

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

Jianxia LYU

Sichuan Cancer Hospital & Institute, Sichuan Cancer Center, School of Medicine, University of Electronic Science and Technology of China

Li Yin

Department of Radiation Oncology, Sichuan Cancer Hospital & Institute, Sichuan Cancer Center, School of Medicine, University of Electronic Science and Technology of China

Ping Cheng

Department of Radiation Oncology, Sichuan Cancer Hospital & Institute, School of Medicine, University of Electronic Science and Technology of China

Bin Li

Sichuan Cancer Hospital and Research Institute

Shanshan Peng

Department of Radiation Oncology, Sichuan Cancer Hospital & Institute, Sichuan Cancer Center, School of Electronic Science and Technology of China

Chunlian Yang

Department of Radiation Oncology, Sichuan Cancer Hospital & Institute, Sichuan Cancer Center, School of Medicine, University of Electronic Science and Technology of China

Jing Yang

Department of Radiation Oncology, Sichuan Cancer Hospital & Institute, Sichuan Cancer Center, School of Medicine, University of Electronic Science and Technology of China

Haixin Liang

Department of Radiation Oncology, Sichuan Cancer Hospital & Institute, Sichuan Cancer Center, School of Medicine, University of Electronic Science and Technology of China

Qinghua Jiang (✉ jqh8859@163.com)

Research article

Keywords: head and neck cancer; support care needs; reliability; validity; SCNS-HNC scale

Posted Date: April 16th, 2020

DOI: <https://doi.org/10.21203/rs.2.20861/v2>

License: © ⓘ This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Background: This Please include the affiliation of each author, including the department, institution, city, state (if applicable), country, postal code here. Study aimed to translate the English version of the supportive care needs scale of head and neck cancer patients (SCNS-HNC) questionnaire into Mandarin and to test its reliability and validity.

Methods: The Mandarin version of the Supportive Care Needs Survey Short-Form (SCNS-SF34) and SCNS-HNC scales were used to assess 206 patients with head and neck cancer in Chengdu, China. 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.

Results: The Mandarin (Simplified) version of the SCNS-HNC had Cronbach's alpha coefficients greater than 0.700 ($0.737 \leq 0.962$) for all of the domains. Except for the psychological demand dimension ($r=0.674$) of the SCNS-SF34 scale, the retest reliability of the other domains was greater than 0.8. Three common factors were extracted by exploratory factor analysis, and the cumulative variance contribution rate was 64.39%.

Conclusions: The Mandarin version of the SCNS-HNC demonstrated satisfactory reliability and validity and is able to measure the supportive care needs of Chinese patients with head and neck cancer.

Clinical registration number: ChiCTR1900026635

Background

Cancer is one of the leading causes of death worldwide [1]; in recent years, the morbidity and mortality of cancer in China have also increased [2]. Research shows [3] that 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, especially information about medical decisions during illness and treatment. 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], and HNC 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 approximately 15.34/100,000 [6], accounting for approximately 10% of all malignant cancers. Head and neck cancer anatomically include cancers of the head, face, ear, nose, throat, mouth, thyroid and other parts (from the base of the skull to supraclavicular region, excluding cervical vertebra) [7]. The head contains the eyes, ears, nose, tongue, throat and other important organs. Although the survival rate of patients with head and neck cancer has increased gradually with the improvement of medical technology, during treatment, patients often face a series of disease-related symptoms, such as nasal congestion, hoarse voice, difficulty chewing and other diseases, as well as a variety of treatment-related symptoms

and functional disorders, such as taste loss, oral pain, radioactive mucositis/dermatitis, difficulty opening the mouth, and difficulty swallowing [8]. The head and face also have a great impact on the appearance and image of patients [9]. Additionally, patients are often faced with a large number of psychosocial problems, such as depression [10], stigma [11], economic difficulties [12], communication difficulties [13], death threats [14], and fear of recurrence [15], which seriously affect the quality of life of patients with head and neck cancer. In addition, approximately 30-50% of HNC patients are associated with varying degrees of malnutrition [16]. At present, there is no special assessment scale for the supportive care needs of head and neck cancer patients in China. The Supportive Care Needs Survey of Head and Neck Cancer (SCNS - HNC) scale is an HNC-specific module that was developed on the basis of the 34-item Short-Form Supportive Care Needs Survey (SCNS-SF34). The SCNS - HNC was developed by Professor Irma m. Verdonck - DE Leeuw, a professor from VU University of Amsterdam in the Netherlands Medical Center, in 2016. The SCNS-HNC scale consists of 11 items and has been tested in the Netherlands. The purpose of this study was to Sinicize the scale and evaluate its reliability and validity in Chinese patients with head and neck cancer to provide a tool for evaluating the supportive care needs of Chinese patients with head and neck cancer.

Methods

Instruments

Irma M. Verdonck-de Leeuw, professor of Vrije Universitat Amsterdam and the developer of the scale, was contacted to obtain the English version of the SCNS - HNC scale and technical supporting documents, scale was translated into Chinese through standard translation, back translation, cultural debugging and evaluation procedures.

Translation procedure

The translation and back translation processes were divided into the following steps: (1) The forward translation was completed independently by two translators who are native speakers of Chinese. The translation results were named translation 1 and translation 2. Translator 1 was a Master of Medicine who knows relevant medical terms and can adjust terms from the perspective of clinical practice to ensure medical equivalence with the original scale. Translator 2, a master of English major without a medical background, mainly translated from the perspective of language to consider the language habits of the general public. (2) The synthesis was performed by an M.D. who was not involved in the "forward translation" and who conducted a comparative analysis of the two translated versions (translation 1 and translation 2). If there were any differences, three people discussed and coordinated with each other to decide on the translation version, namely, translation 3. (3) Back translation was then performed. Two translators proficient in English and Chinese independently back translated 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. Neither of them knew or was informed of the content or purpose of the scale, and neither of them had a medical background 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 compared the translated English version with the original scale, determined the differences and modified the Chinese version appropriately; then, the doctor gave it to the translation team for translation, compared it with the original scale, and repeated it until the English version was as similar as possible to the original scale.

Cultural adjustment

According to the characteristics of the Chinese culture, some items in the scale were adjusted to fit the Chinese cultural background and context, which was called cultural adjustment. Cultural adjustment had the following two aspects: (1) The first aspect was expert consultation. Two 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 were invited to form the expert committee. Then, according to the habits and context of Chinese culture, the first draft of the SCNS-HNC scale in Chinese was adjusted from four aspects: semantic equivalence, idiomatic equivalence, empirical equivalence and conceptual equivalence. For example, item 4 "inform nutrition status" was adjusted to "need to know nutrition knowledge". The revised version 1 of the Chinese scale was formed after adjustment. (2) Then, preliminary investigation was performed. To ensure that the language of the scale was easy to understand and accept, 20 head and neck cancer patients whose native language is Chinese were selected from Sichuan Cancer Hospital for preliminary investigation. First, we explained the purpose and significance of the survey to the patient in detail, and in the patients completed the survey after providing informed consent. After the completion of the scale, each respondent participated in an interview for approximately 5-10 minutes, discussing whether the content of the scale contained any items with vague meaning that was difficult to understand. The understanding and feedback of the pre-respondents on the items were recorded, and version 1 of the Chinese scale was revised and proofread according to the answers to the interview questions. 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.

Sample and setting

The SCNS-HNC has a total of 11 items. According to the factor analysis requirements for sample size, the sample size should not be too small, and the proportion of sample size to basic variables should be above 5:1. The ideal sample size should be 10-25 times the number of variables [17], considering no response bias, and the sample size should be increased by 10%. Therefore, the ideal sample size = $11 * (10 \sim 25) * (1 + 10\%) = 121 \sim 302$.

A convenience sample of head and neck patients from Sichuan Cancer Hospital was recruited from inpatient treatment (surgery, chemotherapy and radiotherapy) and outpatient radiotherapy populations between January 2019 and May 2019. The inclusion criteria were as follows: (1) residents of mainland China, mainly living in mainland China from birth to participation in this study; (2) patients with a

clinicopathologic diagnosis of head and neck carcinoma, including oral, pharynx, larynx, nasal cavity or large salivary adenocarcinoma (with a pathological or imaging diagnostic basis); (3) patients with an ability to understand and answer questions; (4) patients in whom the actual condition is known; (5) patients with an expected survival time ≥ 3 months; and (6) patients who provided informed consent to participate in this study voluntarily. The exclusion criteria were as follows: (1) patients with cognitive impairment or mental illness and (2) patients participating in other psychology-related clinical trials. All patients signed informed consent forms. This study was approved by the Sichuan Cancer Hospital Ethics Committee.

Measures

General information questionnaire

The study was self-designed based on a literature review and included two parts: (1) sociodemographic data: age, sex, nationality, education level, marital status, faith, role of caregiver, and long-term residence and (2) data on diseases and treatments, including cancer type, treatment and adverse reactions.

The Chinese version of 34-item Short-Form Supportive Care Needs (SCNS-SF34)

The SCNS-SF34 is a scale to measure the needs of cancer patients and can be used to measure the supportive care needs of all cancer patients [18]. The SCNS-SF34 contains 34 items in 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), and patient care and support needs (5 items). The time frame for all entries is the past month, and the questions are answered using a Likert-type scale ranging from 1 to 5 points (1 point means no need because this entry does not apply to me; 2 points means a need that has occurred but has been met; 3 points means a small need for help in this area; 4 points means a 50 percent need for help in this area; 5 points means a substantial need for help in this area). The total score was calculated for each dimension. The original score was calculated according to the following 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, and K is the maximum score of each item, namely, 5. The Likert standard score was between 0 and 100 points: the higher the score, the higher the degree of need in this dimension [19].

Chinese version of the Supportive Care Needs Survey-Head and Neck Cancer (SCNS-HNC)

The Chinese version of the SCNS-HNC scale is the head and neck cancer module of the supportive care needs of cancer patients, which is used to determine the specific supportive care needs of patients with head and neck cancer. The SCNS-HNC should be combined with the Chinese SCNS-SF34 scale to evaluate the general needs of supportive care and the specific needs of head and neck cancer. The time frame and scoring method are the same as those of the SCNS-SF34.

Data collection

The head nurse and a trained survey interviewer of each department (head and neck surgery ward, head and neck radiotherapy ward, outpatient radiotherapy department) identified eligible participants from the inpatient treatment (surgery, chemotherapy and radiotherapy) and outpatient radiotherapy list of Sichuan Cancer Hospital. Eligible patients were informed about the study by the head nurse or the interviewer and were assured that the quality of healthcare would not change regardless of whether they participated in the study. After giving informed consent, patients were asked to complete a self-report pen-and-paper questionnaire in the ward or waiting areas of the outpatient radiotherapy departments. If the patient had difficulty reading or writing (visual impairment, physical inconvenience), the interviewer would help to complete the survey by asking the question from the questionnaire. When the questionnaire was completed, the study investigators checked it thoroughly and clarified any missing responses with the patient immediately. The questionnaires were re-administered to the head and neck cancer patients 2-3 days later to evaluate the reliability of the scale.

Statistical analysis

Excel[®]Microsoft Office Home and Student 2019[®] was used for data entry, and SPSS 21.0 software was used for data statistical analysis. Exploratory factor analysis (EFA, principal component analysis with oblique rotation) [20] was used to evaluate the structural validity of the scale. Bartlett's spherical test and the KMO (Kaiser-Mayer-Olkin) test were required for the adaptability test before factor analysis. In factor analysis, it is required that the χ^2 value of Bartlett's spherical test results be statistically significant ($P < 0.05$). The KMO test is used to investigate the partial correlation between variables, and 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 was mainly used to assess the correlations between variables, and $P < 0.05$ was used for factor analysis. The common factors that can represent the structure of the scale were extracted, and the cumulative variance contribution rate of the common factors was obtained. Each common factor was 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 [21]. 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 [22]. In the assessment of ceiling effects and floor effects, if more than 50% of the respondents reached the maximum or minimum extremum of each factor, it means that the factor has a ceiling effect and floor effect, respectively [23].

Cronbach's alpha coefficient was used to evaluate the internal consistency of the scale, and test-retest reliability was measured by the Pearson correlation coefficient between the first and second assessments among the patients ($r > 0.8$ was considered acceptable). It is generally believed that Cronbach's alpha coefficient > 0.7 indicates that the retest reliability of the scale is good [24].

Construct validity was assessed by correlations between the SCNS-SF34 and SCNS-HNC (scores <0.4 indicating no undue overlap between the two questionnaires). The independent-samples t test (two-tailed)

was used to compare the mean scores of each domain between two age groups. Based on previous studies, it was expected that younger patients (18-60 years) would report a higher level of need than older patients (>60) in all domains except for the physiological domain [25]; males reported a higher level of sexual needs than females [26].

Results

Characteristics of 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). The general information and clinical information of the patients are shown in Table 1.

Exploratory factor analysis and ceiling and floor effects

The Kaiser-Meyer-Olkin (KMO) statistic (0.759) exceeded the threshold of 0.5, and Bartlett's test was significant ($\chi^2 = 1051.123$, $P < 0.001$), indicating that the data were suitable for factor analysis. The EFA (principal component analysis with direct oblimin rotation, rotation converged in 9 iterations) was performed. Item 6 had cross loads, and the factor loadings of item 7 and item 9, "Problems with hearing" and "Problems with mobility of neck or shoulders", were lower on every factor. Item 7 was removed. Then, EFA was repeated with the remaining 10 items. The results were acceptable without cross loading. Bartlett's sphericity test was statistically significant ($\chi^2 = 987.630$, $P < 0.001$), and the KMO value was 0.50. As shown in Table 2, a three-factor structure was identified from the Chinese version of the SCNS-HNC scale, and the cumulative variance contribution rate was 68.266%.

Factor 1 comprised 5 items related to the patient's head and neck in regard to chewing/swallowing, dry mouth/sticky saliva, speaking, trachea incision or aided articulation device functions and symptoms, and support care for weight problems closely related to transoral eating, accounting for 39.378% of the variance. Factor 2 comprised 2 items regarding the support needs of patients in regard to smoking and alcohol consumption, and the variance contribution rate was 17.566%. Factor 3 comprised 3 items regarding the patients' needs for nutrition information, oral hygiene, and head and neck movement disorders, with a variance contribution rate of 11.322%. No ceiling effect or floor effect appeared.

Reliability

As shown in Table 3, the reliability of the scale was investigated from two aspects: internal reliability and retest reliability. According to the analysis, Cronbach's alpha coefficient ranged from 0.737 to 0.962 in each field of the scale, and the correlation coefficient of the retest assessment was greater than 0.8, except for that of the psychological dimension, which was 0.674.

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

Apart from the correlation coefficient r of medical system services and information demand and nutrition/oral health/shoulder and neck activity of 0.542, the correlation of the structural domain between the SCNS-HNC and SCNS-SF34 was relatively low ($r < 0.5$). The structural domain of the SCNS-HNC was positively correlated with that of the SCNS-SF34, as shown in Table 4.

Clinical validity

As shown in Table 5, the independent-samples t test (two-tailed) was used to compare the mean scores of each domain between the two age groups (73 patients 18-60 years old and 33 patients >60 years old, 124 males and 81 females). Younger patients and males had higher sexual needs than older patients ($P=0.007$) and female patients ($P=0.028$).

The older patients had a higher level of need in the health system information domain ($P=0.066$), and males had higher lifestyle needs than female patients ($P=0.000$).

Discussion

In this study, we translated and examined the psychometric properties of the SCNS-HNC in terms of assessing supportive care needs in cancer patients in mainland China. The Chinese version of the SCNS-HNC scale can provide an assessment tool for the needs and degrees of needs of head and neck cancer patients in China and provide the basis for appropriate 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 original SCNS-HNC scale had a two-factor structure, namely, HNC-specific functioning and lifestyle [27]. However, the Chinese version of the SCNS-HNC scale has three dimensions, and the cumulative variance contribution rate was 64.39%. This difference may be related to the different cultural backgrounds and medical environments of China and the Netherlands and the different focus of patients, and it may also be related to the unstable structure of the original scale [27]. In addition, patients with head and neck cancer have specific taste/smell, cough and dyspnoea problems, and the SCNS-HNC scale can be updated by further multidisciplinary discussion. The Chinese version of the SCNS-HNC scale had no ceiling effect or floor effect. During the exploratory factor analysis, cross loading occurred. After the discussion between the researchers and the team [28], item 7, "Problems with hearing", was removed. This may be related to the length of treatment for hearing problems in patients with head and neck cancers. Hearing loss in head and neck cancer patients can occur six months to five years after treatment [29]. Most of the included patients in this study were in the treatment period and may not have hearing problems or the problems may not be serious.

The internal consistency (Cronbach's α) should be at least 0.7, and test-retest reliability (r) should be above 0.8 [30]. The results of the 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 (0.737~0.962) in each domain, suggesting that the internal consistency and

stability in different populations of the scale were acceptable. The result was similar to the Cronbach's alpha coefficient range (0.60~0.89) of the original SCNS-HNC scale, indicating that there was no significant cultural difference in the Chinese version of the scale, and the Chinese version of the SCNS-HNC could be understood by patients. Except for the psychological dimension (0.674) of the SCNS-SF34, the test-retest reliability in the other dimensions was > 0.8 , suggesting that the time stability of the scale was good. The psychological domain consists of 10 items: anxiety, down or depressed feelings, feelings of sadness, fears about the cancer spreading, worry that the results of treatment are beyond your control, uncertainty about the future, feeling in control of your situation, keeping a positive look, feelings about death and dying, and concerns about the worries of those close to you. The low test-retest reliability coefficients may be caused by heterogeneity in the ten items. In addition, this may also be related to the introverted personality of Chinese people [31].

For concurrent validity, except for the correlation coefficient r of medical system services and information demand and nutrition/oral health/shoulder and neck activity of 0.542, the correlation of the structural domain between the SCNS-HNC and SCNS-SF34 was relatively low ($r < 0.5$). The structural domain of the SCNS-HNC was positively correlated with that of the SCNS-SF34. These results indicated the independence of the SCNS-HNC and SCNS-SF34. In terms of clinical validity, in our study, younger patients had higher sexual needs than older patients ($P=0.007$), and the older patients had a higher level of need in the health system information domain ($P=0.066$). Males had higher lifestyle ($P=0.000$) and sexual ($P=0.028$) needs than female patients. Except in the domain of sexual needs, the results of our study by age and sex differed from those of previous studies [32,33]. A possible explanation is that young people are more likely to obtain medical information from online sources than elderly people, so the elderly patients have a higher demand for medical information [34]. In regard to lifestyle, most females lead relatively healthy lifestyles [35], while males may need more help with their lifestyles, especially in regard to smoking and alcohol consumption.

Conclusion

In summary, 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 the SCNS-HNC scale is concise, clear, easy to understand and accepted by patients, and it can be used to investigate the supportive care needs of Chinese patients with head and neck cancer and provide a basis for medical staff to understand patients' needs and adopt targeted medical care support in a timely manner. Although this study followed the principle of a sample size 10- to 25-times the number of items, a limitation of this study conducted in patients with a tumour treated in a hospital in Chengdu in Sichuan Province was the use of a convenience sampling method, which may affect the representativeness of the survey population. Therefore, it is suggested that follow-up studies expand the sample and scope, adopt more reasonable sampling methods, and further verify and develop the Chinese version of the SCNS-HNC scale.

List Of Abbreviations

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

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

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 in the current study are not publicly available due to individual privacy but are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

This research was funded by the Sichuan Provincial Health Research Project of the Sichuan Provincial Health Committee, NO. 19PJ142, Science and technology department of sichuan province 2020 research project, NO. 20MZGC0181 and NO. 20ZDYF1869.

Authors' contributions

Lyu Jianxia and Yin Li contributed to the design and manuscript writing.

Cheng Ping, Li Bin, Yang Chunlian and Yang Jing contributed to the questionnaire survey and data collection.

Liang Haixin and Peng Shanshan contributed to the data analysis.

Jiang Qinghua contributed to the research arrangements.

Acknowledgements

The authors would like to thank Professor Irma M. Verdonck-de Leeuw for authorizing the use of the SCNS-HNC scale and the staff in the Department of Head and Neck Radiotherapy ward and Radiotherapy Centre who helped in collecting data. We would also like to thank every patient and family member who participated in the survey.

Authors' information

Jianxia Lyu is a master's student in nursing and a clinical nurse in the Head and Neck Radiotherapy Department of Sichuan Cancer Hospital.

Jiang Qinghua is a deputy chief nurse and chief nurse of the Radiotherapy Centre of Sichuan Cancer Hospital, focusing on the symptoms and clinical problems of patients undergoing head and neck radiotherapy.

References

1. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2015. *CA Cancer J Clin.* 2015;65:5-29.
2. Sun K, Zheng R, Zhang S, Zou X, Chen R, Gu X. Report of cancer incidence and mortality in different areas of China, 2015. *China Cancer.* 2019;28:1-11.
3. Fitch MI. Providing supportive care for individuals living with cancer. Toronto: Ontario Cancer Treatment and Research Foundation; 1994.
4. Li WW, Lam WW, Au AH, Ye M, Law WL, Poon J, et al. Interpreting differences in patterns of supportive care needs between patients with breast cancer and patients with colorectal cancer. *Psychooncology.* 2012;22:792-8.
5. Garg S, Yoo J, Winquist E. Nutritional support for head and neck cancer patients receiving radiotherapy: a systematic review. *Support Care Cancer.* 2010;18:667-77.
6. He BC, Chen F, Gao XY, Cai L. Relationship between HPV infection and prognosis of oropharyngeal squamous cell carcinomas: a meta-analysis. *Mod Prev Med.* 2014;41:3462-5+80.
7. Chinese Society of Clinical Oncology (CSCO) diagnosis and treatment guidelines for head and neck cancer working group. Chinese Society of Clinical Oncology (CSCO) diagnosis and treatment guidelines for head and neck cancer 2018 (English version). *Chin J Cancer Res.* 2019;31:84-98.
8. Costa Bandeira AK, Azevedo EH, Vartanian JG, Nishimoto IN, Kowalski LP, Carrara-de Angelis E. Quality of life related to swallowing after tongue cancer treatment. *Dysphagia.* 2008;23:183-92.
9. Gao Y, Li HY. Investigation on relationship between body image and quality of life in patients with head and neck cancer. *Chin Nurs Res.* 2018;32:3708-11.
10. Haisfield-Wolfe ME, McGuire DB, Soeken K, Geiger-Brown J, De Forge BR. Prevalence and correlates of depression among patients with head and neck cancer: a systematic review of implications for research. *Oncol Nurs Forum.* 2009;36:E107-25.

11. Lebel S, Devins GM. Stigma in cancer patients whose behavior may have contributed to their disease. *Future Oncol.* 2008;4:717-33.
12. Chaukar DA, Walvekar RR, Das AK, Deshpande MS, Pai PS, Chaturvedi P, et al. Quality of life in head and neck cancer survivors: a cross-sectional survey. *Am J Otolaryngol.* 2009;30:176-80.
13. Rapoport Y, Kreitler S, Chaitchik S, Algor R, Weissler K. Psychosocial problems in head-and-neck cancer patients and their change with time since diagnosis. *Ann Oncol.* 1993;4:69-73.
14. McQuellon RP, Hurt GJ. The psychosocial impact of the diagnosis and treatment of laryngeal cancer. *Otolaryngol Clin North Am.* 1997;30:231-41.
15. Campbell BH, Marbella A, Layde PM. Quality of life and recurrence concern in survivors of head and neck cancer. *Laryngoscope.* 2000;110:895-906.
16. Lee H, Havrila C, Bravo V, Shantz K, Diaz K, Lerner J, et al. Effect of oral nutritional supplementation on weight loss and percutaneous endoscopic gastrostomy tube rates in patients treated with radiotherapy for oropharyngeal carcinoma. *Support Care Cancer.* 2008;16:285-9.
17. MacCallum RC, Widaman KF, Preacher KJ, Hong S. Sample size in factor analysis: the role of model error. *Multivariate Behav Res.* 2001;36:611-37.
18. Harrison JD, Young JM, Price MA, Butow PN, Solomon MJ. What are the unmet supportive care needs of people with cancer? A systematic review. *Support Care Cancer.* 2009;17:1117-28.
19. Han Y, Zhou Y, Wang J, Zhao Q, Qin H, Fan Y, et al. Psychometric testing of the Mandarin version of the 34-item Short-Form Supportive Care Needs Survey in patients with cancer in mainland China. *Support Care Cancer.* 2017;25:3329-38.
20. Hyland, M E, Lewith, G T, Westoby, C. Developing a measure of attitudes: the holistic complementary and alternative medicine questionnaire. *Complement Ther Med.* 2003V11N1:33-8.
21. Ding H, Yang Y, Cheng X, Dong P, Yan X, Hu G, et al. Reliability and validity of EQ-5D-3L and FACT in Beijing's patients with cancer and precancerosis. *Tumor.* 2017;37:953-9.
22. An SL, Chen PY. Measurement scales: reliability and affecting factors. *Chin J Clin Psychol.* 2001;9:315-8.
23. Hair JF. *Multivariate data analysis.* Prentice Hall: Upper Saddle River, NJ; 1998.
24. Terwee CB, Bot SD, de Boer MR, van der Windt DA, Knol DL, Dekker J, et al. Quality criteria were proposed for measurement properties of health status questionnaires. *J Clin Epidemiol.* 2007;60:34-42.
25. Boyes AW, Girgis A, D'Este C, Zucca AC. Prevalence and correlates of cancer survivors' supportive care needs 6 months after diagnosis: a population-based cross-sectional study. *BMC Cancer.* 2012;12:150.
26. Lehmann C, Koch U, Mehnert A. Psychometric properties of the German version of the Short-Form Supportive Care Needs Survey Questionnaire (SCNS-SF34-G). *Support Care Cancer.* 2012;20:2415-24.
27. Jansen F, Witte BI, van Uden-Kraan CF, Braspenning AM, Leemans CR, Verdonck-de Leeuw IM. The need for supportive care among head and neck cancer patients: psychometric assessment of the

- Dutch version of the Supportive Care Needs Survey Short-Form (SCNS-SF34) and the newly developed head and neck cancer module (SCNS-HNC). *Support Care Cancer*. 2016;24:4639-49.
28. Ephrem D, Sheferaw, Teka Z, Mengesha, Solomon B, Wase. Development of a tool to measure women's perception of respectful maternity care in public health facilities. *BMC Pregnancy and Childbirth* (2016) 16:67.
 29. Hu L, Jiang H. Research progress of hearing loss caused by radiotherapy in head and neck cancer. *Mod Oncol*. 2017;25:1322-4.
 30. van der Steeg AF, De Vries J, Roukema JA. Quality of life and health status in breast carcinoma. *Eur J Surg Oncol*. 2004;30:1051-7.
 31. Zhang M, Tanenbaum HC, Felicitas-Perkins JQ, Pang Z, Palmer PH, Duan H, et al. Associations between psychological characteristics and indicators of metabolic syndrome among Chinese adults. *Psychol Health Med*. 2017;22:359-69.
 32. Li WW, Lam WW, Shun SC, Lai YH, Law WL, Poon J, et al. Psychometric assessment of the Chinese version of the Supportive Care Needs Survey Short-Form (SCNS-SF34-C) among Hong Kong and Taiwanese Chinese colorectal cancer patients. *PLoS One*. 2013;8:e75755.
 33. Okuyama T, Akechi T, Yamashita H, Toyama T, Endo C, Sagawa R, et al. Reliability and validity of the Japanese version of the Short-Form Supportive Care Needs Survey questionnaire (SCNS-SF34-J). *Psychooncology*. 2009;18:1003-10.
 34. Jiang Y, Li Q, Zhong Y. Investigation on status quo of cognition and use of mobile health app of middle-aged elderly people in Beijing City. *Med Soc*. 2018;31:11-4.
 35. Chen YC, Wu HP, Hwang SJ, Li IC. Exploring the components of metabolic syndrome with respect to gender difference and its relationship to health-promoting lifestyle behaviour: a study in Taiwanese urban communities. *J Clin Nurs*. 2010;19:3031-41.

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 and Exploratory Factor Analysis (principal component analysis with Direct Onlimin rotation) of the SCNS-HNC (n = 206)

Item	Lowest Score [%]	Highest Score [%]	Factor loading ^a			Communalities
			1	2	3	
HNC-specific functioning						
1. Problems with chewing and or swallowing	22.3	17.5	0.698			0.561
2. Problems with dry mouth and/or sticky mucus	11.2	22.8	0.639			0.598
3. Problems with weight (underweight or overweight)	24.3	8.7	0.754			0.580
5. Difficulty speaking	42.2	11.7	0.787			0.625
6. Care of your stoma and/or voice prosthesis	63.1	6.3	0.707			0.611
Lifestyle						
10. Quit smoking	63.6	7.3		0.988		0.945
11. Quit drinking	65.0	6.8		0.971		0.943
Nutrition, oral hygiene and mobility of shoulder or neck						
4. To be informed on nutrition	8.3	35.4			0.826	0.699
8. Oral hygiene	12.6	29.1			0.825	0.772
9. Problems with mobility of neck or shoulders	33.5	14.6			0.441	0.491
7. Problems with hearing ^b	44.7	6.8				
Eigenvalue			3.938	1.757	1.132	6.827
Variance (%)			39.378	17.566	11.323	68.266
KMO = 0.750, Bartlett's Chi-Square =987.630***						

^a Main factor loadings for each item and cross-loading ≥ 0.4 are shown.

^b Item 7 was removed from the EFA.

*** $P \leq 0.001$.

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 ($P \leq 0.05$).

Table 4 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 5 Known-groups validity of the SCNS-SF34 and SCNS-HNC (n = 206)

Domain	18~60(173)		≥60(33)		P value	Male (124)		Female (81)		P value
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
SCNS-SF34										
Physical and daily living	44.57	22.157	40.45	21.986	0.329	42.38	21.073	46.79	23.148	0.160
Psychological	52.76	22.165	51.36	24.789	0.745	51.09	22.370	55.40	22.074	0.176
Sexuality	24.93	25.849	12.03	18.812	0.007*	26.11	26.186	18.17	21.896	0.028*
Health system information	61.07	22.398	68.87	21.118	0.066*	61.60	23.186	63.44	21.200	0.567
Patient care and support	55.49	24.457	60.76	25.468	0.261	55.85	25.277	57.41	23.719	0.658
SCNS-HNC										
HNC-specific functioning	41.65	24.179	46.21	25.032	0.324	42.82	23.738	41.67	25.446	0.741
Nutrition, oral hygiene and mobility of shoulder or neck	54.67	28.407	58.33	25.853	0.492	53.29	26.519	58.02	20.117	0.238
Lifestyle	18.86	30.637	17.05	27.744	0.752	27.32	32.680	5.40	19.659	0.000*

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

* $P \leq 0.05$ (statistically significant, independent-samples t test, two-tailed).