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Psychometric testing of the Mandarin version of the 34-item Short-Form Supportive Care Needs Survey in patients with cancer in mainland China

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Abstract

Purpose: Although the Supportive Care Needs Survey is one of the most comprehensive and robust cancer-specific needs assessment instruments, no version exists specifically for cancer patients in mainland China. This study tested the psychometric properties of the Mandarin version of the 34-item Short-Form Supportive Care Needs Survey (SCNS-SF34-C (Mandarin)) in mainland Chinese cancer patients.

Methods: From December 2015 to May 2016, patients were recruited from two cancer centers in Guangzhou, China, to complete the SCNS-SF34-C (Mandarin). Exploratory factor analysis (EFA) was used to test the factor structure. The internal consistency, convergent validity and discriminant validity of the resulting factor structure were evaluated by traditional psychometric analysis.

Results: A total of 861 patients completed the SCNS-SF34-C (Mandarin). Item 14 was removed for its low factor loadings on every factor in the initial EFA. Using the remaining 33 items, the reiterated EFA produced a five-dimension structure that was consistent with the dimensions of the original version of the SCNS-SF34 (health system and information, psychological, patient care and support, physical and daily living, and sexuality), accounting for 69.757% of the total variance. Cronbach's alpha coefficients ranged from 0.854 to 0.942 for the five domains and 0.947 for the whole scale. Convergent validity was verified by significant correlations with all corresponding instruments. It discriminated between groups based on age, sex, marital status and stage of disease.

Conclusions: Preliminary evidence suggests that the SCNS-SF34-C (Mandarin) is a reliable and valid instrument for assessing the supportive care needs of cancer patients in mainland China.

Keywords: needs assessment; cancer; psychometrics; reliability; validity; questionnaires

Background

Cancer is the leading cause of death in China, with approximately 4.3 million annual new cancer cases and 2.8 million cancer-related deaths reported in 2015 [1]. Throughout the disease course, many cancer patients experience impaired quality of life (QOL) due to the disease itself as well as treatment-related side-effects [2]. Maintaining or improving QOL is now recognized as one of the chief goals of cancer care [3]. However, previous studies have shown that unmet supportive care needs are significantly associated with poor QOL among cancer patients [4, 5]. Therefore, identifying and effectively responding to the unmet supportive care needs of cancer patients is crucial to enhancing their QOL [6-8]. Hence, psychometrically robust instruments for measuring the supportive care needs of cancer patients are essential for both clinical practice and research.

Various measurement tools predominantly developed in English-speaking countries are used to assess the supportive care needs of cancer patients [9, 10]. The Supportive Care Needs Survey (SCNS), which assesses the type and magnitude of cancer patients' current perceived needs across five domains (psychological, health system and information, physical and daily living, patient care and support, and sexuality), is one of the most comprehensive and robust cancer-specific needs assessment tools available [11]. Developed and validated with heterogeneous samples of cancer patients in terms of cancer type, stage of disease and time since diagnosis, the SCNS is suitable for use with a diversity of patients and survivors. Topic and cancer type-specific modules supplement the core SCNS [12]. Currently, there are three versions of the SCNS: 59-item long-form (SCNS-LF59) [11], 34-item short-form (SCNS-SF34) [13], and 9-item screening tool (SCNS-ST9) [14]. All versions cover the same five domains, but the latter can reduce respondent burden in routine cancer care [11, 13]. To date, the SCNS-SF34 has been translated and validated in various languages, including Japanese [15], German [16], French [17], Italian [18] and Dutch [19]. It has also been translated into Chinese (SCNS-SF34-C) [20] using Traditional Chinese characters which is suitable for Hong Kong people, Macanese and Taiwanese. The SCNS-SF34-C has been psychometrically tested in Hong Kong Chinese breast cancer patients [20], and Hong Kong and Taiwanese colorectal cancer patients [21], with the corresponding validation studies finding a four-factor structure for the former and five-factor structure for the latter. While Hong Kong, Taiwan, and mainland China generally derive from similar cultures, their cultural practices and health systems have been vastly influenced by different sociopolitical systems [22, 23]. Furthermore, mainland Chinese speak Mandarin Chinese and use Simplified Chinese characters.

Therefore, we sought to develop the Mandarin version of the 34-item Short-Form Supportive Care Needs Survey (SCNS-SF34-C (Mandarin)) and test its psychometric properties in cancer patients in mainland China.

Methods

Sample and Setting

A convenience sample of cancer patients from mainland China was recruited from the inpatient and outpatient departments of two cancer centers between December 2015 and May 2016. Patients were included if they (a) were of Chinese descent and had lived primarily in mainland China since birth, (b) had a confirmed cancer diagnosis, (c) had been informed of the cancer diagnosis (in Chinese culture, patients are not always informed of their diagnosis at the family's request), (d) were at least 18 years

old, (e) were sufficiently able to read, write, and understand Mandarin Chinese to complete a self-administered questionnaire independently, and (f) had an Eastern Cooperative Oncology Group performance status of 0 to 3 as determined by the health care providers upon enrollment. Patients were excluded if they had (a) cognitive and/or mental disorders, or (b) vision and/or hearing impairment.

Procedure

The head nurse and a trained survey interviewer of each department identified eligible participants from the inpatient and outpatient list. Eligible patients were informed about the study by the head nurse and assured that the quality of healthcare would not change regardless of whether they participated in the study or not. After giving informed consent, patients were asked to complete a self-report pen-and-paper questionnaire in the wards or waiting areas of the outpatient departments on the same day. When the questionnaire was completed, the study investigators checked it thoroughly and clarified any missing responses with the patient immediately. The study was approved by the ethics committees of Sun Yat-sen University Cancer Center and the Cancer Center of Guangzhou Medical University in Guangzhou, China.

Measures

Development of the SCNS-SF34-C (Mandarin)

The SCNS-SF34 is a self-administered survey that comprises five domains of need: psychological, health system and information, physical and daily living, patient care and support, and sexuality. Respondents rate the extent of their need for help during the past month because of having cancer on a 5-point Likert scale (1= no need/not applicable, 2=no need/satisfied, 3=low need, 4=moderate need, 5=high need). A standardized Likert summated score for each domain ranging from 0 to 100 can be calculated, with higher scores representing higher levels of need for help [12].

The forward-backward translation method [24, 25] was used to develop the SCNS-SF34-C (Mandarin). At the beginning of the translation procedure, the SCNS-SF34 was independently translated into Mandarin Chinese by two native bilingual Mandarin Chinese translators. Then, the study team leader and the two translators synthesized the two forward translations into a satisfactory version. Afterward, the synthesized forward translation was emailed to the U.S. back translation team, who was not permitted to see the original English version. When the backward translation was completed, the members of both translation teams identified and resolved the differences between the original and back-translated versions through discussions or repeated forward-backward procedures until a consensus was reached. The preliminary final version was pretested with 23 patients in mainland China with various cancers to ascertain there was no doubt about the clarity, appropriateness of wording and acceptability of the translated questionnaire.

Comparative measures for validity testing

To allow comparison with previous studies, the following measures were selected:

The 14-item Hospital Anxiety and Depression Scale (HADS) was administered to assess symptoms of anxiety (HAD-A) and depression (HAD-D). Each subscale has a total score of 0 to 21, with higher scores indicating more symptomatology [26].

The 30-item European Organization for Research and Treatment of Cancer Quality of Life Core Questionnaire 30 (EORTC QLQ-C30), composed of five functional subscales, three symptom subscales, a global health status/QOL subscale, and several single items was utilized to evaluate

patients' health-related QOL (HRQOL). A linear score of each subscale/item ranges from 0 to 100, with higher scores representing better functioning/QOL but more severe symptom levels [27].

The 25-item EORTC QLQ information module (EORTC QLQ-INFO25), which contains four subscales and eight single items, was used for determining patients' received information [28].

The 10-item Social Support Rating Scale (SSRS) comprising objective support, subjective support and support utilization was employed to measure social support. The inventory has a total score ranging from 12 to 66, with higher scores suggesting stronger social support [29].

Sociodemographic and clinical characteristics

A self-administered questionnaire was used to collect sociodemographic data on age, sex, marital status, rurality of registered residence, native place, educational level, religion, and employment status. The clinical characteristics including primary cancer site, months since initial diagnosis, disease stage, and anticancer treatments (completed and ongoing at the time of interview) were extracted from the patients' medical records.

Statistical analysis

The data were analyzed using SPSS v 19.0 (IBM, NY, USA). Descriptive statistics, such as mean, standard deviation (SD), frequency, and percentage were used to report the sociodemographic and clinical characteristics of the patients. All statistical tests were two-tailed with a significance level of $P<0.05$.

Factor validity was examined via exploratory factor analysis (EFA, principal component analysis with varimax rotation). Although the psychometric properties of a number of different language versions of the SCNS-SF34 have been tested, we undertook an exploratory rather than confirmatory factor analysis due to differences in culture and health systems between regions and populations. The Kaiser-Mayer-Olkin (KMO) and Bartlett's tests were employed to test the appropriateness of the data for EFA. Eigen values > 1.0 and factor loadings > 0.4 were considered acceptable [30]. Items were attributed to the factor with the highest loading, and the proportion of the variance explained by the factor structure calculated. Floor or ceiling effects were deemed to exist if more than 50% of respondents achieved the lowest (0) or highest (100) score for each factor [30]. Internal consistency was calculated using Cronbach's alpha with a coefficient value >0.7 required [30, 31].

To assess convergent validity, the Spearman's rank correlation coefficients between the SCNS-SF34-C (Mandarin) and the HADS, EORTC QLQ-C30, the global score on the EORTC QLQ-INFO25 and SSRS were calculated. Correlations were categorized as being strong (>0.7), moderate (0.3-0.7) or weak (<0.3) [32]. Based on previous studies, we hypothesized that scores on the SCNS-SF34-C (Mandarin) would have: moderate positive correlations with scores on the HADS subscales [13, 16, 20-21] and EORTC QLQ-C30 symptom subscales and single items [15, 19]; moderate negative correlations with scores on the EORTC QLQ-C30 global subscale [13, 15, 19] and functional subscales [15, 19]; weak negative correlations with the global score on the EORTC QLQ-INFO25 [33]; and weak negative or weak positive correlations with scores on different domains of the SSRS [16].

With respect to discriminant validity, we employed independent-samples *t*-test to test differences in the mean score for each domain between several subgroups of patients with different basic characteristics. Based on the findings of some of the largest studies of unmet needs conducted to date[15-16, 21, 34-35], we expected that patients with advanced cancer would report higher mean

scores on all domains except sexuality than patients with early-stage disease [15]; females would have higher mean scores on the psychological domain than males [16, 21, 34]; and patients who were male, younger, with life partners would have higher mean scores on the sexuality domain than patients who were female, older, without life partners [16, 34, 35].

Results

Participant characteristics

A total of 83.1% (861/1036) of eligible participants including 27.6% (238/861) outpatients and 72.4% (623/861) inpatients provided informed consent and returned the completed questionnaires. A further 58 eligible participants refused to complete the survey because of inadequate time or feeling unwell during interviewing. A total of 117 eligible patients were missed due to discharging, transferring to another hospital, or leaving hospital without returning the questionnaire. Participants had a mean age of 51.66 years (SD=12.75), and a mean interval of 8.7 months (SD=11.98) since the initial cancer diagnosis. Most patients were male (56.7%), were married (84.3%), were urban residents (56.4%), had at least a junior high school education (88.7%), had advanced-stage cancer (71.2%), and had received chemotherapy (76.9%). The most frequent primary cancer sites were gastrointestinal tract (25.9%) and nasopharynx (23.7%) (see Table 1).

Factor structure and factor loadings

The KMO statistic (0.917), exceeded the threshold of 0.5, and the Bartlett's test was significant (chi^2=26,958.140, *P*<0.001), indicating that the data were suitable for factor analysis. The EFA extracted a five-factor structure accounting for 68.557% of the total variance. However, the factor loadings of item 14, "feelings about death and dying," were less than 0.4 on every factor. Therefore, item 14 was removed. Then, EFA was repeated with the remaining 33 items. The KMO value was 0.915, and Bartlett's test was significant (chi^2=26,608.188, *P*<0.001). As shown in Table 2, again, a five-factor structure was identified, accounting for 69.757% of the total variance. Factor 1 comprised 11 items related to health system and information needs, accounting for 21.724% of the variance. Factor 2 comprised 9 items regarding psychological needs accounting for 19.612% of the variance. Factor 3 comprised 5 items regarding patient care and support needs, accounting for 11.050% of the variance. Factor 4 comprised 5 items addressing needs related to physical and daily living, accounting for 9.575% of the variance. Factor 5 comprised 3 items about sexuality needs, accounting for 7.795% of the variance. No floor or ceiling effects occurred.

Reliability

As shown in Table 2, a high level of internal consistency was achieved, with Cronbach's alpha coefficients ranging from 0.854 to 0.942 for all five domains and 0.947 for the whole scale.

Convergent validity

As demonstrated in Table 3, with the exception of some insignificant correlations regarding the sexuality domain, all other domains of the SCNS-SF34-C (Mandarin) mostly had significant weak to moderate positive correlations with the HADS and most symptom subscales and single items of the EORTC QLQ-C30, but had significant weak to moderate negative correlations with the global subscale, the functional subscales of the EORTC QLQ-C30, and the global score on the EORTC QLQ-INFO25.

In addition, there were some significant weak correlations between the SSRS and the psychological, physical and daily living, and sexuality domains of the SCNS-SF34-C (Mandarin).

Discriminant validity

As shown in Table 4, advanced cancer patients reported higher levels of needs than those with early-stage cancer on all domains except sexuality. Females had greater needs than males on the psychological domains, but no significant difference was found between males and females on the sexuality domain ($t=0.681$, $P=0.496$). Younger patients and those with a life partner had higher sexuality needs than older patients and those without a partner.

Discussion

The present study provides preliminary evidence of the construct validity and internal reliability of the Mandarin version of the SCNS-SF34 (SCNS-SF34-C (Mandarin)) to assess the needs of cancer patients in mainland China. Our EFA extracted a five-dimension structure almost identical to that of the original English version [13] and culturally and linguistically translated versions in Japanese [15], German [16], French [17], Italian [18], and Chinese (for Hong Kong and Taiwanese patients with colorectal cancer) [21]. The SCNS-SF34-C (Mandarin) maintained a high level of structural reliability with Cronbach's alpha of 0.947 for the full scale, and at least 0.85 for all five domains. These findings are consistent with those of other studies [13, 15-17, 36] and add to the growing body of evidence about the dimensionality of the SCNS-SF34. However, in contrast to these findings, the Chinese version for Hong Kong breast cancer patients [20] and the Dutch version [19] of the SCNS-SF34 revealed a four-factor structure, which combined the health systems and information domain and the patient care and support domain into a single domain [19, 20]. Taken together, these findings suggest that the dimensionality of the SCNS-SF34 may alter according to cultural settings, thereby reinforcing the importance of examining the cross-cultural validity of measures.

Item 14, which was related to the concept of death and dying—a heavy and distressing topic for residents of mainland China—was removed. This item was also remarked upon by participants in Zeneli et al.'s study reporting the cultural and linguistic adaption of the SCNS-SF34 into Italian [18]. Traditional beliefs of Taoism, Confucianism, and Buddhism have deeply influenced the ideology of Chinese; discussing death and dying in Chinese communities and families is taboo, for fear of invoking bad luck [37]. Most patients in mainland China evade thinking seriously about these questions. Moreover, religion is widely known to play a part in individuals' attitudes toward death and dying [38]. However, only 8.8% of the patients in our study reported holding any religious beliefs, and this may be another reason contributing to item 14 not reaching the minimum loading required on any factors. By contrast, item 14 was retained in the validation of the Chinese version by Au et al. [20]. Because the culture of Hong Kong has been influenced by western cultures for almost 100 years, Hong Kong Chinese may have opinions about death and dying that are different from the views of mainland Chinese [22, 38].

Additionally, item 19 (better hospital choice) was retained in our study but was deleted by Au et al. [20]. This may be attributed to the differences in health systems between the two regions. In Hong Kong, public healthcare attracts a host of patients for its high-quality services and high rate of subsidy. Therefore, public hospitals are overburdened, and patients must usually wait for the services [39]. Compared with patients in Hong Kong, patients in mainland China have more efficient medical

resources on a fee-for-service basis and have greater rights to choose the most appropriate hospitals according to their own conditions [22, 39].

Despite some weak correlations, most of the hypothesised correlations between the SCNS-SF34-C (Mandarin) and instruments measuring similar constructs were achieved. Consistent with previous studies [13, 16, 20-21], the correlation coefficients on the psychological domain were the highest among all significant correlation coefficients between the SCNS-SF34-C (Mandarin) and the HADS subscales. Furthermore, our results of expected convergent validity between the SCNS-SF34-C (Mandarin) and the EORTC QLQ-C30 were similar to that found in previous studies [13, 15, 19]. These findings provide further evidence that the SCNS-SF34 has good convergent validity in measuring psychosocial well-being [13, 15-16, 19-21]. The moderate negative correlation between the health system and information domain and the global score on the EORTC QLQ-INFO25 was not consistent with our hypothesis which was informed by Faller et al. [33]. This may be explained, in part, by measurement differences whereby the EORTC QLQ-INFO25 used in this study was not available at the time of the study by Faller et al. [33]. It may also be due to this domain of the SCNS-SF34 being comprised of items that also examine health system delivery issues rather than information only. In accordance with Lehmann et al. [16], we also found some significant marginal correlations between the SCNS-SF34-C (Mandarin) and the SSRS, implying the two instruments are measuring conceptually different issues.

The discriminant validity of SCNS-SF34-C (Mandarin) was also well verified by known group comparisons. As hypothesized, patients with advanced disease reported more needs across all domains except sexual needs, which is consistent with findings reported by Okuyama et al. [15]. Our results also found that females expressed higher levels of psychological needs, which supports findings of other researchers [16, 21, 34]. Interestingly, contrary to our hypothesis, we found no significant difference in sexual needs between sexes. This result is in accordance with the results of a study by Jansen et al. [19] but contrary to a number of other studies [15-17, 20, 21]. Influenced by Chinese traditional culture, sexuality is a private and intimate topic for mainland Chinese, so most patients and even some medical staff in mainland China avoid discussing it [40, 41]. This is reflected in the current study by 47% of participants reporting the lowest score for this domain. Patients who were younger than 65 years and had a life partner perceived higher levels of sexual need, which also supports the results of a previous study [34, 35].

Our study had a few limitations that should be discussed. First, we conducted the investigation in only two cancer centers in Guangzhou, the biggest city in south China, which may not represent mainland China entirely. However, as one of these research hospitals is one of the largest cancer centers in China, 28.1% of participants were from other provinces of mainland China. Second, due to the convenience sampling design, our study sample is not representative of cancer patients in mainland China. The mean age of the sample was relatively young, the portion of the sample in advanced stages was over-represented, and the majority of patients were natives of Guangdong province of China. The results should be verified in studies involving a random sample of cancer patients drawn from multiple treatment centers. Third, we did not examine the full range of psychometric properties such as test-retest reliability, responsiveness, and predictive validity. However, it must be acknowledged that validation of a measure is a lengthy and ongoing process which involves accruing evidence of a tool's performance over a number of studies.

In conclusion, this study provides preliminary evidence suggesting that the SCNS-SF34-C (Mandarin) is a reliable and valid tool for assessing the supportive care needs of mainland Chinese

cancer patients. Using our existing database, we are conducting additional analyses to identify factors associated with supportive care needs. These data will provide valuable insight into the specific needs of subgroups of patients and potentially inform both patient care and the development of interventions to address unmet needs.

Conflict of interest

The authors declare they have no conflict of interest to report. The authors declare they have full control of all primary data and agree to allow the journal to review the data if requested.

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Table 1 Sample demographic and clinical characteristics (n=861)

Characteristic		*N*	(%)
Mean age in years (SD, range)		51.66 (12.75, 18-80)	
Sex	Male	488	56.7
	Female	373	43.3
Marital status	Single	66	7.7
	Married/cohabiting	726	84.3
	Divorced/separated	28	3.2
	Widowed	41	4.8
Registered residence type	Rural	375	43.6
	Urban	486	56.4
Native place	Native of Guangdong province	619	71.9
	Non-native of Guangdong province	242	28.1
Educational level	Elementary school	97	11.3
	Junior high school	241	28.0
	High school degree	192	22.3
	College degree	133	15.4
	University degree	167	19.4
	Master's degree and above	31	3.6
Religion	No religious beliefs	785	91.2
	Christianity	14	1.6
	Buddhism	62	7.2
Employment status	Employed	470	54.6
	Retired	97	11.3
	Unemployed/other	294	34.1
Primary cancer site	Gastrointestinal tract	223	25.9
	Nasopharynx	204	23.7
	Liver	122	14.2
	Breast	118	13.7
	Lung	67	7.8
	Hematologic	60	7.0
	Esophagus	43	5.0
	Female genital organs	9	1.0
	Other types cancers (e.g. bladder, prostate, osteoma)	15	1.7
Mean months since initial diagnosis	(SD, range)	8.7 (11.98, 0-80)	
Disease stage (UICC)	I	36	4.2
	II	165	19.1
	III	263	30.6
	IV	350	40.6
	Unclear	47	5.5
Anticancer treatments [a, b]	Chemotherapy	662	76.9
	Surgery	447	51.9
	Radiation therapy	304	35.3

	Traditional Chinese medicine	257	29.8
	treatment Concurrent	164	19.0
	radiochemotherapy Transarterial	122	14.2
	chemoembolization Targeted therapy	67	7.8
	Hyperthermic intraperitoneal chemotherapy	40	4.6
	Radioembolization	33	3.8
	Immunotherapy	26	3.0
	Bone marrow transplantation	2	0.2

[a] Multiple responses allowed.

[b] Total for each treatment includes patients who have completed or are receiving the treatment

Traditional Chinese medicine 257 29.8

treatment Concurrent 164 19.0

Table 2 Principle component analysis (EFA, varimax rotation), reliability, and descriptive statistics of SCNS-SF34-C (Mandarin) (n=861)

Item No.	Items	Factor structure and loadings [a]				
		Health system and information	Psycho-logical	Patient care and support	Physical and daily living	Sexuality
25	Being given explanations of those tests for which you would like explanations	0.851				
26	Being adequately informed about the benefits and side-effects of treatments before you choose to have them	0.838				
27	Being informed about your test results as soon as feasible	0.826				
28	Being informed about cancer which is under control or diminishing (that is, remission)	0.820				
33	Being treated in a hospital or clinic that is as physically pleasant as possible	0.756				
23	Being given written information about the important aspects of your care	0.755				
29	Being informed about things you can do to help yourself to get well	0.754				
24	Being given information (written, diagrams, drawings) about aspects of managing your illness and side-effects at home	0.711				
30	Having access to professional counselling (e.g. psychologist, social worker, counsellor, nurse specialist) if you, family or friends need it	0.694				
32	Being treated like a person not just another case	0.689				
34	Having one member of hospital staff with whom you can talk to about all aspects of your condition, treatment and follow-up	0.613				
7	Feeling down or depressed		0.867			
8	Feelings of sadness		0.865			
10	Worry that the results of treatment are beyond your control		0.830			
6	Anxiety		0.814			
9	Fears about the cancer spreading		0.810			
11	Uncertainty about the future		0.801			

13	Keeping a positive outlook		0.674			
12	Learning to feel in control of your situation		0.665			
17	Concerns about the worries of those close to you		0.511			
21	Hospital staff attending promptly to your physical needs			0.814		
20	Reassurance by medical staff that the way you feel is normal			0.806		
22	Hospital staff acknowledging, and showing sensitivity to, your feelings and emotional needs			0.749		
19	More choice about which hospital you attend			0.706		
18	More choice about which cancer specialists you see			0.653		
3	Feeling unwell a lot of the time				0.839	
2	Lack of energy/tiredness				0.821	
5	Not being able to do the things you used to do				0.755	
1	Pain				0.686	
4	Work around the home				0.534	
16	Changes in your sexual relationships					0.908
15	Changes in sexual feelings					0.898
31	Being given information about sexual relationships					0.722
14	Feelings about death and dying [b]					
	% of the total variance	21.724	19.612	11.050	9.575	7.795
	Alpha coefficient	0.942	0.940	0.894	0.858	0.854
	Mean (0-100)	53.21	48.46	35.34	38.98	18.99
	SD [c]	21.15	23.98	21.24	22.14	23.53
	Median	50.00	50.00	30.00	40.00	8.33
	% lowest score (floor)	0.2	3.0	8.0	9.9	47.0
	% highest score (ceiling)	2.2	0.6	1.2	0.9	0.6

[a] Main factor loading for each item and cross-loading>0.4 are shown.

[b] Item 14 was removed from the EFA as it did not load onto any factor in the initial analysis.

[c] SD, Standard deviation.

Table 3 Correlations between SCNS-SF34-C (Mandarin), HADS, EORTC QLQ-C30, EORTC QLQ-INFO25 and SSRS (n=861)

	SCNS-SF34-C (Mandarin) domain				
	Health system and information	**Psycho-logical**	**Patient care and support**	**Physical and daily living**	**Sexuality**
HADS					
Anxiety subscale	0.286**	0.653**	0.436**	0.429**	0.077*
Depression subscale	0.229**	0.593**	0.359**	0.427**	0.043
EORTC QLQ-C30					
Global health status	- 0.247**	- 0.559**	- 0.334**	- 0.484**	- 0.009
Physical functioning	- 0.177**	- 0.356**	- 0.289**	- 0.473**	0.004
Role functioning	- 0.197**	- 0.427**	- 0.308**	- 0.473**	- 0.005
Emotional functioning	- 0.299**	- 0.683**	- 0.394**	- 0.418**	- 0.099**
Cognitive functioning	- 0.259**	- 0.337**	- 0.361**	- 0.404**	- 0.139**
Social functioning	- 0.295**	- 0.443**	- 0.364**	- 0.398**	- 0.140**
Fatigue	0.269**	0.389**	0.339**	0.583**	0.025
Nausea and vomiting	0.142**	0.204**	0.172**	0.240**	0.158**
Pain	0.276**	0.448**	0.311**	0.558**	- 0.035
Dyspnoea	0.219**	0.281**	0.251**	0.392**	- 0.024
Insomnia	0.237**	0.417**	0.295**	0.403**	0.062
Appetite loss	0.169**	0.315**	0.214**	0.386**	0.048
Constipation	0.257**	0.109**	0.209**	0.194**	0.163**
Diarrhoea	0.061	- 0.034	0.076*	0.071*	0.051
Financial difficulties	0.141**	0.224**	0.273**	0.273**	0.121**
EORTC QLQ-INFO25					
Global Score	- 0.410**	- 0.254**	- 0.180**	- 0.181**	- 0.004
SSRS					
Total support score	- 0.002	- 0.235**	- 0.010	- 0.113**	0.234**
Objective support	0.025	- 0.035	0.053	- 0.019	0.181**
Subjective support	0.018	- 0.255**	- 0.056	- 0.120**	0.170**
Support-seeking behavior	- 0.016	- 0.179**	0.009	- 0.080*	0.121**

HADS, Hospital Anxiety and Depression Scale.

EORTC QLQ-C30, European Organization for Research and Treatment of Cancer Quality of Life-C30.

EORTC QLQ-INFO25, European Organization for Research and Treatment of Cancer Quality of Life-Information module (INFO25).

SSRS, Social Support Rating Scale.

** Value $p<0.01$.

 * Value $p<0.05$.

Table 4 Comparison of SCNS-SF34-C (Mandarin) mean domain scores between known subgroups (n=861)

Variable		Health system and information			Psychological			Patient care and support			Physical and daily living			Sexuality		
		Mean	SD [a]	p-value	Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value	Mean	SD	p-value
Age	**N**			NSD [b]			NSD			0.007			0.018			0.000
<64 years	707	53.77	21.33		48.48	24.09		36.16	21.71		38.22	22.59		21.77	24.19	
≥65 years	154	50.65	20.18		48.38	23.58		31.56	18.49		42.50	19.64		6.22	14.62	
Sex				NSD			0.035			NSD			0.039			NSD
Male	488	54.12	21.06		46.95	23.97		36.06	21.59		37.62	22.28		19.47	23.92	
Female	373	52.03	21.24		50.42	23.89		34.40	20.76		40.76	21.85		18.36	23.04	
Marital status				NSD			NSD			NSD			0.007			0.000
With life partner	726	53.63	21.48		48.24	23.34		35.61	21.53		38.22	22.75		20.74	24.06	
Without life partner	135	50.96	19.19		49.63	27.26		33.89	19.60		43.07	18.04		9.57	17.82	
Cancer stage [c]				0.005			0.000			0.002			0.000			NSD
Early stage (UICC I, II)	201	49.89	18.30		41.74	23.66		31.09	19.00		28.43	19.70		18.33	20.97	
Advanced stage (UICC III, IV)	613	54.29	21.36		50.83	23.45		36.23	21.26		42.61	21.71		19.29	24.39	

[a] SD, Standard deviation.

[b] NSD, No significant difference.

[c] 47 patients' cancer stages were unclear; thus, these data were treated as missing.