

Reliability and validity of Mandarin (Simplified) version of Head and Neck Cancer-specific Supportive Care Needs (SCNS-HNC) scale

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Abstract

Background To translate the English version of supportive care needs scale of head and neck cancer patients (SCNS-HNC) questionnaire into Mandarin (Simplified), and to test reliability and validity.

Methods The With authorization of the English version scale were obtained from Professor Irma M. Verdonck-de Leeuw who worked at VU University Medical Center of Cancer Center Amsterdam (CCA), in the Netherlands. The Mandarin (Simplified) version of the SCNS-HNC scale was developed by translation, back-translation and cultural adaptation. The Mandarin (Simplified) version of Supportive Care Needs Survey Short-Form (SCNS-SF34) and SCNS-HNC scales were used to measure 206 patients with head and neck cancer in a upper first-class hospital in Chengdu. Among them, 51 patients were re-tested 2 or 3 days after the first survey. The internal consistency of the scale was evaluated by Cronbach's alpha coefficient, the retest reliability of the scale was evaluated by retest correlation coefficient r , the structural validity of the scale was evaluated by exploratory factor analysis, and the ceiling and floor effects of the scale were evaluated. Item-domain correlation analysis was used to evaluate the collective validity and differential validity of the scale.

Results The Mandarin (Simplified) version of SCNS-HNC had Cronbach's alpha coefficients of more than 0.700 ($0.737 \leq 0.962$) for the all of the domains. Except for the psychological demand dimension of SCNS-SF34 scale, the retest reliability in other fields was more than 0.8. Three common factors were extracted by exploratory factor analysis, and the cumulative variance contribution rate was 64.39%. The correlation coefficient of all items in Mandarin (Simplified) version of SCNS-SF34 and SCNS-HNC with their own domains were higher than those with other domains.

Conclusion The Mandarin (Simplified) of SCNS-HNC demonstrates satisfactory reliability and validity, which is available for measurement of the supportive care needs of Chinese patients with head and neck cancer.

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Background

Cancer is one of the leading causes of death worldwide[1], in recent years, the morbidity and mortality of cancer in china are also on the rise[2]. Research shows[3],In addition to medicine, surgery, chemoradiotherapy and other treatment measures, Cancer patients and their families have a need for supportive care in the management of disease symptoms and side effects, and information about medical decisions during illness and treatment, And patients with different types of cancer have different needs for supportive care[4]. According to incomplete statistics, there are more than 900,000 new cases of head and neck cancer (HNC)in the world every year [5], which is the sixth most common cancer in the world today. China has a high incidence of head and neck cancer, with an annual incidence of about 15.34/100,000 [6], accounting for about 10% of all malignant cancers. During treatment, patients with head and neck cancer often face a series of disease-related symptoms such as nasal congestion, voice hoarse, difficulty in chewing and other diseases, as well as a variety of treating-related symptoms and functional disorders such as taste loss, oral pain, radioactive mucous/dermatitis, difficulty in opening the mouth, difficulty in swallowing and so on [7]. At the same time, patients are often faced with a large number of psychosocial problems such as depression [8], stigma [9], economic difficulties [10], communication difficulties [11], death threats [12], fear of recurrence [13], etc., which seriously affect the quality of life of patients with head and neck cancer. In addition, about 30–50% of HNC patients are associated with varying degrees of malnutrition [14]. At present, there is no special assessment scale for supportive care needs of head and neck cancer patients in China. SCNS - HNC scale (Supportive Care Needs Survey the Head and Neck) is the free university of Amsterdam in the Netherlands medical center Irma m. Verdonck - DE Leeuw professor in 2016, according to the EORTC questionnaire guidelines for patients with Head and Neck cancer Supportive Care Needs

scale. The purpose of this study was to Sinicize the scale and evaluate its reliability and validity in Chinese patients with head and neck cancer, so as to provide a tool for evaluating the supportive care needs of Chinese patients with head and neck cancer.

Methods

Participants

A total of 206 patients with head and neck cancer admitted to a grade a hospital in chengdu from January 2019 to May 2019 were included. Inclusion criteria: residents of mainland China, mainly living in mainland China from birth to participating in this study; The clinicopathologic diagnosis was head and neck carcinoma, including oral, pharynx, larynx, nasal cavity or large salivary adenocarcinoma (with pathological or imaging diagnosis basis); Ability to understand and answer questions; The patient knows the actual condition; Expected survival time ≥ 3 months; Informed consent to participate in this study voluntarily. Exclusion criteria: patients with cognitive impairment, or mental illness; Patients are participating in other psychology-related clinical trials. All patients signed informed consent.

Instruments

Contacted with Irma m. verdonck-de Leeuw, professor of vrije universitat Amsterdam, the developer of the scale, obtained the English version of the scns-hnc scale and technical supporting documents, and made the scale Chinese through standard translation, back translation, cultural debugging and evaluation procedures.

Translation procedure

The translation and back translation process is divided into the following steps: (1) the forward translation is completed independently by two translators who are native speakers of Chinese . The translation results are named as translation 1 and translation 2 respectively. Translator 1 is a master of medicine who knows relevant medical terms and can be adjusted from the perspective of clinical practice to ensure the medical equivalence with the original scale. Translator 2, a master of English major without medical background, mainly translated from the perspective of language to meet the language habits of the general public. (2) synthesis. A M.d., Ph.D. who was not involved in "forward translation" conducted a comparative analysis of the two translated versions (translation 1 and translation 2); If there are any differences, three people shall discuss and coordinate with each other to form the initial translation version, namely translation 3. The key link in this stage is that the integration of all translation differences is formed through the consensus of three people after discussion, not the compromise of one person to the opinion of the majority. (3) back translation: two translators proficient in English and Chinese independently back translate translation 3, forming back translation version 1 and back translation version 2. Back translation translator 1 was a master's student, Back translation translator 2 was a doctoral student, and neither of them knew or was informed of the content and purpose of the scale, and neither of them had a medical background. In order to avoid information deviation and at the same time discover the hidden translation differences of the items in translation 3. Finally, a doctor with a master's degree in medicine will compare the translated English version with the original scale, find out the differences and modify the Chinese version appropriately, and then give it to the translation team for translation, and then compare with the original scale, and repeat until the English version is as similar as possible to the original scale.

Cultural adjustment

According to the characteristics of Chinese culture, some items in the scale are adjusted to fit the Chinese cultural background and context, which is called cultural adjustment. Cultural adjustment has the following two aspects: (1) expert consultation, invite 2 chief physicians, deputy chief physicians and deputy chief nurses of head and neck cancer,

1 medical doctor with overseas study experience, 1 professional English teacher, 1 master of psychology, 1 statistical expert and all translators to form the expert committee. Then, according to the habit and context of Chinese culture, the first draft of SCNS-HNC scale in Chinese is adjusted from four aspects: semantic equivalence, idiom equivalence, empirical equivalence and conceptual equivalence. For example, item 4 "inform nutrition status" was adjusted to "need to know nutrition knowledge", Revised version 1 of the scale in Chinese was formed after adjustment. (2) preliminary investigation. In order to ensure that the language of the scale is easy to understand and accept, 20 head and neck cancer patients whose native language is Chinese are selected from sichuan cancer hospital for preliminary investigation. First, explain the purpose and significance of the survey to the patient in detail, and fill in after obtaining the patient's informed consent; After the completion of the scale, each respondent conducted an interview for about 5-10 minutes, asking whether the content of the scale contained any items with vague meaning and difficult to understand. The understanding and feedback of the pre-respondents on the items were recorded, and the revised version 1 of the Chinese scale was revised and proofread according to the questions reflected in the interview. For example, item 9 "neck or shoulder movement disorder" was modified to "support needs for shoulder and neck movement difficulty" to ensure easy understanding of the scale items, and the Chinese version of the SCNS-HNC scale was finally formed.

Measures

General information questionnaire

Self-designed on the basis of literature review, including two parts: (1) demographic sociology data: Age, gender, nationality, education level, marital status, faith, role of caregiver, long-term residence, etc. (2) data of diseases and treatments: Including cancer type, treatment and so on.

Chinese version of Supportive Care Needs Survey Short-Form (Supportive Care Needs Survey Short-Form=SCNS-SF34)

SCNS-SF34 is a scale to measure the needs of cancer patients, which can be used to measure the supportive care needs of all cancer patients [15]. SCNS-SF34 contains 34 items on a five dimensions: physiological and daily life needs (5 items), psychological needs (10 items), sexual needs (3 items), medical system services and information needs (11 items), patient care and support needs (5 items). The time frame for all entries is the past month, using a likert-5 rating of 1 to 5 points: 1 point means no need , because this entry applies to me; 2 points means a need that has occurred but has been met; Three points means I have a small need for help in this area; four points means I have a 50 percent need for help in this area; five points means I need a lot of help in this area; Calculate the total score of each dimension, Original score according to conversion formula Likert standard total score $= (\text{sum of the original scores for all entries in the dimension} - m) \times \{100 / (m \times (k - 1))\}$, Where m is the number of items contained in the dimension, K is the maximum score of each item, namely 5, Likert standard score between 0 and 100 points, The higher the score, the higher the need degree of this dimension [16].

Chinese version of Supportive Care Needs Survey -Head and Neck cancer SCNS-HNC

The Chinese version of SCNS-HNC scale is the head and neck cancer module of supportive care needs of cancer patients, which is used to determine the specific supportive care needs of patients with head and neck cancer. It should be combined with Chinese SCNS-SF34 scale, To evaluate the general needs of supportive care and the specific needs of head and neck cancer. The scale consists of 11 items and is divided into 3 areas (head and neck function, nutrition/oral hygiene/head and neck activity, lifestyle). The time frame and scoring method are the same as those of SCNS-SF34.

Other PROMS and clinical measures

All HNC patients also completed the Hospital Anxiety and Depression Scale (HADS) [17], and the 10-item Social Support Rating Scale (SSRS) [18] .

Data collection

The researcher introduces the purpose, significance and notes of the questionnaire to the respondents. After obtaining the consent of the respondents and signing the informed consent form, the researchers distributed the scale. Respondents fill in the scale by themselves, If the respondents have visual impairment, physical inconvenience, etc., the researcher will provide unguided assistance. 51 cases were selected from the samples and re-measured 2~3 days later to evaluate the reliability of the scale.

Statistical analysis

Excel2010 was used for data entry, and SPSS21.0 software was used for data statistical analysis. Cronbach's alpha coefficient was used to evaluate the internal consistency of the scale, and the Person correlation coefficient measured twice was used to evaluate the reliability of the scale. It is generally believed that Cronbach's alpha coefficient > 0.7, Indicates that the reliability of the scale retest is good. Exploratory factor analysis was used to evaluate The structural validity of The scale. Bartlett's spherical test and KMO(The Kaiser-Mayer-Olkin) test were required for adaptability test before factor analysis. In factor analysis, it is required that the Chi² value of Bartlett's spherical test results must be statistically significant (P < 0.05). The KMO test is used to investigate the partial correlation between variables, It compares the simple correlation and partial correlation between variables. It is generally believed that KMO statistics >0.5 can be used for factor analysis. Bartlett's spherical test is mainly used to determine the correlation between variables, P < 0.05 can be used for factor analysis. The common factors that can represent the structure of the scale are extracted and the cumulative variance contribution rate of the common factors is obtained. Each common factor is highly correlated with a group of specific variables. These common factors represent the basic structure of the scale, and the cumulative variance contribution rate reflects the cumulative effectiveness of the common factor to the scale [19]. The common factor can explain more than 40% of the variation, Moreover, each entry has a relatively high load value (≥ 0.4) on the corresponding factor, which is an ideal factor analysis result [20]. Item-domain correlation analysis was used to evaluate the set validity and discriminant validity of the scale, Namely, calculate the correlation coefficient of each item and Pearson of each field, If the correlation coefficient between each item and the field is greater than that of other fields, it indicates that the scale has good set validity and discriminant validity. p<0.05 was considered statistically significant. Check for Ceiling effects and Floor effects, If more than 50% of the respondents reach the maximum or minimum extremum of each factor, it means that the factor has ceiling effect and floor effect [21].

Results

characteristicsof participants

In this study, a total of 210 questionnaires were distributed, and 206 questionnaires were effectively recovered, with an effective recovery rate of 98.0%. Among the 206 patients, 125 were male and 81 were female. The mean age was 47.29±12.678 years (age range 16~77 years). General information and clinical information of the patients are shown in table 1

The reliability

The reliability of the scale was investigated from two aspects: internal reliability and retest reliability. According to the analysis, Cronbach's alpha coefficient ranges from 0.737 to 0.962 in each field of the scale in this study, the correlation coefficient of the retest was greater than 0.8 except for the psychological dimension was 0.674.

Validity

The structural validity and discriminant validity of the scale were evaluated from ceiling effect, exploratory factor analysis and item-domain correlation analysis.

Ceiling floor effect and exploratory factor analysis

Exploratory factor analysis showed that Bartlett's spherical test difference was statistically significant ($\text{Chi}^2 = 1051.123$, $P < 0.0001$), the KMO value is 0.759, indicating that the data is suitable for factor analysis. Common factors were extracted by principal component analysis and rotated with the maximum variance. The entries of each main item and its entry factor load, and the ceiling effect and floor effect were shown in table 3.

The Chinese version of SCNS-HNC scale extracted three principal components through factor analysis, and the cumulative variance contribution rate was 64.390%. The three main components are: (1) The first main component mainly reflects the patient's head and neck special chewing/swallowing, dry mouth/sticky saliva, speaking, hearing, trachea incision or aided articulation device functions and symptoms, and support care for weight problems closely related to transoral eating. Variance contribution rate was 38.084%. (2) The second main component reflects the patients' needs for nutrition information, oral hygiene, and head and neck movement disorders, with a variance contribution rate of 15.985%. (3) The third main component reflects the support needs of patients in smoking and drinking, and the variance contribution rate is 10.321%. In the theoretical model, the SCNS-HNC scale is composed of 11 items in two fields. According to the statistical method, the principal components proposed are mostly consistent with the design, and it can be considered that the specific module structure validity is better. No ceiling effect or floor effect appeared in each common factor.

item - domain correlation analysis

According to the results of item-domain correlation analysis, the correlation coefficient between each item and its domain is relatively high, while the correlation between each item and other domains is significantly lower than that of this domain, as shown in table 4.

Correlation analysis of structural domain between SCNS-SF34 and SCNS-HNC scale

Except that the correlation coefficient r of medical system services and information demand and nutrition/oral health/shoulder and neck activity was 0.542, the correlation of structural domain between SCNS-HNC and SCNS-SF34 was relatively low ($r < 0.5$). The structure domain of SCNS-HNC is positively correlated with that of SCNS-SF34, as shown in table 5.

Clinical validity

The Mann-Whitney U test was used to compare the mean scores of each domain between the two age groups (292 cases < 65 and 101 cases ≥ 65 , Rural and city/town). No significant differences were found regarding age or region, as shown in Table 6. except for the lifestyle dimension, which is not statistically significant, all others domains of the SCNS-SF34-C (Mandarin) mostly had significant correlations with the HADS. And there were some significant weak correlations between the SSRS and the psychological, patient care and support domains of the SCN-SF34.

Discussion

The necessity and significance of introducing SCNS-HNC scale

China is a large country in the incidence of head and neck cancer, and head and neck cancer anatomically includes the head, face, ear, nose, throat, mouth, thyroid and other parts (from skull base to supraclavicular, excluding cervical vertebra) [22,25]. The head has the eyes, ears, nose, tongue, throat and other important organs; In addition, the head and face have a great impact on the appearance and image of patients [23]. Although the survival rate of patients with head and neck cancer has increased gradually with the improvement of medical technology. However, due to the anatomic characteristics of head and neck cancer and the way of disease treatment, patients with head and neck cancer still face many difficulties and problems in the treatment and rehabilitation period, and need the support and help of medical staff. The Chinese version of SCNS-HNC scale can provide an assessment tool for the needs and degrees of head and neck cancer patients in China, and then provide the basis for corresponding support for patients. On the other hand, it can also promote the development of cross-cultural research comparing the supportive care needs of head and neck cancer patients in different countries.

The Chinese version of SCNS-HNC scale has good reliability and validity

The results of reliability evaluation of the scale in this study showed that the Cronbach's alpha coefficients of the Chinese version of the SCNS-HNC scale and the Chinese version of the SCNS-SF34 were >0.7 ($0.737\sim 0.962$) in each domain, suggesting that the internal consistency of the scale was good; it was similar to the Cronbach's alpha coefficient range ($0.60\sim 0.89$) of the original SCNS-HNC scale, indicating that there was no significant cultural difference after the Chinese version of the scale, and the Chinese version of the SCNS-HNC could be understood by patients. Except for the dimension of psychological needs of scns-sf34, the reliability of retest in other fields was > 0.8 , suggesting that the time stability of the scale was good.

The original SCNS-HNC scale was composed of head and neck specific ability, problems and lifestyle. However, the Chinese version of the SCNS-HNC scale extracted three common factors through exploratory factor analysis, and the cumulative variance contribution rate was 64.39%. In addition, some items have relatively high loading coefficients on the principal components, while others have relatively low loading coefficients on the other principal components, It may be related to the different cultural background and medical environment of China and the Netherlands and the different focus of patients, and it may be related to the unstable structure of the original scale [24]. In addition, patients with head and neck cancer have specific taste/smell, cough and dyspnea problems, the SCNS-HNC scale can be updated by further multidisciplinary discussion. The Chinese version of SCNS-HNC scale has no ceiling effect or floor effect. The results of item-domain correlation analysis show that the correlation between items in the domain and other domain is significantly lower than that between items in the domain and this domain. This indicates that the Chinese version of SCNS-HNC scale has a high degree of differentiation in each item and domain, a reasonable structure, and a good reliability and validity. Except that the correlation coefficient r of medical system services and information demand and nutrition/oral health/shoulder and neck activity was 0.542, the correlation of structural domain between SCNS-HNC and SCNS-SF34 was relatively low ($r < 0.5$). The structure domain of SCNS-HNC is positively correlated with that of SCNS-SF34.

Conclusion

To sum up, the Chinese version of the SCNS-HNC scale was Sinicized in this study, and the reliability and validity of the Chinese version were tested. The results showed that the Chinese version of the SCNS-HNC scale had good reliability and validity. The Chinese version of SCNS-HNC scale is concise and clear, easy to understand and to be accepted by patients, which can be used to investigate the supportive care needs of Chinese patients with head and neck cancer, and provide basis for medical staff to timely understand patients' needs and adopt targeted medical care support. Although this study followed the principle that the sample size was 5 to 10 times of the number of items, but as a result

of this research limitations in patients with a tumor hospital in chengdu in sichuan province, and using the convenience sampling method, may affect the representation of the survey population, Therefore, it is suggested that follow-up studies should expand the sample and scope, adopt more reasonable sampling methods, and further verify and develop Chinese version of SCNS-HNC scale.

Declarations

Ethics approval and consent to participate

This study was approved by the Sichuan Cancer Hospital Ethics Committee and the project number was IIT2019007.

Consent for publication

Not applicable.

Availability of data and materials

The datasets generated and/or analysed during the current study are not publicly available due individual privacy but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no conflict of interest.

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Authors' contributions

Lyu Jianxia and Yin Li is contribute for design and thesis writing.

Cheng Ping, Li Bin, Yang Chunlian and Yang Jing is contribute for questionnaire survey and data collection.

Liang Haixin and Peng Shanshan is contribute for data analysis.

Jiang Qinghua is contribute for all the research's arrange.

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Footnotes

Not applicable.

Abbreviations

SCNS-SF34: Supportive Care Needs Survey Short-Form 34

SCNS-HNC: Head and Neck Cancer-specific Supportive Care Needs

HADS: Hospital Anxiety and Depression Scale

SSRS: Social Support Rating Scale

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Tables

Table 1 Socio-demographic and clinical characteristics of the study samples(*n*206)

Characteristic	Number/Percent
Age in years mean(<i>SD</i> ,range)	47.29±12.678,16-77
Gender	
Male	125(60.68)
Female	81(39.32)
Ethnics	
Han	195(94.66)
Others	11(5.34)
Educational status	
Primary school	34(16.50)
Middle school	104(50.49)
Polytechnic school	41(19.90)
College and above	27(13.11)
Marital status	
Single	28(13.59)
Married/cohabiting	169(82.04)
Divorced/separated	5(2.43)
Widowed	4(1.94)
Religion	
No religious beliefs	181(87.86)
Buddhism	17(8.25)
Christianity	6(2.91)
Others	2(0.97)
Long-term residence	
Rural	72(34.95)
City/town	134(65.05)
Employment status	
Employed	44(21.36)
Retired	28(13.59)
Unemployed	134(65.05)
Caregiver role	
spouse	133(64.56)
children	32(15.53)
Others	41(19.91)
Cancer types	
Oral cavity	18(8.74)
Pharynx	117(56.80)
Larynx	20(9.71)
Nasal cavity	14(6.80)
Major salivary glands	37(17.96)
Treatment ,ongoing or past 2months	
Surgery	18(8.74)
Radiotherapy	32(15.53)
Surgery and chemoradiation	33(16.02)
Surgery and radiation	22(10.68)
Surgery and chemotherapy	9(4.37)
Chemoradiation	92(44.66)

Table 2 Floor and ceiling effects of the SCNS-HNC and suggested factor structure in head and neck cancer patients (n = 206)

Item	Lowest Score (%)	Highest Score (%)	Factor loading ^a		
			1	2	3
HNC-specific functioning					
1. Problems with chewing and or swallowing	22.3	17.5	0.687		
2. Problems with dry mouth and/or sticky mucus	11.2	22.8	0.643		
3. Problems with weight (underweight or overweight)	24.3	8.7	0.712		
5. Difficulty speaking	42.2	11.7	.0739		
6. Care of your stoma and/or voice prosthesis	63.1	6.3	0.688		
Nutrition, oral hygiene and mobility of shoulder or neck					
4. To be informed on nutrition	8.3	35.4		0.825	
8. Oral hygiene	12.6	29.1		0.836	
9. Problems with mobility of neck or shoulders	33.5	14.6		0.507	
Lifestyle					
10. Quit smoking	63.6	7.3			0.961
11. Quit drinking	65.0	6.8			0.950
7. Problems with hearing	44.7	6.8			
Eigenvalue			4.189	1.758	1.135
Variance			38.084	15.985	10.321
Cronbach's α			0.787	0.737	0.962

^a Loadings > 3 are presented, and main (i.e. highest) loading is italicized

Table 3 Internal consistency and test-retest reliability of the SCNS-SF34 and SCNS-HNC (n = 206 for α , n = 51 for r)

Domains/scales/items	Number of items	Cronbach's α coefficients	Correlation coefficients r*
SCNS-SF34			
Physical and daily living	5	0.769	0.809
Psychological	10	0.866	0.674
Sexuality	3	0.752	0.885
Health system information	11	0.891	0.841
Patient care and support	5	0.840	0.835
SCNS-HNC			
HNC-specific functioning	6	0.789	0.870
Nutrition, oral hygiene and mobility of shoulder or neck	3	0.737	0.941
Lifestyle	2	0.962	0.870

* All correlation coefficients r are statistically significant ($P < 0.05$).

Table 4 Correlation coefficients (absolute value) among multi-items domains and items of the SCNS-SF34 and SCNS-HNC (n = 206)

Item	PD	PS	SE	HI	PC	HNC-SF	NO	LI
Q1	0.750	0.457	0.166	0.196	0.194	0.355	0.274	0.049 ^a
Q2	0.739	0.440	0.232	0.219	0.236	0.325	0.273	0.126 ^a
Q3	0.725	0.516	0.184	0.350	0.390	0.288	0.334	0.194
Q4	0.668	0.336	0.232	0.243	0.215	0.207	0.227	0.016 ^a
Q5	0.722	0.465	0.276	0.224	0.238	0.277	0.254	0.118 ^a
Q6	0.558	0.709	0.234	0.345	0.350	0.237	0.245	-0.005 ^a
Q7	0.288	0.276	0.156	0.224	0.179	0.108 ^a	0.125 ^a	-0.027 ^a
Q8	0.505	0.749	0.251	0.411	0.365	0.227	0.323	0.033 ^a
Q9	0.416	0.748	0.204	0.429	0.445	0.290	0.370	0.190
Q10	0.368	0.794	0.217	0.502	0.450	0.268	0.372	0.118 ^a
Q11	0.426	0.779	0.227	0.437	0.372	0.276	0.319	0.133 ^a
Q12	0.459	0.807	0.240	0.489	0.475	0.291	0.358	0.114 ^a
Q13	0.422	0.702	0.113 ^a	0.477	0.461	0.289	0.367	0.180
Q14	0.356	0.616	0.299	0.276	0.300	0.190	0.220	0.121 ^a
Q15	0.309	0.310	0.863	0.106 ^a	0.122 ^a	0.356	0.148	0.225
Q16	0.351	0.292	0.858	0.150	0.65	0.336	0.181	0.245
Q17	0.344	0.532	0.326	0.446	0.422	0.307	0.329	0.210
Q18	0.279	0.472	0.229	0.590	0.500	0.175	0.178	0.132 ^a
Q19	0.299	0.422	0.259	0.650	0.561	0.258	0.292	0.094 ^a
Q20	0.311	0.457	0.159	0.650	0.820	0.320	0.394	0.132 ^a
Q21	0.286	0.461	0.149	0.673	0.866	0.285	0.391	0.095 ^a
Q22	0.264	0.493	0.119 ^a	0.656	0.815	0.280	0.371	0.080 ^a
Q23	0.266	0.461	0.069 ^a	0.688	0.661	0.238	0.431	-0.022 ^a
Q24	0.290	0.510	0.077 ^a	0.729	0.603	0.295	0.458	0.073 ^a
Q25	0.232	0.472	0.049 ^a	0.724	0.543	0.188	0.392	0.101 ^a
Q26	0.235	0.299	0.162	0.761	0.546	0.318	0.371	0.170
Q27	0.240	0.322	0.158	0.782	0.552	0.284	0.396	0.196
Q28	0.209	0.330	0.134 ^a	0.741	0.513	0.228	0.330	0.139
Q29	0.174	0.360	0.026 ^a	0.668	0.474	0.173	0.449	0.138
Q30	0.142	0.382	0.146	0.629	0.511	0.325	0.418	0.094 ^a
Q31	0.097 ^a	0.193	0.730	0.209	0.236	0.234	-0.007	0.265
Q32	0.257	0.391	0.213	0.586	0.683	0.332	0.384	0.226
Q33	0.256	0.369	0.199	0.555	0.721	0.224	0.303	0.091 ^a
Q34	0.234	0.411	0.169	0.705	0.665	0.345	0.441	0.148
HNCQ1	0.317	0.311	0.227	0.348	0.337	0.758	0.411	0.186
HNCQ2	0.347	0.301	0.194	0.337	0.309	0.756	0.476	0.173
HNCQ3	0.305	0.296	0.268	0.273	0.250	0.760	0.411	0.185
HNCQ4	0.281	0.373	0.061 ^a	0.548	0.434	0.354	0.787	0.063 ^a
HNCQ5	0.323	0.294	0.307	0.277	0.314	0.788	0.436	0.205
HNCQ6	0.193	0.149	0.440	0.131 ^a	0.140	0.596	0.199	0.328
HNCQ7	0.181	0.242	0.278	0.263	0.283	0.406	0.351	0.231
HNCQ8	0.352	0.381	0.007 ^a	0.469	0.404	0.438	0.869	0.199
HNCQ9	0.284	0.329	0.229	0.311	0.315	0.490	0.775	0.253
HNCQ10	0.156	0.161	0.290	0.175	0.176	0.252	0.201	0.983
HNCQ11	0.152	0.146	0.303	0.146	0.139	0.302	0.221	0.981

Note. PD=Physical and daily living; PS=Psychological; SE=Sexuality; HI=Health system information; PC=Patient care and support; HNC-SF=HNC-specific functioning; NO=Nutrition, oral hygiene and nobility of shoulder or neck; LI=Lifestyle.

^a Not statistically significant ($p > 0.05$). Bold values represent correlation coefficients among items and there own domains.

Table 5 Correlations between the SCNS-SF34 and SCNS-HNC scales (n =206)

Item	Physical and daily living	Psychological	Sexuality	Health system information	Patient care and support
HNC-specific functioning	0.404	0.368	0.375	0.372	0.369
Nutrition, oral hygiene and mobility of shoulder or neck	0.378	0.445	0.125 ^a	0.542	0.472
Lifestyle	0.157	0.156	0.302	0.164	0.161

^a Not statistically significant ($p > 0.05$); all unmarked are statistically significant.

Table 6 Known-groups validity of the the SCNS-SF34 and SCNS-HNC (n = 206)

Domain	[65-189]		≥65(17)		P value*	Rural(72)		City and town(134)		
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	P value*
SCNS-SF34										
Physical and daily living	44.44	21.723	37.94	26.224	0.247	44.24	21.007	43.73	22.783	0.876
Psychological	53.19	22.088	45.29	26.837	0.167	52.92	20.988	52.33	23.416	0.860
Sexuality	23.69	25.541	13.65	20.371	0.117	23.36	23.656	22.60	26.172	0.837
Health system information	62.20	22.295	63.63	23.399	0.801	62.47	20.834	62.24	23.174	0.946
Patient care and support	56.24	24.774	57.35	23.725	0.859	52.92	24.961	58.17	24.353	0.145
SCNS-HNC										
HNC-specific functioning	42.25	24.108	43.82	27.245	0.799	39.10	19.864	44.14	26.297	0.156
Nutrition, oral hygiene and mobility of shoulder or neck	55.11	28.016	56.86	28.448	0.806	51.39	26.13	57.34	28.814	0.146
Lifestyle	18.72	30.253	16.91	29.627	0.814	15.97	28.086	19.96	31.193	0.366

Note. Higher scores indicate higher levels of supportive care needs.