Libertas Academica
FREEDOM TO RESEARCH

Open Access: Full open access to this and thousands of other papers at http://www.la-press.com.

Healthy Aging & Clinical Care in the Elderly

Sense of Coherence and Perceived Health in Older Hospitalized Patients without Dementia—A 12-month Follow–up Study

Anne-Sofie Helvik[1–3], Knut Engedal[4–6], Guro Hanevold Bjørkløf[6,7] and Geir Selbæk[4,8]

[1]Department of Public Health and General Practice, Faculty of Medicine, Norwegian University of Science and Technology (NTNU), Trondheim, Norway. [2]Innlandet Hospital Trust, Division Tynset, Tynset, Norway. [3]St Olav's University Hospital, Trondheim, Norway. [4]Centre for Old Age Psychiatric Research, Innlandet Hospital Trust, Ottestad, Norway. [5]The Norwegian Centre for Dementia Research, Oslo University Hospital, Ullevaal, Norway. [6]Faculty of Medicine, University of Oslo, Oslo, Norway. [7]Vestre Viken Hospital Trust, Lier, Norway. [8]Akershus University Hospital, Lørenskog, Norway.

ABSTRACT: Prospective studies of whether sense of coherence (SOC) affects perceived health over time in cognitively intact older adults are rare. In the current study, we aimed to investigate the association between perceived health one year after hospitalization (T2) and SOC at baseline (T1) among persons aged 65 years or more without cognitive impairment. Patients at a public general hospital in Norway were followed up 1 year after inclusion. At T1, SOC, depression and anxiety, physical health and functional status were assessed. Hospitalizations between T1 and T2 were recorded. At T1 and T2 44 (44.0%) and 51 (52.5%), respectively, perceived their health as good. The odds for good perceived health at T2 were reduced in people who had been hospitalized between T1 and T2. Gender and SOC at T1 interacted on perceived health at T2; men with a low SOC and women with a medium high SOC had reduced odds for perceiving their health as good at T2. The SOC had limited importance for perceived health one year after hospitalization in this sample of older people. Thus, the importance of including SOC in rehabilitation programs after hospitalization is questionable.

KEYWORDS: coping, elderly, mental health, perception of health, prospective study and self-reported health

CITATION: Helvik et al. Sense of Coherence and Perceived Health in Older Hospitalized Patients without Dementia—A 12-month Follow–up Study. *Healthy Aging & Clinical Care in the Elderly* 2013:5 41–48 doi:10.4137/HACCE.S12357.

TYPE: Original Research

FUNDING: The research was funded by collaboration between the Norwegian Ministry of Health and Care Services, and Innlandet Hospital Trust.

COMPETING INTERESTS: Authors disclose no potential conflicts of interest.

CORRESPONDENCE: anne-sofie.helvik@ntnu.no

Introduction

Several studies indicate that perceived health is a relevant indicator for mortality in older adults.[1–5] The concept of self-reported or perceived health is based on biomedical, functional and affective components[6,7] and is a summary of a patient's status in several health related domains.[6,8]

A perceived health assessment incorporates both peoples' subjective assumptions and their actual knowledge of their own health.[9–11] Perceived health, assessed by a single item, is frequently used to study associations between perceived health and physical health, functional status, mental health,[9] age[12] and socio-demographic factors such as social support and living condition.[6] For example, the living condition may be operationalized by type of work (e.g. irregular work hours or not, and occupational status), or financial situation and household composition (e.g. living alone or not).[6] Gender may be important for the perception of health, as women and men often base their ratings on different information.[6,10]

Coping can be regarded as an important determinant for health, both for the maintenance of health and to prevent a breakdown of health.[13] Coping is a multifactorial concept[14] and may include both coping resources and strategies. According to Antonovsky's 'Salutogenetic' theory, 'sense of coherence' (SOC) is seen as a basic resource of coping and part of a person's general orientation towards stressors in life.[13,15] The concept of SOC consists of 3 parts: comprehensibility, manageability and meaningfulness.[13,15,16] Regarding comprehensibility, the extent to which stimuli is perceived as

structured, logical and predictable, engaging both cognition and emotions, is the main concern. Manageability refers to how much the individual perceives available resources to be adequate and satisfactory to cope with the demands of the current situation. Meaningfulness as a motivational factor is understood as to what extent a person perceives life to be important and worthy of engagement.[13,15] According to Antonovsky, the level of sense of coherence is quite stable in adulthood: i.e. at the age of about 30 years.[13,15] However, in recent community studies of older adults, SOC was found to be less stable than expected by Antonovsky,[17–19] but few studies have reported whether SOC is stable or not over time in somatically ill older people.

A systematic review has shown that SOC is positively related to good perceived health in cross-sectional studies.[19,20] However, longitudinal studies report divergent associations between a high SOC and good perceived health.[19,20] The role of gender seems to influence the relation between SOC and perceived health and this may explain some of the divergent results.[19,20] Since it may be difficult to fill in the SOC questionnaire,[16,21] recent cross-sectional studies in older adults have been carried out on hospitalized or previously hospitalized patients without cognitive impairment[22–24] or persons without cognitive impairment living in the community or in nursing homes.[10,22,25] These studies have reached the same conclusion that good perceived health is associated with a higher SOC. However, 1 of these recent studies found that SOC was significantly associated with perceived health only in men, not in women.[10] In a previous cross-sectional study among hospitalized older adults, we found no gender differences in SOC and perceived health. Medium high and high SOC were important factors in explaining why older inpatients rate their health as good.[24] However, in cross-sectional studies, causality regarding the relation between SOC and perceived health cannot be studied, and longitudinal studies of SOC and perceived health in older people are still scarce. Thus, it remains to be explored whether SOC affects perceived health over time in cognitively intact older men and women. If SOC affects perceived health over time, actions could be taken to identify those persons with a vulnerable health and low SOC and to strengthen their coping resources, e.g. as part of the rehabilitation program after hospitalization.

In accordance with Antonovsky's Solutogenetic theory,[13,15] we hypothesized that a high SOC at baseline would be associated with perceiving health as good at follow-up both in women and men. Thus, the aim of the present study was to explore whether SOC at baseline was associated with perceived health at follow-up 1 year after hospitalization in older adults (≥65 years) without cognitive impairment, and to study if gender differences existed.

Method

The present study is based on information from a longitudinal study. The baseline information was collected over a 2-year period (1 September 2006–30 August 2008) of patients (≥65 years) at a public general hospital in Norway.[26–28] The hospital serves 9 inland municipalities covering an area of 15,000 km^2 with 25,000 inhabitants, where 4,600 persons were 65 years or older.[28]

Participants in the study were followed up once; i.e. 1 year after the inclusion (±14 days) The same 2 research nurses (1 specialized in geriatrics and 1 in health science) collected all data both at baseline and follow-up using a standardized interview procedure.[26–28] Prior to the study start, the nurses completed a 2-day course on how to conduct the interview. Subsequently, they practiced on a number of healthy subjects. The inter-rater reliability between the 2 nurses was checked at baseline for the first 30 study participants and found acceptable (the correlation of the sum-score of each inventory assessed between the nurses by Spearman's rho varied from 0.91–0.97).

All potential patients aged 65 years or older were invited to participate in the study during their hospital stay after they had been medically stabilized. The research nurses administered initially the Mini-Mental State Examination (MMSE)[29] and subsequently the Clinical Dementia Rating Scale (CDR)[30] to rate the severity of cognitive impairment. Assessment of SOC was conducted when the older person showed minimal or no cognitive impairment defined as a score on the MMSE of 25 and above. At follow-up the MMSE, CDR and the perceived health measure were repeated.

The study was based on the participants' written, informed consent and approved by the Regional Committee for Medical Research Ethics in South-Eastern Norway and the Norwegian Social Science Data Service.

Participants. All patients 65 years and older living in the region, admitted with an acute medical condition to the medical inpatients service, and hospitalized for at least 48 hours at the Tynset Division of the Innlandet Hospital Trust were eligible for inclusion in the study. Of the 802 possible study participants, 318 (40%) were excluded due to: severe dementia (116 patients) signified by a score of 3 on the CDR,[30] severe communication difficulties mainly caused by profound speech difficulties and severe hearing loss (25 patients), being in a terminal state or having died before inclusion (47 patients), reduced physical functioning that made completion of the protocol impossible (mainly caused by profound cardiovascular, pulmonary or cancer diagnoses) (106 patients), or refusal to participate (24 patients).[26,27] Thus, 484 patients remained to be assessed for inclusion. Among these, 267 patients were excluded as they had a score of 24 or lower on the MMSE,[21,24] leaving 217 participants for this study at baseline (T1) (Fig. 1). At 1-year follow-up (T2), 27 had died, 75 participants had a score on MMSE of 24 or lower indicating cognitive impairment, and 18 declined to participate. In total, 97 (44.7%) patients participated in the follow-up study.

Measures. Perceived health, the dependent variable at follow-up, was measured by one item; "How is your present

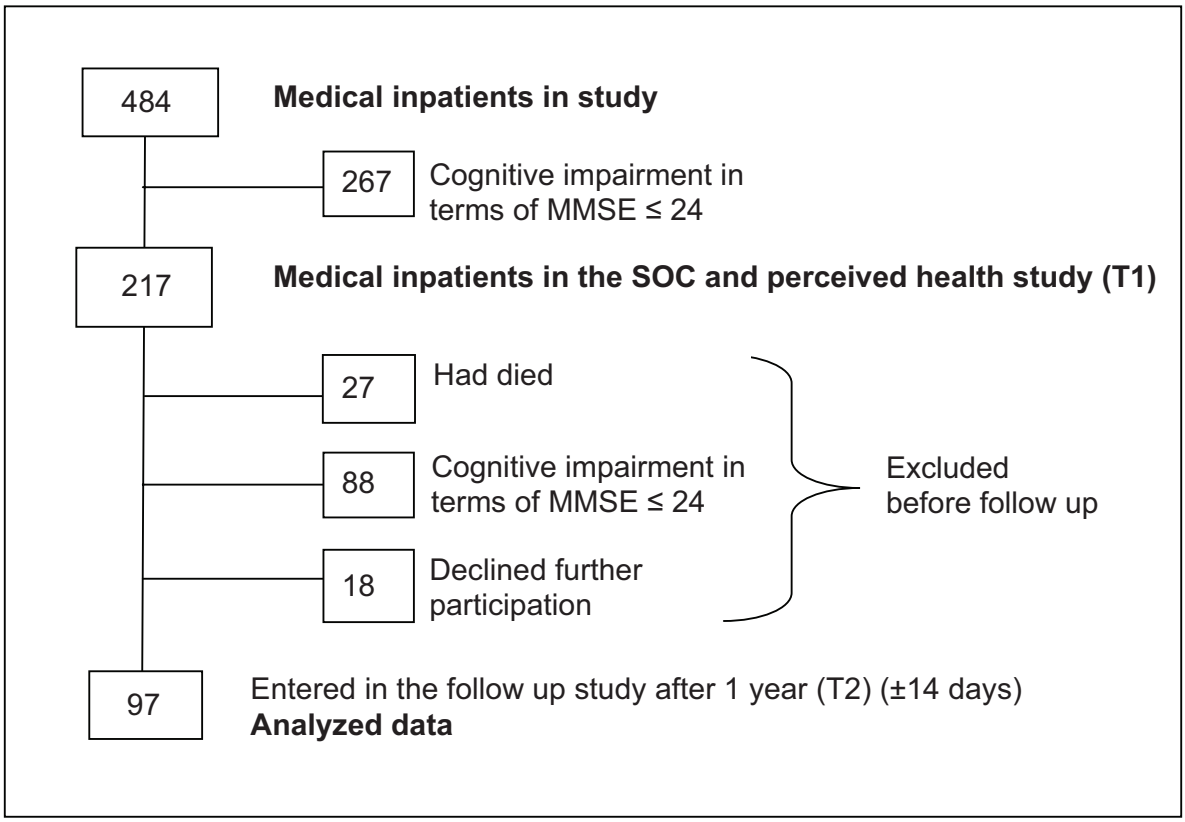

Figure 1. Flow chart. Hospitalized older patients (≥65 years) at Innlandet Hospital trust, Division Tynset with MSSE > 24 at inclusion (T1) and Follow up (T2).

state of health?" with a 4-point response scale consisting of the options "very good", "good", "fair" and "poor"[32] at baseline and follow-up. The perceived health scores were dichotomized, i.e., good (score 1 and 2) and not good (score 3 and 4), which is a procedure carried out in several studies.[33]

Socio-demographic information (living alone or not, smoking habits and residence details) was measured by self-report questions from the population-based health study undertaken in Nord-Trøndelag.[34]

Physical health was obtained from medical records and hospital administrative systems regarding the number of hospitalizations during the previous 5 years, length of stay and diagnoses at inclusion and the number of drugs and new hospitalizations during the period of follow-up. Details of co-morbid diseases were collected at inclusion using the Charlson Index employing Schneeweiss weighting.[35]

Cognitive, physical and instrumental level of functioning were measured both at baseline and follow-up using several scales. The first was the Mini-Mental State Examination (MMSE);[29] a 30-point questionnaire where a score of 25 or higher on the Norwegian version of MMSE indicates no or minimal cognitive impairment.[31] In addition, the Clinical Dementia Rating Scale (CDR)[30] was applied at baseline and follow-up. CDR evaluates the severity of cognitive impairment, where a total score of 3 (range 0–3) indicates severe dementia.[30] The level of functioning in the activities of daily living (ADL) was assessed with the Physical Self-Maintenance Scale (PSMS, score range of 6–30) and the Instrumental Activities of Daily Living Scale (I-ADL a score range of 8–31)[36] at baseline. Having a PSMS sum score of 6 and an I-ADL sum score of 8 points indicate a normal level of functioning.[36]

Sense of Coherence was assessed at baseline with the 13-item version of the Sense of Coherence questionnaire (SOC) with 7 response options, the sum score ranging from 13 to 91. A higher SOC score indicates more capacity to cope adaptively to stressful situations.[20] The SOC questionnaire has been used in Norwegian settings[19,20] and among older adults with minimal, but not significant, cognitive impairment.[22,24]

Depression and anxiety were measured at baseline by the self-report Hospital Anxiety and Depression scale (HAD), consisting of 14 items in total, where 7 items each measure depressive symptoms and anxiety symptoms, and both sub-scales have a score range of 0–21. A high sum-score indicates more severe symptoms. The cut-off points for having clinically significant depression (HAD-D) or anxiety (HAD-A) were set to ≥8 in each sub-scale.[37] The HAD scale has been validated in Norway and used in several studies, including samples among older adults.[27,28,38]

Data analysis. Data were analyzed by means of PASW, version 18.0 (Chicago, Ill, USA). Descriptive analysis of

independent samples was performed with the Chi-square statistic or Fisher's Exact Test for categorical variables (depending on the number of cases included). Independent sample t-tests or the nonparametric Mann–Whitney test was performed for continuous variables (depending on whether or not the distribution was normal). The correlations between socio-demographic, health-related and coping resource variables were inspected with nonparametric analyses using Spearman's rho.

The main outcome, perceiving health as good or not good at follow-up, was studied by logistic regression. The analyses were checked for possible interactions. Gender and SOC at T1 interacted strongly with perceived health at T2 and the analyses were stratified by gender. SOC at T1 was not linearly associated with the outcome. Thus, the sum score of SOC was categorized into 3 groups based on the 33.3 and 66.6 percentile of the total sample in line with previous research[20] and the our linearity tests. In the forth coming analysis, living status, smoker/non-smoker, Charlson's Index, PSMS, I-ADL, perceived health and depression and anxiety (according to HAD) at T1 and hospitalization during the year of follow-up were explored. The independent variables not linearly associated with the outcome were dichotomized (i.e. PSMS, I-ADL, HAD-A and HAD-D) using standardized cut-off scores for the scales. The category indicating the best health situation was set as the reference when possible for both continuous and categorical variables. The variables with a potential effect ($p \leq 0.2$) on the primary outcome in the crude analyses for men or women or both genders together were included in adjusted analyses. Inter-correlations between independent variables were checked before regression analysis. *P*-values ≤ 0.05 were regarded as statistically significant.

Results

Characteristics of the 51 men and 46 women who completed the follow-up assessment are shown in Table 1. At T1 the patients' mean age was 75.3 (SD 6.3, range 65–89) years. Women lived alone more often (56.5% vs. 25.5%; $p < 0.01$) and had a better mean I-ADL score (mean 6.3 SD 1.9 versus (vs.) mean 8.6 SD 1.8; $p < 0.01$) than men. Men and women did not differ in their perception of health at baseline (n = 22, 41.7% vs. n = 22, 46.5% perceived health as good, respectively). Compared to those who completed follow-up, those who dropped out were significantly older (mean 80.0, SD 6.9 years vs. mean 75.3, SD 6.3 years; $p < 0.01$), had a higher Charlson Index score (mean 2.4, SD 2.2 vs. mean 1.6, SD 1.6; $p < 0.01$) and a lower MMSE score (mean 27.0, SD 1.5 vs.

Table 1. Characteristics of total study sample at baseline (N = 97) by gender.

		MEN	WOMEN	TOTAL
Socio-demographic				
Gender	N (%)	51 *(52.58)*	46 *(47.42)*	97 *(100)*
Age (by year)	Mean (*SD*)	74.41 *(6.16)*	75.89 *(6.29)*	75.33 *(6.30)*
Smoking	N (%)	4 *(7.84)*	8 *(17.39)*	12 *(12.37)*
Living alone	N (%)	13 *(25.49)*	26 *(56.22)*	39 *(40.21)***
Information on physical health				
Previous hospitalisations in last 5 years	Mean (*SD*)	2.33 *(2.67)*	1.65 *(2.88)*	2.06 *(2.80)*
Actual hospitalisation (days)				
Duration of hospital stay	Mean (*SD*)	5.61 *(4.18)*	5.28 *(3.62)*	5.47 *(3.77)*
Duration before inclusion	Mean (*SD*)	3.73 *(2.80)*	3.87 *(2.68)*	3.67 *(2.63)*
Charlson Index	Mean (*SD*)	1.76 *(1.40)*	1.35 *(1.68)*	1.60 *(1.56)*
Functional capability				
PSMS	Mean (*SD*)	6.49 *(1.41)*	6.82 *(1.43)*	6.66 *(1.14)*
I-ADL	Mean (*SD*)	6.28 *(1.90)*	8.57 *(1.82)*	7.36 *(2.23)***
Coping resources				
Sense of coherence	Mean (*SD*)	76.53 *(11.15)*	76.52 *(12.51)*	76.53 *(11.75)*
Anxiety and depression				
Depression (HAD-D ≥ 8)	N (%)	1 *(1.96)*	3 *(6.52)*	4 *(4.12)*
Anxiety (HAD-A ≥ 8)	N (%)	3 *(5.88)*	5 *(10.87)*	8 *(8.25)*
General health				
Perceived health as good	N (%)	22 *(41.67)*	22 *(46.51)*	44 *(43.96)*

**$p \leq 0.01$.

Abbrviations: PSMS, Physical Self-Maintenance Scale; I-ADL, Instrumental Activities of Daily Living function; HAD-D, The depression subscale of the Hospital Anxiety and Depression scale; HAD-A, The anxiety subscale of the Hospital Anxiety and Depression scale.

mean 28.0, SD 1.6; $p < 0.01$). There were no differences in the gender distribution, sense of coherence or perceived health.

The mean follow-up time was 367 (SD 29.5) days and 60.8 % (n = 59) had been hospitalized during the follow-up period (mean number of hospitalizations 0.8, SD 1.4, range 0–8 hospitalizations).

Perceived health at T2. The correlations between variables at T1 and perceived health at T2 are presented in Table 2. The prevalence of good perceived health at T2 was 52.6% (n = 51) and there was no significant difference between women and men (n = 27, 62.8% vs. n = 24, 52.1%, respectively). There was no significant correlation between perceiving health as good at baseline and follow-up.

In an unadjusted gender-specific logistic regression analysis, women with a medium high SOC at T1 had reduced odds of perceiving their health as good at T2 compared to women with a low SOC (OR 0.19, 95% CI 0.04–0.95, $p < 0.05$), while men with a medium high SOC at T1 had increased odds of perceiving good health at T2 compared to men with a low SOC (OR 7.22, 95% CI 1.44–36.22, $p < 0.05$). A high SOC at T1 was not associated with perceived health at T2 in either women or men (OR 0.60, 95% CI 0.11–3.21 and OR 1.73, 95% CI 0.45–6.63).

Adjusted logistic regression analysis categorizing SOC by gender was performed with women with a low SOC as reference (see Table 3). Men with a low SOC and women with a medium high SOC had reduced odds for perceiving health as good at T2 compared to women with a low SOC. Perceived health in men with a medium high or high SOC and women with a high SOC did not differ from women with a low SOC. In the same analysis, new hospitalizations between T1 and T2 decreased the odds for perceiving health as good at T2, but PSMS score at T1 was not associated with perceived health at T2.

Table 2. Correlations[1] between variables at baseline (T1) and hospitalization during the year of follow-up, and perceived health as good at follow-up (T2) (N = 97).

	PERCEIVED HEALTH AS GOOD AT T2		
	WOMEN	MEN	TOTAL
At T1			
Older (by year)	.04	.01	.04
Smoking	–.08	–.07	–.06
Living alone	.07	.07	–.09
Increasing Charlson Index	.08	–.23	–.09
PSMS > 6	.00	–.45**	–.22*
I-ADL >8	.04	–.14	.04
Increasing SOC	–.06	.19	.08
Depression (HAD-D ≥ 8)	.22	–.14	.09
Anxiety (HAD-A ≥ 8)	.15	–.07	.06
Perceived health as good	.10	–.01	.05
During the year of follow-up			
Hospitalization	–.13	–.45**	–.31**

1Nonparametric correlation analysis with Spearman's rho.
*p ≤ 0.05, **p ≤ 0.01.
Abbreviations: T1, baseline; T2, follow-up.

Discussion

In this Norwegian longitudinal study of perceived health in cognitively well-functioning older adults, we found that about half of the sample perceived their health as good one year after hospitalization. We found no association between perceiving health as good at baseline and at follow-up. When addressing the perceived health at inclusion the patients were still hospitalized with an acute illness and this may have influenced their answers. However, the proportion of older adults assessing their health as good was quite low both at baseline and follow-up compared to a sample of older home-dwelling people (in which 90% perceived their health as good)[22] and these findings may reflect the fact that we followed up a group of fragile older persons.

Since various living conditions have been found associated with perceived health in earlier studies,[6] we explored the association between living status (living alone or not) and perceived health in the initial analysis, but living status was not associated with the primary outcome in the crude analyses for men or women or both genders together ($p > 0.2$). Perceived health may partly be influenced by gender.[6] In gender-specific unadjusted analyses, men with a medium high SOC at baseline had increased odds for perceiving health as good at follow-up compared to men with a low SOC, while the opposite was the case for women. In the adjusted analysis of SOC, we found men with a low SOC less likely to perceive their health as good compared to women with a low SOC. Otherwise, SOC seems to have a limited importance on perceived health in this sample of fragile older people. A medium high SOC seemed to have an influence on the perception of health in women, but the results were barely significant, so this finding should be interpreted with caution. A recent Norwegian cross-sectional study among older men and women living in their own homes with assistance found SOC important for perceived health only in men.[10] Men with a medium high and high SOC more often perceived their health as good compared to men with low SOC. In cross-sectional studies among adults, some have reported a medium high and/or high SOC to be important for perceiving health as good only in women; others only in men or not revealing any gender differences.[19,20] In a previous cross-sectional study we did not find gender to be of importance for the relation between SOC and perceived health.[24] The role of SOC in relation to gender and later perceptions of health seems to be complicated and possibly influenced by various issues such as the patients social upbringing and network.[19,20] In one study it is reported that experiencing poor childhood living conditions, including a poor level of education, and little social support as adults is associated with lower

Table 3. Associations with perceived health (good vs. not good) at T2 in adjusted logistic regression analysis (N = 97).

		PERCEIVED HEALTH AT T2		ADJUSTED ANALYSIS	
		GOOD	NOT GOOD	OR_A	95% CI
At T1					
Sense of coherence					
Low level	Women	10	3	1.00	Reference
	Men	6	13	**0.16**	**(0.03–0.86)**
Medium high level	Women	7	11	**0.19**	**(0.04–1.00)**
	Men	10	3	0.70	(0.10–1.04)
High level	Women	10	5	0.52	(0.09–2.98)
	Men	8	11	0.25	(0.05–1.28)
Hospitalizations during follow-up	No	38	20	1.00	Reference
	Yes	13	26	**0.33**	**(0.13–0.80)**
Physical Self-Maintenance	Normal	39	25	1.00	Reference
	Reduced	12	21	0.46	(0.17–1.24)
Nagelkerke R square[1]					26.8

[1]The **Hosmer and Lemeshow goodness of fit Test** of adjusted analysis of perceived health as good, Chi-square 8.397 (df = 8) Sign 0.396.
OR_A: The odds ratio analysis was adjusted for all included variables.
Results with p-values ≤ 0.05 are marked with bold digits.
Abbrviations: T1, baseline; T2, follow-up.

SOC for both genders.[39] In the present study we were unable to adjust for such possible explanatory variables. Moreover, the SOC may be less stable in these older adults than the theory of Antonovsky indicates[13,15] which has been found in community studies of older adults.[17–19] In addition, test-retest studies of SOC are missing in samples of older adults.[19,20] Furthermore, fragile older people, vulnerable to further health deterioration, may be realistic about their future prospects for health, and thus SOC has less importance for their perception of health in the future. More studies are needed to investigate this phenomenon. Thus, according to our findings the importance of SOC in rehabilitation programs after hospitalization of older persons with a vulnerable health seems to be somewhat limited.

In the present study, the odds for perceiving health as good 1 year after hospitalization was reduced for those who had been re-admitted to hospital during the follow-up period; i.e., the physical health status was not stable. This result was not surprising. A meta-analysis of perceived health in older adults reported similar results as we did. Strong associations were found between poor perceived health and indicators of reduced physical health status.[12] In another study, change in physical health status, rather than age and perceived health at baseline explained the perceived health at follow-up.[40] Thus, instead of co-morbidity assessed at baseline in this group of fragile older adults we could have assessed change in co-morbidity during follow-up in order to better study change in objectively measured health status during follow-up.

The study has limitations that need to be addressed. About 50% of the patients who passed the first step of the inclusion at baseline were later excluded due to cognitive impairment beyond the limit we had defined as acceptable (MMSE ≤ 24) and additionally a large proportion (34.6%) were excluded at follow-up because of cognitive impairment (MMSE ≤ 24) (Fig. 1). We may be criticized for setting too strict a limit, since there does not seem to be an exact limit for acceptable cognitive function for the use of the SOC questionnaires.[19,20] However, a study of SOC in non-institutionalized older persons showed that the participants did not always interpret the SOC-questions as intended.[21]

SOC was assessed with a 13-item version of the questionnaire since comparable studies confirm that the 13-item version can be substituted for the original 29-item version.[13,15] Antonovsky talks in general terms about high and low SOC,[13,15] but he did not define boundaries for low, medium high or high scores for a SOC. However, the categorization done in the present study is in line with the categorization of the SOC variable performed by others[20] and the linearity test did not support a dichotomization of the SOC variable into high and low SOC, which some other studies have used.[20]

The relatively low number of participants has restricted our statistical power; thus, we cannot exclude type 2 error. Moreover, the low number of participants made it impossible to perform gender-specific adjusted analyses. An interaction term would have made the results more complicated to interpret; consequently, SOC was categorized by gender. Lastly, coping is a multifactorial concept, but in this study coping was solely studied by the SOC. A broader coping perspective including both coping strategies and coping resources could enrich the understanding of coping in relation to perceived health in older adults.

Lastly, in a follow-up period of 12 months, several health-related changes may occur in previously hospitalized

patients. Thus, we cannot rule out that there are changes of importance which we did not measure that could have altered the relation between SOC in men and women at baseline and their perceived health at follow-up.

Conclusion

The SOC has restricted importance for the perceived health in older adults with vulnerable health one year after hospitalization. However, SOC assessed at hospitalization may be of some importance for perceived health at follow-up in men; i.e., those with a low SOC were less likely to perceive their health as good compared with women with a low SOC. Thus, the importance of using SOC in rehabilitation programs after hospitalization seems to be somewhat limited in fragile older adults, but more studies are needed to explain the importance of SOC for future health in older persons.

Implications of the Study

- The proportion of older adults perceiving their health as good at follow-up one-year after hospitalization is quite low.
- The importance of SOC in rehabilitation programs after hospitalization may be limited in fragile older adults.
- The rehabilitation needs to focus on stabilization and eventually improvement of their physical health so they may avoid re-admittance.

Acknowledgements

The authors would like to thank the Medical Department at Divison Tynset at Innlandet Hospital Trust and Randi Helene Skancke whose collaboration made the research possible.

Author Contributions

A-SH was responsible for developing the research idea, the data collection and performing the statistical analysis. KE and GS have participated in the design and the analysis, and all authors (A-SH, KE, GHB and GS) have participated in the preparation of the manuscript. All authors reviewed and approved of the final manuscript.

DISCLOSURES AND ETHICS

As a requirement of publication the authors have provided signed confirmation of their compliance with ethical and legal obligations including but not limited to compliance with ICMJE authorship and competing interests guidelines, that the article is neither under consideration for publication nor published elsewhere, of their compliance with legal and ethical guidelines concerning human and animal research participants (if applicable), and that permission has been obtained for reproduction of any copyrighted material. This article was subject to blind, independent, expert peer review. The reviewers reported no competing interests.

REFERENCES

1. Walker JD, Maxwell CJ, Hogan DB, Ebly EM. Does self-rated health predict survival in older persons with cognitive impairment? *J Am Geriatr Soc*. 2004;52(11):1895–1900.
2. Onawola RS, LaVeist TA. Subjective health status as a determinant of mortality among African-American elders. *J Natl Med Assoc*. 1998;90(12):754–758.
3. Fillenbaum GG, Burchett BM, Kuchibhatla MN, Cohen HJ, Blazer DG. Effect of cancer screening and desirable health behaviors on functional status, self-rated health, health service use and mortality. *J Am Geriatr Soc*. 2007;55(1):66–74.
4. Han B, Phillips C, Ferrucci L, et al. Change in self-rated health and mortality among community-dwelling disabled older women. *Gerontologist*. 2005;45(2): 216–221.
5. Ishizaki T, Kai I, Imanaka Y. Self-rated health and social role as predictors for 6-year total mortality among a non-disabled older Japanese population. *Arch Gerontol Geriatr*. 2006;42(1):91–99.
6. Moum T. Self-assessed health among Norwegian adults. *Soc Sci Med*. 1992; 35(7):935–947.
7. Brief AP, Butcher AH, George JM, Link KE. Integrating bottom-up and top-down theories of subjective well-being: the case of health. *J Pers Soc Psychol*. 1993;64(4):646–653.
8. Benyamini Y, Leventhal H, Leventhal EA. Self-rated oral health as an independent predictor of self-rated general health, self-esteem and life satisfaction. *Soc Sci Med*. 2004;59(5):1109–1116.
9. Idler EL, Benyamini Y. Self-rated health and mortality: a review of twenty-seven community studies. *J Health Soc Behav*. 1997;38(1):21–37.
10. Saevareid HI, Thygesen E, Nygaard HA, Lindstrom TC. Does sense of coherence affect the relationship between self-rated health and health status in a sample of community-dwelling frail elderly people? *Aging Ment Health*. 2007;11(6):658–667.
11. Van Hooft S, Disease and subjectivity. In: Humber JM, Almeder RF, Eds. What is disease? 1997; Totawa: Humana Press.
12. Pinquart M. Correlates of subjective health in older adults: a meta-analysis. *Psychol Aging*. 2001;16(3):414–426.
13. Antonovsky A. *Unraveling the Mystery of Health: How People Manage Stress and Stay Well*. 1987; San Francisco: Jossey-Bass.
14. Bjorklof, Engedal, Selbaek, Kouwenhoven, Helvik. Coping and depression in old age: a literature review. *Dementia and Geriatric Cognitive Disorders*. 2013;35(3–4):121–54.
15. Antonovsky A. *Health, Stress and Coping*. 1979, San Francisco: Jossey-Bass; 270.
16. Antonovsky A. The sense of coherence. An historical and future perspective. *Israel Journal of Medical Sciences*. 1996;32:170–178.
17. Feldt T, Lintula H, Suominen S, Koskenvuo M, Vahtera J, Kivimäki M. Structural validity and temporal stability of the 13-item sense of coherence scale: prospective evidence from the population-based HeSSup study. *Qual Life Res*. 2007;16(3):483–493.
18. Hendrikx T, Nilsson M, Westman G. Sense of coherence in three cross-sectional studies in Northern Sweden 1994, 1999 and 2004—patterns among men and women. *Scand J Public Health*. 2008;36(4):340–345.
19. Eriksson M, Lindström B. Validity of Antonovsky's sense of coherence scale: a systematic review. *J Epidemiol Community Health*. 2005;59(6):460–466.
20. Eriksson M, Lindström B. Antonovsky's sense of coherence scale and the relation with health: a systematic review. *J Epidemiol Community Health*. 2006;60(5):376–381.
21. Naaldenberg J, Tobi H, van den Esker F, Vaandrager L. Psychometric properties of the OLQ-13 scale to measure Sense of Coherence in a community-dwelling older population. *Health Qual Life Outcomes*. 2011;9:37.
22. Söderhamn O, Söderhamn U. Sense of coherence and health among home-dwelling older people. *Br J Community Nurs*. 2010;15(8):376–380.
23. Ekman I, Fagerberg B, Lundman B. Health-related quality of life and sense of coherence among elderly patients with severe chronic heart failure in comparison with healthy controls. *Heart Lung*. 2002;31(2):94–101.
24. Helvik AS, Engedal K, Bjørkløf GH, Selbaek G. Factors associated with perceived health in elderly medical inpatients: a particular focus on personal coping recourses. *Aging Ment Health*. 2012;16(6):795–803.
25. Drageset J, Eide GE, Nygaard HA, Bondevik M, Nortvedt MW, Natvig GK. The impact of social support and sense of coherence on health-related quality of life among nursing home residents—a questionnaire survey in Bergen, Norway. *Int J Nurs Stud*. 2009;46(1):65–75.
26. Helvik AS, Engedal K, Selbaek G. The quality of life and factors associated with it in the medically hospitalised elderly. *Aging Ment Health*. 2010;14(7): 861–869.
27. Helvik AS, Skancke RH, Selbaek G. Screening for depression in elderly medical inpatients from rural area of Norway: prevalence and associated factors. *Int J Geriatr Psychiatry*. 2010;25(2):150–159.
28. Helvik AS, Engedal K, Selbaek G. Depressive symptoms among the medically hospitalized older individuals—a 1-year follow-up study. *Int J Geriatr Psychiatry*. 2012.
29. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res*. 1975;12(3):189–198.
30. Morris JC. The Clinical Dementia Rating (CDR): current version and scoring rules. *Neurology*. 1993;43(11):2412–2414.
31. Engedal K, Haugen P, Gilje K, Laake P. Efficacy of short mental tests in the detection of mental impairment in old age. *Compr Gerontol A*. 1988;2(2):87–93.

32. Holmen J, Midthjell K. The Nord-Trøndelag Health Survey 1984–86. Purpose, background and methods. Participation, non-participation and frequency distributions. 1990; National Institutes of Public Health; 257.
33. Helvik AS, Jacobsen GW, Hallberg LRM. Effects of impaired hearing on perceived health and life situation. *Scandinavian Journal of Disability Research*. 2006;8:263–277.
34. HUNT. The health Study in Nord-Trøndelag (HUNT). Available at http://www.ntnu.no/dmf/hunt/skjema 2009. Accessed January 20, 2009.
35. Schneeweiss S, Wang PS, Avorn J, Glynn RJ. Improved comorbidity adjustment for predicting mortality in Medicare populations. *Health Serv Res*. 2003;38(4):1103–1120.
36. Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental activities of daily living. *Gerontologist*. 1969;9(3):179–186.
37. Snaith RP, Zigmond AS, *The Hospital Anxiety And Depression Scale Manual*. 1994; Windsor: NFER-Nelson.
38. Helvik AS, Engedal K, Skancke RH, Selbæk G. A psychometric evaluation of the Hospital Anxiety and Depression Scale for the medically hospitalized elderly. *Nord J Psychiatry*. 2011;65(5):338–344.
39. Volanen SM, Suominen S, Lahelma E, Koskenvuo M, Silventoinen K. Sense of coherence and its determinants: a comparative study of the Finnish-speaking majority and the Swedish-speaking minority in Finland. *Scand J Public Health*. 2006;34(5):515–525.
40. Leinonen R, Heikkinen E, Jylhä M. Changes in health, functional performance and activity predict changes in self-rated health: a 10-year follow-up study in older people. *Arch Gerontol Geriatr*. 2002;35(1):79–92.