Association of objective health factors with self-reported health

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Key words

Self-reported health status • Cardiovascular risk • Risk factors • Primary care

Summary

Objectives. *There is a strong relationship between subjective health and mortality, level of functional ability and medical consumption. The aim of this study was to describe the correlation of objective health-related factors with self-reported health (SRH) of a sample of the Belgian population.*
Methods. *Participants were recruited during an exhibition at the Brussels Exhibition Centre. They completed a visual analogue scale assessing their SRH. Medical history and health related parameters of the participants were recorded.*
Results. *In total 974 visitors participated. From the multivariate analysis we found an association between low SRH and diabetes (OR 0.23-0.80), increased body mass index (OR 0.52-0.74),*

coronary heart disease (OR 0.28-0.97), smoking (OR 0.38-0.89), speaking Dutch (OR 0.40-0.92), not knowing length (OR 0.36-0.99), family history of breast cancer (OR 0.41-0.94), family history of coronary heart disease (OR 0.45-095) and aging (OR 0.84-0.99). Following a cholesterol-lowering diet was associated with a high SRH (OR 1.10-2.44).
Conclusions. *Most of the factors associated with low SRH are known and confirm what has previously been reported in literature. However, the associations between low SRH and not knowing your length, speaking Dutch or having a family history of breast or colon cancer, as well as the association between high SRH and being on a cholesterol-lowering diet are interesting new findings.*

Introduction

Good health seems to be an important determinant for the well-being and quality of life of people. The context of health is not limited to the physical well-being of individuals or communities but should take into account the emotional, socio-economic, mental, spiritual and cultural well-being of the individuals in the community. The most widely used definition of health is that provided by the World Health Organization (WHO): "Health is a complete state of physical, mental and social well-being, and not merely the absence of disease or infirmity" [1].

We aimed to measure the subjective health status in one question, which means that our measurements included not only physical health, but also social and psychological health components. We may assume that such a subjective health status will be affected by the presence of symptoms or specific complaints, but also by the medical diagnoses and risk factors known by the participant [2].

In the past, several studies have been set up to identify the determinants of subjective health. However, it has never been possible to develop an accurate conceptual description of subjective health status [3].

According to the second goal of the WHO Millennium Development Goals, everyone should have the possibility to develop one's own health potential. The subjective assessment of one's own health is considered to be

a good indicator in this context, both at the individual level and at the level of society.

Many studies were able to demonstrate a strong cohesion between subjective health and mortality [4]. Subjective health also seems to be a good predictor of morbidity, the level of functional ability and medical consumption [5-10]. The subjective perception of health status is therefore a useful tool to detect high-risk persons and to estimate care requirements.

This study aimed to describe the correlation of objective health-related factors with the perceived health of a sample of the Belgian population.

Methods

PARTICIPANTS

Participants were recruited during a food exhibition at the Brussels Exhibition Centre from October 6th to October 21th 2012. All adult visitors were invited to participate. Exclusion criteria were: pregnancy, taking vitamin K antagonists, showing signs of addiction to alcohol, medication or drugs, or being intolerant to blood and / or finger pricks.

QUESTIONNAIRE

To evaluate the self-reported health (SRH) the part of the EQ-5D questionnaire measuring SRH using a visual analogue scale (VAS) was used [11]. We did not use

the other scales from the EQ-5D questionnaire. Participants were asked to score their perceived health status on a scale between 0 and 100 with 0 corresponding with the worst health participants could possibly imagine and 100 meaning the best imaginable health.

Scoring on the VAS was performed after recording the participants' age, gender and zip-code but before other health-related questions were asked.

Participants were asked if they knew their length, weight, abdominal circumference, blood pressure, cholesterol level and blood sugar level. Subsequently these parameters were also measured. Furthermore, participants were asked about their medical history (coronary heart disease, hypercholesterolemia, diabetes, hypertension, other diseases) and their family history (breast cancer, coronary heart disease, diabetes, colon cancer). They were also asked about their latest tetanus vaccination.

MEASUREMENTS

Some parameters of the enrolled subjects were measured. We respectively used a digital personal scale Seca Sensa 804 to measure weight, a Seca 206 wall-mounted measuring tape for height, a Seca 201 ergonomic circumference measuring tape for abdominal circumference, a calibrated DS-54 WelchAllyn sphygmomanometer blood pressure device for blood pressure, a OneTouch device using capillary blood for blood sugar and an Accutrend Plus monitor using capillary blood for total cholesterol. Capillary blood was obtained by pricking the index finger. A short medical history was obtained, focusing on food and beverage intake during the two hours before the measurement.

APPROVAL OF THE ETHICAL COMITY

The study protocol was approved by the ethical committee of the University Hospital Brussels. Visitors of the exhibition were allowed to participate after they had read the patient-information leaflet and had signed an informed consent form. After completing the questionnaire, participants were offered personalised health advice.

STATISTICAL PROCESSING

Data were anonymously recorded in a mySQL database using an online custom-made PHP-based interface, hosted by the Faculty of Medicine and Pharmacy of the Vrije Universiteit Brussel. Incomplete data sets were eliminated from the database. From the entered data, body mass index (BMI) was generated by the system. Cardiovascular risk was estimated by the system using the Belgian SCORE risk tables [12]. Participants were assigned to either a low-SRH-group or a high SRH-group, using the SRH median (7.14) as an arbitrary cutoff. This permitted us to compare two groups of a similar size.

Statistical analyses were performed using SPSS 22, using cross-tables and the Chi-Square test for discrete variables. A t-test was used to compare the means of two groups and the one-way ANOVA was used to compare the means of three groups.

A logistic regression was performed to determine variables linked with high or low SRH. The following variables were entered: gender, age-groups, language, region, hypertension, hypercholesterolemia, diabetes, coronary heart disease, no disease, family history of coronary heart disease, family history of colon cancer, family history of diabetes, family history of breast cancer, no family history, tetanus vaccination up-to-date, weight, length, abdominal circumference, does know blood pressure, does know blood sugar level, does know cholesterol level, no treatment or diet for cholesterol, diet for cholesterol, statin for cholesterol, plant stanol for cholesterol, smoker, alcohol abuse, physical activity, BMI (4 groups), cardiovascular risk groups (SCORE low, intermediate and high).

Results

STUDY POPULATION

In total 974 visitors participated: 31% men and 69% women. Ages ranged from 18 to 90 years, with an average of 53.3 years. Most of the participants (77%) were from the Flemish region, 18% from the Brussels Region and 5% from the Walloon Region.

The median SRH was 71.4%: 499 participants had a SRH of 71% or lower and 475 had a SRH of more than 71%.

The mean SRH was the highest among the very young (< 20 year) and decreased gradually until the age group of 50 to 59 years, to remain stable in the older age groups (Fig. 1).

MEAN SELF-REPORTED HEALTH

The mean SRH did not differ between men (72%) and women (71%) (Tab. I.). Neither was there a significant difference between regions, although Dutch-speaking participants had a lower SRH than French-speaking participants.

SRH was lower among participants with known hypertension, diabetes and coronary heart disease compared to those without these conditions.

Fig. 1. Mean self-reported health (SRH) per age-group.
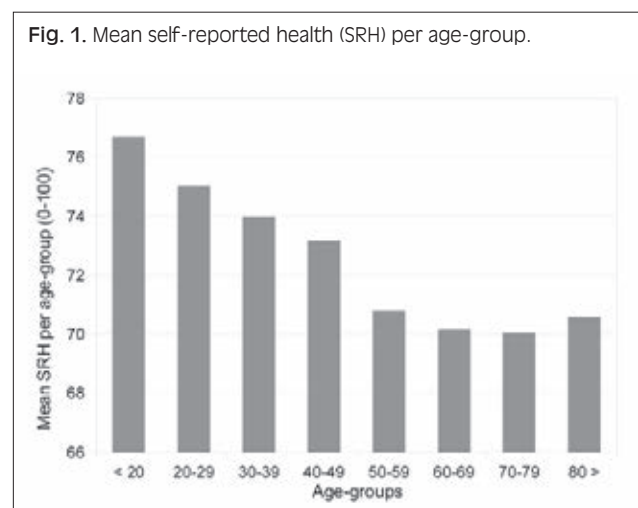
Tab. I. Mean self-reported health (SRH) per group.

	N	Mean SRH	Std. Dev.	p-value
Men	299	72.36	15.113	0.160
Women	675	71.00	13.314	
Brussels Region	174	71.36	17.274	0.176*
Flemish region	749	71.19	13.030	
Walloon region	51	74.94	13.143	
Dutch	857	70.75	13.746	< 0.001
French	117	76.34	14.069	
No hypertension	749	72.44	13.148	< 0.001
Hypertension	225	68.04	15.707	
No hypercholesterolemia	656	71.98	13.891	0.072
Hypercholesterolemia	318	70.27	13.860	
No diabetes	912	71.85	13.592	< 0.001
Diabetes	62	65.11	16.686	
No coronary heart disease	919	72.02	13.236	< 0.001
Coronary heart disease	55	61.35	19.798	
No disease	528	73.15	12.941	< 0.001
Some disease	446	69.38	14.704	
No family history of coronary heart disease	824	72.11	13.466	< 0.001
Family history of coronary heart disease	150	67.65	15.578	
No Family history of colon cancer	874	71.55	14.015	0.376
Family history of colon cancer	100	70.33	12.840	
No family history of diabetes	736	72.13	13.417	0.005
Family history of diabetes	238	69.23	15.107	
No family history of breast cancer	861	71.67	14.000	0.109
Family history of breast cancer	113	69.55	12.990	
No Family history of no disease	527	72.83	13.393	0.001
Family history of some disease	447	69.76	14.308	
Tetanus vaccination not up-to-date or unknown	422	71.32	13.308	0.849
Tetanus vaccination up-to-date or unknown	552	71.49	14.343	
Does not know weight	21	69.57	12.424	0.499
Does know weight	953	71.46	13.931	
Does not know length	78	67.68	16.289	0.035
Does know length	896	71.75	13.631	
Does not know abdominal circumference	892	71.62	13.666	0.197
Does know abdominal circumference	82	69.23	16.135	
Does not know blood pressure	140	73.31	12.662	0.062
Does know blood pressure	834	71.10	14.076	
Does not know blood sugar level	321	72.29	14.058	0.174
Does know blood sugar level	653	70.99	13.808	
Does not know cholesterol level	330	72.36	14.311	0.136
Does know cholesterol level	644	70.94	13.666	
No diet or treatment for cholesterol	622	71.72	13.926	0.369
Diet or treatment for cholesterol	352	70.89	13.849	
No diet for cholesterol	846	71.28	13.996	0.390
Diet for cholesterol	128	72.37	13.241	
No statin treatment for cholesterol	794	72.12	13.553	0.001
Statin treatment for cholesterol	180	68.32	14.974	
No plant stanol treatment for cholesterol	822	71.14	14.111	0.117
Plant stanol treatment for cholesterol	152	72.93	12.617	
Non-smokers	865	71.75	13.897	0.034
Smokers	109	68.77	13.676	
Non-alcohol abusers	944	71.55	13.784	0.200
Alcohol abusers	30	67.47	16.870	
No physical activity	678	70.78	14.353	0.029
Physical activity	296	72.90	12.692	
Underweight (BMI < 18.5)	39	74.74	10.371	< 0.001*
Normal weight (18.5 < BMI < 25)	433	73.47	14.231	
Overweight (25 < BMI < 30)	360	70.87	13.167	
Obesity (BMI > 30)	142	65.66	13.846	
Low cardiovascular risk SCORE	690	72.67	13.095	< 0.001*
Intermediate cardiovascular risk SCORE	149	71.88	12.054	
High cardiovascular risk SCORE	135	64.51	17.430	

* p = one way Anova

Having a disease was related to a lower SRH than not having a disease. Having a family history of diabetes or coronary heart disease was also related to a lower SRH. However, having a family history of breast cancer or colon cancer was not related to a lower SRH. But having a family history of a hereditary disease was related to a lower SRH than not having family history of such a disease. Several other health parameters were assessed but only few were related to a lower SRH: not knowing one's own length, taking a statin, smoking and having little physical activity.

There was a linear relationship between BMI and SRH: the higher the BMI the lower the SRH. A similar relationship was found between cardiovascular risk and SRH: the higher the risk, the lower the SRH.

MEAN VALUES FOR PARAMETERS

In the group with low SRH, median age, mean previous and actual systolic blood pressures, previous and actual weights, previous and actual blood sugar levels, actual BMI and actual abdominal circumferences were higher than in the high SRH group. In the group with high SRH, mean previous and actual lengths were higher (Tab. II).

LOGISTIC REGRESSION

Where possible, parameters were dichotomized and included in a logistic regression (Tab. III.). Participants were divided into age groups of 10 years, four BMI groups and three cardiovascular risk groups. A multivariate analysis confirmed the relationships between low SRH and diabetes (OR 0.23-0.80), increased BMI (OR 0.52-0.74), coronary heart disease (OR 0.28-0.97), smoking (OR 0.38-0.89), speaking Dutch (OR 0.40-0.92), not knowing length (OR 0.36-0.99), family history of breast cancer (OR 0.41-0.94), family history of coronary heart disease (OR 0.45-095) and aging (OR 0.84-0.99). Following a cholesterol-lowering diet was associated with a high SRH (OR 1.10-2.44).

Tab. II. Mean values for parameters for low and high self-reported health (SRH).

	SRH group	N	Mean	Std. Dev.	p-value
Age	Low	499	55.39	16.600	< 0.001
	High	475	51.07	18.156	
Last measured systolic blood pressure	Low	355	127.47	16.488	0.014
	High	304	124.69	11.734	
Last measured diastolic blood pressure	Low	355	78.26	9.245	0.54
	High	304	77.86	7.735	
Last measured weight	Low	483	73.62	15.651	< 0.001
	High	466	69.63	12.465	
Last measured length	Low	442	166.52	8.741	0.008
	High	448	168.06	8.594	
Last measured abdominal circumference	Low	30	95.63	12.164	0.165
	High	19	90.21	13.559	
Last measured blood sugar	Low	261	92.17	17.741	< 0.001
	High	258	85.91	10.267	
Last measured cholesterol	Low	265	196.26	34.851	0.091
	High	254	191.00	35.787	
Mean number of cigarets per day	Low	499	1.62	5.150	0.169
	High	475	1.19	4.614	
Mean number of alcoholic beverages per day	Low	499	4.29	7.673	0.277
	High	475	3.81	5.866	
Actual systolic blood pressure	Low	499	125.90	16.175	0.049
	High	475	124.00	13.773	
Actual diastolic blood pressure	Low	499	77.58	9.240	0.861
	High	475	77.68	7.933	
Actual blood sugar	Low	499	109.70	53.936	< 0.001
	High	475	98.71	22.465	
Actual body weight	Low	499	73.56	15.633	< 0.001
	High	475	69.62	12.412	
Actual length	Low	499	166.12	8.792	0.002
	High	475	167.85	8.789	
Actual total cholesterol	Low	499	181.02	33.648	0.460
	High	475	179.43	33.501	
Actual abdominal circumference	Low	499	92.82	13.878	< 0.001
	High	475	87.37	12.410	
Actual body mass index	Low	499	26.062	4.8485	< 0.001
	High	475	24.226	3.9512	

Tab. III. Logistic regression: factors related to high or low self-reported health (SRH).

	B	p-value	OR	95% C.I.for OR	
				Lower	Upper
Age-groups (per 10 years)	-0.092	0.037	0.912	0.836	0.995
Speaking Dutch (vs French)	-0.501	0.019	0.606	0.399	0.920
Diabetes (Y/N)	-0.839	0.008	0.432	0.232	0.803
Coronary heart disease (Y/N)	-0.658	0.041	0.518	0.275	0.974
Family history of coronary heart disease (Y/N)	-0.421	0.027	0.656	0.451	0.954
Family history of breast cancer (Y/N)	-0.479	0.025	0.619	0.407	0.942
Does not know length (Y/N)	-0.521	0.047	0.594	0.355	0.992
Does not know blood sugar level (Y/N)	-0.503	0.058	0.605	0.360	1.017
Does not know cholesterol level (Y/N)	0.483	0.077	1.621	0.949	2.770
Follows a cholesterol diet (Y/N)	0.491	0.016	1.634	1.097	2.435
Smoking (Y/N)	-0.547	0.013	0.579	0.377	0.889
Body mass index (4 groups underweigh > obesity)	-0.476	<0.001	0.621	0.520	0.742

Variable(s) entered on step 1: gender, age-groups, language, region, hypertension, hypercholesterolemia, diabetes, coronary heart disease, no disease, family history of coronary heart disease, family history of colon cancer, family history of diabetes, family history of breast cancer, no family history, tetanus vaccination up-to-date, weight, length, abdominal circumference, does know blood pressure, does know blood sugar level, does know cholesterol level, no treatment or diet for cholesterol, diet for cholesterol, statin for cholesterol, plant stanol for cholesterol, smoker, alcohol abuse, physical activity, body mass index (4 groups), cardiovascular risk groups (SCORE low, intermediate and high).

Discussion

SAMPLE POPULATION

Women and participants from the Flemish region were overrepresented in our study. Extra bias was caused by the fact that all participants were visitors of a food exhibition, meaning that severely disabled or seriously ill people were less likely to participate. As we never aimed to include a representative sample of the Belgian population, this did not hamper the interpretation of our results. Our purpose was to describe the correlation of objective health-related factors with SRH in an arbitrary sample of the Belgian population.

SELF-REPORTED HEALTH

Health status was not assessed by an objective third party. Even though self-assessment is undoubtedly influenced by external factors, including the views of other people, it was ultimately the participant himself who answered the questions.

This type of subjective assessment could rather be an emotional reflection than a systematic, cognitive analysis. Moreover, the subjective measurement of health is without any doubt related to the participants' quality of life.

We were particularly interested in "general" health and not in "current" health. With this subtle difference we tried to reduce the influence of temporary health issues. However, it is not clear how well participants were able to distinguish their general health from their actual health.

The median SRH in our study was 71.4%. In a Finnish study, a similar population had a SRH of 70% [13]. A similar study in Singapore also reported a SRH of approximately 70% [14]. Another study among institutionalised elderly reported a SRH of 78 [15]. Some caution is needed while comparing SRH-results from different studies and different countries, because a subjective approach of health could be highly influenced by cultural diversity. However, such a subjective assessment is sometimes influenced by some cultural related tendencies to complain more or to reflex a rather pessimistic view. Also the functional status appears to be related to ethnic variation [3]. Thereupon, SRH seems to be more useful to monitor health over a period of time or before and after a treatment.

Another limitation of the SRH assessment using a VAS is the difficulty to differentiate participants considering themselves in good or bad health because every participant might use its own arbitrary cut-off between good and bad health. Assessment methods as proposed by the WHO or the one used in the National Health Interview Survey in de United States do not have this disadvantage [10, 16].

COMPARISON WITH OTHER STUDIES

In the Belgian Health Interview Survey (HIS) of 2008 – using the assessment method proposed by the WHO – 23% of the participants considered themselves not to be in good health [17]. As we used a VAS we cannot compare this figure with our results. However, some comparisons are possible. In the HIS more women (25%) than men (20%) reported a bad health. This was not confirmed by our findings. Neither could we confirm that inhabitants of the Flemish region complained less about bad health (21%) than the inhabitants of the Walloon region (26%) or Brussels region (26%).

In our study (very) young participants scored the highest mean SRH with a gradual decrease until the age of 50. The HIS showed a similar evolution. But contrary to our findings that SRH remained stable in the older age groups, the HIS reported a continuing decrease in SRH after the age of 60. This can be explained by the fact our study population was a selected "mobile" population and that disabled or seriously ill people were less likely to visit the exhibition.

Another reliable source on health is the Organisation for Economic Co-operation and Development (OECD) [18]. From the most recent data (2011), 74% of the Belgian adult population considers its health as good. In Portugal, for example, only 50% of the population considers its health as good. The highest SRH is found in the United States with 90%. The figures for Belgium are comparable with The Netherlands (76%) although some other West-European countries such as Germany (65%) and France (68%) report substantially lower figures.

FACTORS ASSOCIATED WITH SELF-REPORTED HEALTH

This multivariate analysis reconfirmed the relationship between low SRH and known diabetes, as has already been reported in other studies [19, 20]. Several studies also found increased BMI to be related to low SRH [21-23]. Similar evidence exists for coronary heart disease and aging [24, 18]. There is even some evidence that SRH predicts the prognosis after percutaneous coronary stenting [25].

Regarding the association between smoking and SRH strong evidence exists. An Irish study showed that non-working status, no private health insurance, inability to afford enough food, no car, being non-married, low social participation, serious neighbourhood problems, low social support, smoking, no alcohol consumption, illicit drug use, low physical activity and obesity were associated with poor SRH [26].

Only little is known about the influence of language on the SRH. A study in Singapore showed that Chinese speaking participants reported a lower SRH than English speaking participants despite that only very few differences existed between both groups, except the language [14]. In our study Dutch-speaking participants reported a lower SRH than French-speaking participants. The importance of language as such is unclear, because important cultural and socio-economic differences exist between both groups.

Our study detected an association between low SRH and not knowing one's own length. Although only few participants didn't know their length, we found it to be a strong predictor of low SRH. To our knowledge no information exists on this association, but other studies do mention an association between knowing one's own medical condition and SRH [15]. It is remarkable that in our study this association was only found for length and not for blood pressure, weight or other evident parameters. Having a family history of breast cancer or coronary heart disease also seems to impact on SRH. Knowing that one has an increased risk for a hereditary disease seems to affect one's SRH. However, this was not confirmed for colon cancer.

In our study, being on a cholesterol-lowering diet was associated with a high SRH, confirming previous evidence that people who are on a diet report a higher SRH [27]. One might expect that the quality of life of people on a diet is lower than of those who are not. Leading a healthy lifestyle probably has a favourable impact on the SRH. However, people following a diet often have an unhealthy lifestyle and compensate with a diet.

Conclusions

Our findings on the associations between low SRH and diabetes, increased body mass index, coronary heart disease, smoking and aging are known and confirm what has previously been reported in literature. However, the associations between low SRH and speaking Dutch, not knowing your own length or having a family history of breast cancer or colon cancer as well as the association between high SRH and being on a cholesterol-lowering diet are new and interesting findings. This is important because these factors might have an impact on the assessment of SRH.

Acknowledgement

Conflicts of interest

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