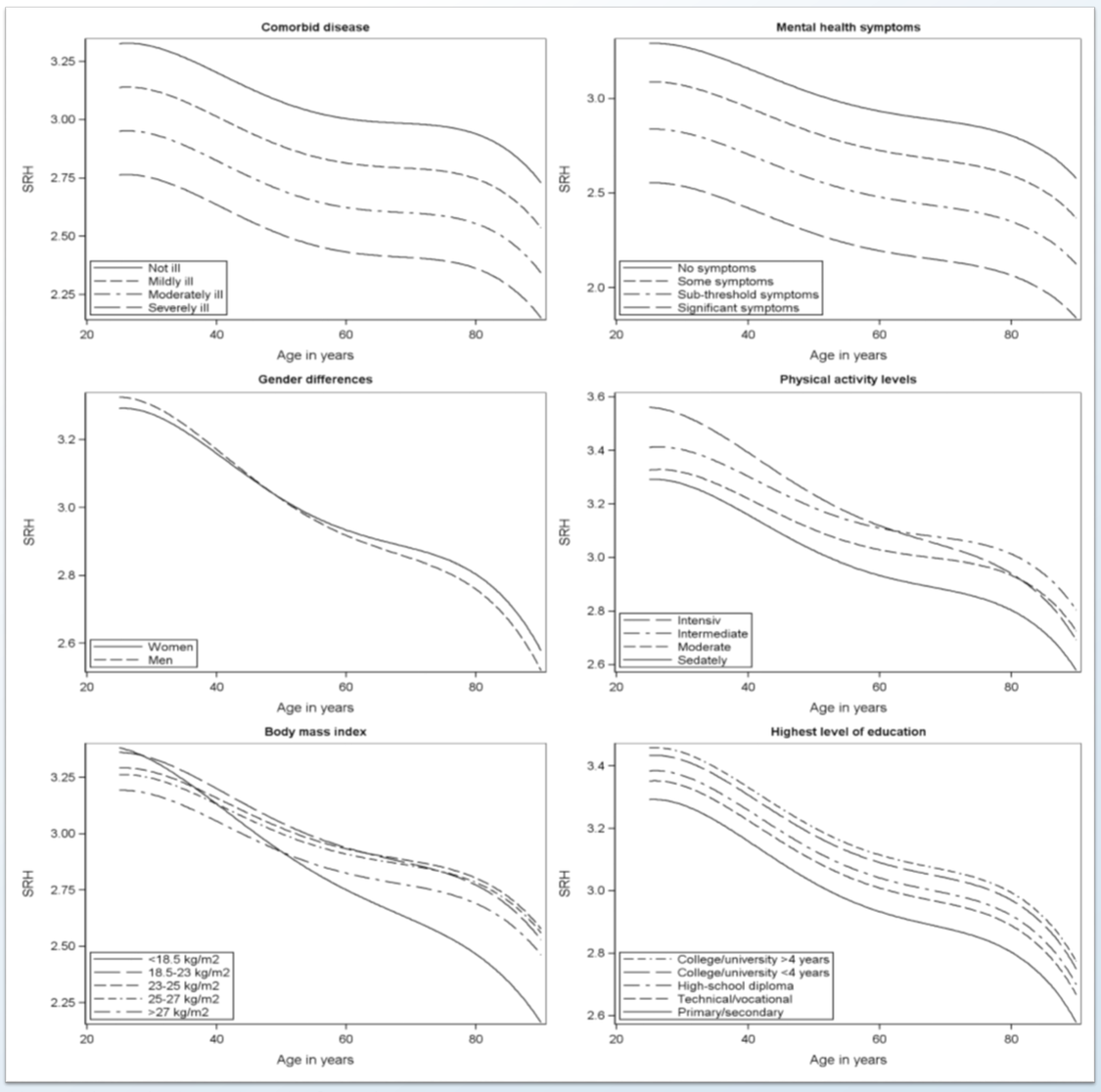

Figure 2 shows the SRH trajectories for each category.

The Tromsø study has followed up inhabitants living in Tromsø since 1974. It allows us to analyse which factors matters most for aging in good health. Photo: Lars Å Andersen

	Odds Ratio	Std. Err.	p-value
Age in 10 years	0.637	0.011	<0.001
Gender			
Female (reference cat.)	1.000		
Male	0.927	0.035	0.043
Comorbid disease			
Not ill (reference cat.)	1.000		
Mildly ill	0.522	0.019	<0.001
Moderately ill	0.281	0.014	<0.001
Seriously ill	0.158	0.015	<0.001
Mental health			
No symptoms (ref. cat.)	1.000		
Some symptoms	0.394	0.016	<0.001
Sub-threshold symptoms	0.125	0.007	<0.001
Significant symptoms	0.034	0.003	<0.001
Body mass index			
<18.5 Kg/m2	0.536	0.095	<0.001
18.5-23 Kg/m2	1.083	0.052	0.098
23-25 kg/m2 (ref. cat.)	1.000		
25-27 kg/m2	0.909	0.043	0.044
>27 kg/m2	0.633	0.029	<0.001
Educational level			
Primary school (ref. cat.)	1.000		
Secondary school	1.441	0.066	<0.001
High school diploma	1.766	0.134	<0.001
College/university, < 4 years	2.483	0.143	<0.001
College/university, >4 years	3.056	0.185	<0.001
Marital status			
Married	1.073	0.057	0.188
Widow/Widower	1.427	0.123	<0.001
Divorced	1.013	0.066	0.837
Living alone	1.016	0.048	0.745
Smoking status			
Smoker	0.674	0.027	<0.001
Previous smoker	0.914	0.040	0.038
Never smoked (ref.cat.)	1.000		
Physical activity			
Sedately			
Moderate	1.577	0.059	<0.001
Intermediate	2.226	0.097	<0.001
Intensive	2.857	0.169	<0.001
/cut1: Good	-9.015	0.146	<0.001
/cut2: Not so good	-4.718	0.125	<0.001
/cut3: Poor	-0.221	0.116	0.058
Random part of the model Variance(cons)	2.168 (95% CI: 1.992, 2.360)		

Table 1. Results from the random-coefficient proportional odds model with estimates for the effect of subject-specific factors on Self-Reported health. Odds ratio <1.0 implies an increased probability for lower SRH scores.

Contact information: Geir Fagerjord Lorem, Professor/PhD, Faculty of health sciences, UiT The Arctic University of Norway, NO-9037 Tromsø, NORWAY, Office: +47 77 64 65 33, geir.lorem@uit.no.

Photographer: Lars Åke Andersen.