Validation of the Supportive Care Needs Survey Screening Tool Chinese Version for Patients With Head and Neck Cancer in Taiwan

Chan-Chuan HU1 • Kai-Lin YOU2 • Li-Yun TSAI3 • Yuan-Yuan FANG4 • Sin-Yuan JHANG5 • Pei-Jen LOU6 • Cheng-Ping WANG7 • Jenq-Yuh KO6 • Yun-Hsiang LEE8,10 • Yeur-Hur LAI9,10*

ABSTRACT

Background: The increasing number of cancer survivors and the trend of shifting cancer treatments into outpatient clinics have increased rapidly the supportive care needs of patients with cancer. However, no brief assessment tool is available to screen for these needs.

Purpose: In this study, we aimed to (a) translate and develop a nine-item Chinese version of the Supportive Care Needs Survey Screening Tool (SCNS-ST9-C) and (b) examine the psychometric properties of this tool in a sample of patients with head and neck cancer (HNC) in Taiwan.

Methods: In this two-phase instrument validation study, the SCNS-ST9-C was translated and evaluated for content, face validity, and feasibility in Phase I and was examined for internal consistency reliability and construct validity (including factor structure and theoretically supported correlations) on a sample of patients with HNC in Phase II.

Results: In Phase I, the SCNS-ST9-C was translated and developed by three bilingual doctoral-prepared nurse researchers (Chinese and English). A standardized score system ranging from 0 to 100 was built, with higher scores indicating higher unmet supportive care needs. Good content and face validity were confirmed by five cancer care experts and 20 patients with HNC, respectively. In Phase II, 116 subjects were recruited. A clear four-factor structure, which incorporated one of the original five dimensions (sexuality care needs, with one item) into the dimension of psychological and emotional care needs, was identified using exploratory factor analysis. Good internal consistency reliability for the overall SCNS-ST9-C was supported by a Cronbach’s α of .75 and its four subscales (domains). Good construct validity was also confirmed by the theoretically supported correlations. Better performance status and longer time since treatment completion correlated negatively with the SCNS-ST9-C (i.e., lower unmet care needs), whereas higher distress (anxiety, depression, and symptoms) correlated positively with the SCNS-ST9-C (i.e., greater unmet care needs). Female patients reported higher overall unmet care needs and psychological and emotional care needs and higher scores on the care and support needs subscale than male patients.

Conclusions: The SCNS-ST9-C is a brief, low-burden, and psychometrically valid instrument that may be applied in ethnically Chinese settings. This tool takes 1–2 minutes to complete. Further testing of the psychometrics of this instrument in different cancer populations is recommended.

KEY WORDS: SCNS-ST9, care needs, head and neck cancer, psychometrics, validation.

Introduction

The high incidence of cancer worldwide, particularly in Asia, represents a major threat to health (International Agency for Research on Cancer, World Health Organization, 2018). Because of improved early screening capabilities and related medical advances, patients with cancer are surviving longer now than ever before (Miller et al., 2019). Anticancer treatments are delivered in outpatient departments. Thus, the demands for related supportive care are increasing tremendously. However, screening for cancer patients’ care needs, particularly in outpatient department settings, is still

*Corresponding author.
in its infancy. Scales that are brief, easily understood, and valid are being increasingly used to help improve quality of care and are particularly urgently needed to quickly screen for the main supportive care needs (SCN) of populations with cancer.

SCN are defined as “patients’ perceived needs for support or help” (Sanson-Fisher et al., 2000), whereas unmet SCN are defined as SCN that are “not addressed and where additional support (is) required” (Harrison, Young, Price, Butow, & Solomon, 2009). Previous studies and reviews have identified a high level of unmet SCN across different cancer populations (Brédart et al., 2013; Chen et al., 2013; Harrison et al., 2009; Wang, Molassiotis, Chung, & Tan, 2018). Two systematic reviews (Harrison et al., 2009; Wang et al., 2018) identified a wide range of care needs across patients with different types of cancers, treatments, and disease phases. The most frequently reported unmet SCN for cancer relate to activities of daily living, psychological problems and concerns, physical care needs, information needs, and needs related to sexuality and social functions (Harrison et al., 2009; Wang et al., 2018).

To enhance the quality of patient care, the Institute of Medicine identified cancer survivorship care (Hewitt, Greenfield, & Stovall, 2005) as a critical part of cancer treatment and care. Conducting a SCN assessment is important to making survivorship care more patient-centered. The Supportive Care Needs Survey-Short Form 34 (SCNS-SF34) from Girgis and colleagues is the most widely used needs assessment scale (Boyes, Girgis, & Lecathelinais, 2009; Wang et al., 2018). However, the SCNS-SF34 contains 34 items and thus may be a burden for patients with cancer and be relatively time consuming, particularly in very busy care settings and situations. To decrease the questionnaire burden of patients and increase the possibility of integrating care needs assessments into clinical care and services, a very brief scale with “robust items” that cover the most important domains of care needs is urgently needed.

The nine-item Supportive Care Needs Survey-Screening Tool (SCNS-ST9; Girgis, Stojanovski, Boyes, King, & Lecathelinais, 2012) is the screening version of the SCNS-SF34 (Boyes et al., 2009). On the basis of the same five domains of SCN in SCNS-SF34, the SCNS-ST9 was developed as a very brief screening tool for application in clinical oncology settings to provide better cancer care (Girgis et al., 2012).

The SCNS-ST9 was developed based on data from 1,458 subjects who completed the SCNS-SF34. The records/data from two thirds of the subjects (67%) were randomly selected and used as the developmental sample for vetting the items for inclusion in the SCNS-ST9. The criteria for selecting these items included (a) diagnostic accuracy; (b) variation in the original domain score explained by single items, pairs, and triplets; (c) factor loading; (d) item prevalence; and (e) predictive ability (Girgis et al., 2012). The other 30% of subjects’ data were used as the validation sample to repeat the analyses of SCNS-ST9 (Girgis et al., 2012).

Nine robust items were abstracted from the original SCNS-SF34 to represent the five care needs domains. These included (a) psychological and emotional needs (help with psychological and emotional care), (b) health system and information needs (information on disease and treatments and financial issues), (c) physical and daily living needs, (d) patient care and support needs (support from family and healthcare professionals), and (e) sexuality care needs (Girgis et al., 2012). All of the five domains included two items with the exception of the sexuality domain, which included only one.

The translated German version of the SCNS-ST9 was found to be appropriate and feasible for use with patients with brain tumor (Renovanz et al., 2018). Because the SCNS-ST9 contains the robust items of the original SCNS-SF34 (Girgis et al., 2012), it may be used as a first-line clinical assessment tool to identify quickly the main SCN domains. Following this screening, further, in-depth assessment may be conducted if needed.

Two primary reasons justify the use in this study of the population with head and neck cancer (HNC) in Taiwan to validate the Chinese version of the SCNS-ST9 (SCNS-ST9-C). First, HNC is one of the most prevalent cancers in Taiwan, particularly among men. The complexity of this disease and the multimodality treatments that are used is known to cause relatively high levels of distress and increase care needs. Furthermore, the relatively high homogeneity in terms of disease characteristics and treatment modalities in cases with HNC permits the comparison of care needs differences among assumed variables and decreases the risk of introducing confounding factors attributable to different types of cancers.

Therefore, the purposes of this two-phase study were to (a) translate and examine the content and face validity and feasibility of the SCNS-ST9-C and (b) test the internal consistency, reliability, and construct validity of this scale in a sample of patients with HNC in Taiwan.

Methods

This two-phase instrument validation study was conducted from January 2015 to August 2017. Permission to use and translate the SCNS-ST9 into Chinese was obtained from Professor Girgis before conducting the study.

Phase I: Instrument Translation, Content Validity, Face Validity, and Feasibility

The SCNS-ST9-C was developed based on the principles of instrument translation across different cultures and languages (Jones, Lee, Phillips, Zhang, & Jaceldo, 2001). The overall goal of the first phase of instrument translation is to ensure that items reflect the same meaning as the original scale. The original English version was first translated into Chinese independently by two doctoral-prepared nurse researchers who were familiar with both English and Chinese. Next, three experts who were fluent in both English and Chinese evaluated the equivalence of the original and back-translated English versions. A comparison and discussion of the two draft
Chinese versions were conducted by the two translators and corresponding author together. The results showed the two versions to be very similar and that they accurately reflected the meaning of the original English version for each item. The authors then designated one of the two Chinese versions as the initial draft version. Subsequently, a third bilingual, doctoral-prepared nurse researcher was asked to back-translate the Chinese version into English. This back-translated version was evaluated as sufficiently similar to the original SCNS-ST9 English version.

The content validity of the draft SCNS-ST9-C was further evaluated by five experts (two HNC surgeons, two master-degree oncology nurses, and one doctoral-level oncology researcher) for understandability, clarity, relevance, clinical and culture appropriateness, and comprehensiveness in the context of application in populations with cancer (HNC in this study). After a thorough discussion, the results showed complete agreement among the five experts regarding the appropriateness and comprehensiveness of the SCNS-ST9-C, which met the above criteria.

Finally, the face validity of SCNS-ST9-C and the feasibility of using this instrument (Fitzpatrick, Davey, Buxton, & Jones, 1998) were evaluated by 20 patients with HNC who were recruited by convenience sampling from a medical center in Taiwan. Eligibility for participation included (a) having an HNC diagnosis, (b) being able to communicate in Mandarin or Taiwanese, and (c) agreeing to participate after being informed of the study purposes. Patients were recruited after institutional review board approval had been obtained (Institutional review board no. 201408039RINA). These patients reported that the SCNS-ST9-C was easy to follow (higher SCNS-ST9 scores) were hypothesized to correlate positively with symptom severity and psychological distress (depression and anxiety; Au et al., 2013; Chen et al., 2013; Shun et al., 2014; Wang et al., 2018), whereas negative correlations were hypothesized between higher unmet SCN and daily performance status (Chen et al., 2013; Shun et al., 2014) and length of time since treatment completion or cancer diagnosis (Fiszer, Dolbeault, Sultan, & Brédart, 2014; Li, Lin, Zhou, Xu, & Xu, 2019).

With regard to care needs and demographic variables, despite the inconsistent relationships found between SCN and, respectively, patient age and level of education (Wang et al., 2018), previous studies of Chinese populations support that patients who are younger and have higher levels of education have greater care needs (Chen et al., 2013; Li et al., 2019; Shun et al., 2014). Furthermore, female patients have been widely reported as having higher level of unmet SCN (Boyes et al., 2015; Sarkar et al., 2015), particularly unmet psychological and emotional care needs, than male patients.

**Measures**

**Supportive care needs survey screening tool**

As described previously, the SCNS-ST9 addresses the original five main domains of SCN. Each item uses a 5-point Likert-type scoring method, with 1 = no need, not applicable; 2 = no need, satisfied; 3 = low need; 4 = moderate need; and 5 = high need. Each item, subscale, or overall scale may be calculated and transformed into a 0 (no care need) to 100 (very strong care need) scoring system based on the “A Guide to Administration, Scoring and Analysis of the Supportive Care Needs Survey” (McElduff, Boys, Zucca, & Girgis, 2004), with higher scores indicating greater unmet needs with regard to the item, subscale, or overall scale (Girgis et al., 2012).

**Hospital anxiety and depression scale**

The 14-item Hospital Anxiety and Depression Scale is divided into two subscales: anxiety (seven items) and depression (seven items). Each item is scored from 0 = not at all to 3 = always, with a total possible score for each subscale ranging from 0 to 21 and higher subscale scores indicating a higher level of either anxiety or depression. Respondents with subscale scores of ≤ 7 are defined as noncases; 8–10, as doubtful/borderline cases; and ≥ 11, as clinical cases (Zigmond & Snaith, 1983). The Chinese version of the Hospital Anxiety and Depression Scale was shown to be reliable in cancer patient research in Taiwan (Kang, Chen, Hung, Hsiao, & Wang, 2019; Lee, Wu, Chien, Fang, & Hung, 2019).
related information on the participants. In addition, data on form was used to gather demographic and disease/treatment-status were also collected. A background information form 11 general cancer-related symptoms (e.g., pain, fatigue, weakness, dry mouth) and 13 HNC-specific symptoms (e.g., oral mucositis, trismus, shoulder stiffness, speech difficulties, swallowing dysfunction, appearance change). The Cronbach’s α for the SSS in this study was .83.

**Karnofsky performance status scale and background information form**

Karnofsky Performance Status (KPS) is a scale that is used widely to assess the daily performance status of patients with cancer (Karnofsky & Burchenal, 1949; Mor, Laliberte, Morris, & Wiemann, 1984). KPS uses a score range of 0–100, with 0 = death and 100 = fully active normal function (Karnofsky & Burchenal, 1949). A background information form was used to gather demographic and disease/treatment-related information on the participants. In addition, data on clinical characteristics such as cancer type, time since treatment completion, cancer stage, treatment, and performance status were also collected.

**Statistical Analysis**

Cronbach’s α was used to evaluate the internal consistency reliability, and EFA was used to analyze the factor structure of the SCNS-ST9-C. Principal component analysis with varimax rotation was used to extract the factors, with the criteria for retaining factors set at (a) eigenvalue ≥ 1 and (b) clear screen test plot. Items with factor loadings greater than ±.40 were considered important and were retained (Peterson, 2000). We also evaluated the normality of the data. Because the data were not normally distributed, nonparametric analyses were used. Thus, Spearman’s correlation was used to examine the relationship between SCNS-ST9-C and the theoretically supported variables. Finally, a Mann–Whitney U test was used to assess the gender-based differences in care needs in the sample.

**Results**

**Demographic and Clinical Characteristics of the Participants in Phases I and II**

The 20 patients with HNC (male = 16, female = 4) in Phase I had a mean age of 51.1 years, were diagnosed as having stage I–IV HNC, and had all received main anticancer treatments (Table 1). The patients in Phase I had a longer average length of time since treatment completion (M = 38.7 months) and better average performance status than the patients in Phase II.

The 116 patients in Phase II were recruited by consecutive sampling from the same medical center in Northern Taiwan as used in Phase I. The Phase II sample had a mean age of 55.1 years (Table 1). Most (81.9%) were male, three quarters (77.6%) were married, most (56.9%) were educated to the junior or senior high school level, and half (50%) were employed. Slightly more than half (50.9%) had been diagnosed with oral cavity cancer, whereas nearly a quarter (23.3%) had been diagnosed with nasopharyngeal cancer. More than 80% had a cancer of Stage II or higher; nearly half (45.7%) had received surgery with concurrent chemoradiotherapy or radiotherapy; and nearly two thirds (64.6%) reported a “good” performance status, with a KPS score of ≥ 90. Time since treatment completion in Phase II was 12.0 months (Table 1).

**Internal Consistency Reliability of the Nine-Item Chinese Version of the Supportive Care Needs Survey-Screening Tool**

The internal consistency reliability of the overall SCNS-ST9 was .75, as measured using Cronbach’s alpha. With the exception of one item in the Health System & Information subscale (“Being informed about things you can do to help yourself to get well”), the item-to-total correlations in the SCNS-ST9-C were all greater than .30 (Table 2). After conducting an EFA of the factor structure (as discussed below), the Cronbach's alpha for each identified subscale (needs domain) was examined. The Cronbach’s alpha values for “Physical and Daily Living Needs,” “Psychological and Emotional Needs,” “Care and Support,” and “Health System and Information Needs” were .77, .71, .88, and .73, respectively.

**Factor Structure Examined by Exploratory Factor Analysis**

The results of the EFA showed a clear four-factor structure for the SCNS-ST9-C, with 80.63% of the variance explained (Table 3). All of the four factors had eigenvalues greater than 1, and the factor loadings were all higher than .40, ranging from .69 to .94. These four factors, ranked in descending order by explained variance, were “Patient Care and Support Needs (Care & Support),” “Physical and Daily Living Needs (Phy & Living),” “Psychological and Emotional Needs (Psy & Emotion),” and “Health System and Information Needs (System & Inf),” with 38.67%, 18.03%, 12.62%, and 11.31% of the explained variance, respectively. The single item “Sexuality Care Needs” was merged into the “Psychological and Emotional Care Needs” dimension.

To recheck the possibility of retaining the theoretically assumed five-domain SCNS-ST9, an EFA was conducted that forced a five-factor solution. However, the fifth factor had a low eigenvalue (.40). Thus, the four-factor structure of
the SCNS-ST9 was identified as a better model than the assumed five-factor structure.

Correlations to Support Construct Validity

The Spearman’s rank correlation coefficients revealed significant associations between the selected variables and the overall care needs and four domains of subscales. This supports the hypothesis of this study, as patients with higher anxiety, depression, and overall symptom severity had greater overall unmet SCN, with respective $r$ values of .54, .36, and .45.

All of the subscales correlated positively to anxiety, depression, and overall symptom severity with the exception of the system and information care needs subscale (Table 4). Patients with longer time since completion of treatments and better performance reported having fewer overall unmet needs, with correlations of $-0.46$ and $-0.27$, respectively. Moreover, these two variables were found to correlate negatively with the physical and psychological SCN domains. Younger patients reported having higher unmet psychological and emotional SCN ($r = -0.22$), although this difference was not significant with the overall and other SCN domains. Female patients reported having significantly higher overall, psychological, and emotional care needs and SCN ($z = -2.362$, $-2.719$, $-1.239$).
TABLE 2.
*Cronbach’s Alpha and Item-to-Total Correlations of SCNS-ST9-C (N = 116)*

| Item | Original Subscale (Abbreviation) | Item-to-Total Correlation | Cronbach’s α if Item Deleted |
|------|---------------------------------|---------------------------|-----------------------------|
| (1) Lack of energy/tiredness | Physical & daily living (Phy & Living) | .49** | .71 |
| (2) Not being able to do the things you used to do | Physical & daily living (Phy & Living) | .40** | .73 |
| (3) Fears about the cancer spreading | Psychological and emotional (Psy & Emotion) | .57** | .70 |
| (4) Uncertainty about the future | Psychological and emotional (Psy & Emotion) | .52** | .71 |
| (5) Changes in sexual feelings | Sexuality (Sexual) | .39** | .73 |
| (6) Reassurance by medical staff that the way you feel is normal | Patient care & support (Care & Support) | .59** | .71 |
| (7) Hospital staff acknowledging, and showing sensitivity to, your feelings and emotional needs | Patient care & support (Care & Support) | .56** | .70 |
| (8) Being informed about your test results as soon as feasible | Health system & Information (System & Inf) | .31** | .75 |
| (9) Being informed about things you can do to help yourself to get well | Health system & Information (System & Inf) | .23** | .77 |

Note. Overall Cronbach’s α of SCNS-ST9-C = .75. SCNS-ST9-C = nine-item Chinese version of the Supportive Care Needs Survey Screening Tool. **p < .01.

TABLE 3.
*Factor Structure of the SCNS-ST9-C, Analyzed Using EFA (N = 116)*

| Item | Item in SCNS-SF34 Subscale | Item in SCNS-ST9-C Subscale | Factor I | Factor II | Factor III | Factor IV |
|------|----------------------------|----------------------------|----------|-----------|------------|-----------|
| (7) Hospital staff acknowledging, and showing sensitivity to, your feelings and emotional needs | Care & Support | Care & Support | .94 | .35 | .38 | .17 |
| (6) Reassurance by medical staff that the way you feel is normal | Care & Support | Care & Support | .94 | .38 | .43 | .11 |
| (2) Not being able to do the things you used to do | Phy & Living | Phy & Living | .32 | .89 | .38 | -.12 |
| (1) Lack of energy/tiredness | Phy & Living | Phy & Living | .36 | .89 | .25 | .16 |
| (5) Changes in sexual feelings | Sexual | Psy & Emotion | .29 | .18 | .88 | .03 |
| (3) Fears about the cancer spreading | Psy & Emotion | Psy & Emotion | .45 | .49 | .83 | .15 |
| (4) Uncertainty about the future | Psy & Emotion | Psy & Emotion | .62 | .62 | .69 | -.13 |
| (9) Being informed about things you can do to help yourself to get well | System & Inf | System & Inf | .07 | .00 | .09 | .89 |
| (8) Being informed about your test results as soon as feasible | System & Inf | System & Inf | .23 | .09 | .06 | .87 |

Eigenvalues for each factor: 3.48, 1.62, 1.14, 1.02
Variance explained (%): 38.67, 18.03, 12.62, 11.31
Cumulative variance explained (%): 38.67, 56.70, 69.32, 80.63

Note. Together, the four factors explained 80.63% of the variance. SCNS-SF34 = Supportive Care Needs Survey-Short Form 34; SCNS-ST9-C = nine-item Chinese version of the Supportive Care Needs Survey Screening Tool; EFA = exploratory factor analysis.
and $-3.394/p = 0.018, 0.007, 	ext{ and } 0.001$, respectively) and having higher physical care needs ($z = -1.717, p = 0.086$) than male patients to a degree that approaches significance.

### Discussion

This was the first study to validate the psychometric properties of the very brief SCNS-ST9-C. The findings generally support that the very brief nine-item structure of the SCNS-ST9-C has satisfactory psychometrics, making this scale feasible for use in clinical care and research for the quick identification of main care needs of patients with HNC. The important issues addressed in this study are described in the following paragraphs.

First, in Phase I, patients with HNC at different disease stages identified the SCNS-ST9-C as easy to understand and used this scale to reflect their main needs. Furthermore, in Phase II, the SCNS-ST9-C exhibited good internal consistency reliability (Cronbach’s $\alpha = 0.75$). Although one of the items failed to meet the minimum suggested correlation criterion of 0.30 (“Being informed about things you can do to help yourself to get well”: correlation = 0.23), this item was retained because of the first-time validation of the scale. The SCNS-ST9-C is shorter than even most brief scales. However, the use of shorter scales is a trend because of implementation time and cost concerns. With regard to using two-item subscales, as in this study, a prior study showed that using a two-item scale is able to obtain acceptable results with good reliability (Eisinga, Grotenhuis, & Pelzer, 2013). In this study, the Cronbach’s $\alpha$ of all of the SCNS-ST-9 subscales exceeded 0.70, supporting the internal reliability of each subscale. Further validations using larger and more diverse patient populations will be necessary to confirm all of the correlations identified in this study.

Second, the clear, four-factor structure that was abstracted using EFA merged the sexuality care needs dimension (one item) into the “psychological and emotional care needs” domain. One reason for this may be the single-item measure for this dimension, which lacks the strong variance necessary to load as one factor. Another reason may reflect the close relationship between sexuality and psychological issues. The relationship between sexuality and psychological status has been supported in previous studies (Dosch, Rochat, Ghisletta, Favez, & Van der Linden, 2016; Tsatsou et al., 2019). Overall, the clear four-factor structure with more than 80% of explained variance supports the SCNS-ST9-C as a strong screening tool for identifying the domains of needs in patients with HNC.

With the exception of age, the moderate correlations found between the SCNS-ST9-C overall scale and the assumed concepts (physical function, time since treatment completion, anxiety, depression, and symptoms) as well as the significant gender differences strongly support the construct validity of the overall SCNS-ST9-C. Similar to previous study, inconsistencies in the relationships between SCN and age (Wang et al., 2018) may be expected. More research is needed for validation.

In addition, significant correlations were found between most of the variables and the SCNS-ST9-C subscales, with some exceptions of system and information care needs and the care and support domains. This suggests that patients’ needs related to “system and information” and “care and supports” may be either more specific or broader. Further research is suggested to explore these issues.

Although the overall psychometrics of the SCNS-ST9-C was found to be satisfactory in this study, several limitations must be considered. In this study, gender was the only variable selected to examine discriminant validity because of concerns regarding the mixed types of diagnosed patients with HNC with different stages. The test–retest reliability should be studied further to ensure the stability of the SCNS-ST9-C. Moreover, this study was designed as a preliminary examination of the psychometrics of the SCNS-ST9-C and the subjective nature of perceived care needs. Thus, a future study should examine the validity of the SCNS-ST9-C as a predictive tool. Finally, because of the study design, we recruited the population sample with HNC from one hospital only. Future studies should expand psychometric testing to different cancer populations and use multisite data collection.

### Table 4

Results of Spearman’s Correlation Between SCNS-ST9-C and Theoretically Supported Variables (N = 116)

| Variable | Overall SCN | Phy & Living | Psy & Emotion | Care & Support | System & Inf |
|----------|-------------|--------------|---------------|---------------|--------------|
| 1. Age   | -1.10       | 0.05         | -0.22*        | -0.01         | -0.08        |
| 2. Performance status | -0.27** | -0.43** | -0.28** | -0.10 | -0.01 |
| 3. Time since treatment completion | -0.46** | -0.29** | -0.33** | -0.15 | -0.32** |
| 4. Anxiety | 0.54** | 0.32** | 0.57** | 0.38** | 0.23* |
| 5. Depression | 0.36** | 0.47** | 0.35** | 0.25** | -0.03 |
| 6. Overall symptom severity | 0.45** | 0.47** | 0.39** | 0.28** | 0.12 |

Note. SCNS-ST9-C = nine-item Chinese version of the Supportive Care Needs Survey Screening Tool; SCN = supportive care needs, measured by SCNS-ST9-C; Phy & Living = physical and daily living needs; Psy & Emotion = psychological and emotional needs; Care & Support = patient care and support needs; System & Inf = health system and information needs.

*p < .05. **p < .01.
Conclusions
The SCNS-ST9-C is a very brief tool that is psychometrically sound for use with patients with HNC in Chinese-speaking settings. Furthermore, the very low burden of this instrument makes the SCNS-ST9-C highly appropriate for healthcare professionals to use in clinical settings to quickly identify the main care needs concerns of patients with cancer. Further validation of the SCNS-ST9-C in different cancer populations and assessment of the stability, discriminant validity, and predictability of this instrument are recommended. The findings of this study support the integration of the SCNS-ST9-C into hospital cancer treatment and care information systems. The instrument allows the quick assessment of patients’ care needs on a 0–100 scale that reflects the main perceived care needs for specific item(s), subscales, or overall. Using this instrument will allow health professional caregivers to deliver more personalized support that fits the main care needs of patients effectively. Finally, future research to test the use of SCNS-ST9-C to reflect patients’ care needs concerns and as a basis for developing patient-centered interventions is strongly suggested.

Acknowledgments
This was a principal investigator-initiated research. We would like to thank all of the patients involved in this study for their participation and contribution.

Author Contributions
Study conception and design: CCH, LYT, YH Lai
Data collection: CCH, KLY, LYT, SYJ, PJL, CPW, JYK
Data analysis and interpretation: YYF, YH Lee, YH Lai
Study conception and design: CCH, LYT, YH Lai

References
Au, A., Lam, W., Tsang, J., Yau, T. K., Soong, I., Yeo, W., ... Fielding, R. (2013). Supportive care needs in Hong Kong Chinese women confronting advanced breast cancer. Psycho-Oncology, 22(5), 1144–1151. https://doi.org/10.1002/pon.3119
Boyces, A., Girgis, A., & Lecathelinais, C. (2009). Brief assessment of adult cancer patients’ perceived needs: Development and validation of the 34-item Supportive Care Needs Survey (SCNS-SF34). Journal of Evaluation in Clinical Practice, 15(4), 602–606. https://doi.org/10.1111/j.1365-2753.2008.01057.x
Boyces, A. W., Clinton-McHarg, T., Waller, A. E., Steele, A., D’Este, C. A., & Sanson-Fisher, R. W. (2015). Prevalence and correlates of the unmet supportive care needs of individuals diagnosed with a haematological malignancy. Acta Oncologica, 54(4), 507–514. https://doi.org/10.3109/0284186X.2014.958527
Brèdard, A., Kop, J. L., Griesser, A. C., Fiszer, C., Zaman, K., Panes-Ruedin, B., ... Dolbeault, S. (2013). Assessment of needs, health-related quality of life, and satisfaction with care in breast cancer patients to better target supportive care. Annals of Oncology, 24(8), 2151–2158. https://doi.org/10.1007/anconmdt128
Chen, S. C., Chiou, S. C., Yu, C. J., Lee, Y. H., Liao, W. Y., Hsieh, P. Y., ... Lai, Y. H. (2016). The unmet supportive care needs—What advanced lung cancer patients’ caregivers need and related factors. Supportive Care in Cancer, 24(7), 2999–3009. https://doi.org/10.1007/s00520-016-3096-3
Chen, S. C., Lai, Y. H., Liao, C. T., Chang, J. T., Lin, C. Y., Fan, K. H., & Huang, B. S. (2013). Supportive care needs in newly diagnosed oral cavity cancer patients receiving radiation therapy. Psycho-Oncology, 22(6), 1220–1228. https://doi.org/10.1002/pon.3126
Dosch, A., Rochat, L., Ghisletta, P., Favez, N., & Van der Linden, M. (2016). Psychological factors involved in sexual desire, sexual activity, and sexual satisfaction: A multi-factorial perspective. Archives of Sexual Behavior, 45(8), 2029–2045. https://doi.org/10.1007/s10508-014-0467-z
Eisinga, R., Grotenhuis, M., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach, or Spearman–Brown? International Journal of Public Health, 58(4), 637–642. https://doi.org/10.1007/s00038-012-0416-3
Fiszer, C., Dolbeault, S., Sultan, S., & Brèdard, A. (2014). Prevalence, intensity, and predictors of the supportive care needs of women diagnosed with breast cancer: A systematic review. Psycho-Oncology, 23(4), 361–374. https://doi.org/10.1002/pon.3432
Fitzpatrick, R., Davey, C., Buxton, M. J., & Jones, D. R. (1998). Evaluating patient-based outcome measures for use in clinical trials. Health Technology Assessment, 2(14), 1–74. https://doi.org/10.3310/hta2140
Girgis, A., Stojanovski, E., Boyces, A., King, M., & Lecathelinais, C. (2012). The next generation of the supportive care needs survey: A brief screening tool for administration in the clinical oncology setting. Psycho-Oncology, 21(8), 827–835. https://doi.org/10.1002/pon.1973
Harrison, J. D., Young, J. M., Price, M. A., Butow, P. N., & Solomon, M. J. (2009). What are the unmet supportive care needs of people with cancer? A systematic review. Supportive Care in Cancer, 17(8), 1117–1128. https://doi.org/10.1007/s00520-009-0615-5
Hewitt, M., Greenfield, S., & Stovall, E. (Eds.). (2005). From cancer patient to cancer survivor: Lost in transition. Washington, DC: The National Academies Press. Retrieved from https://www.georgiacancerinfo.org/articleImages/articlePDF_396.pdf
International Agency for Research on Cancer, World Health Organization. (2018). Latest global cancer data: Cancer burden rises to 18.1 million new cases and 9.6 million cancer deaths in 2018. Retrieved from https://www.iarc.fr/wp-content/uploads/2018/09/pr263_E.pdf

The authors declare no conflicts of interest.
Validation of SCNS-ST9 Chinese Version

Jones, P. S., Lee, J. W., Phillips, L. R., Zhang, X. E., & Jaceldo, K. B. (2001). An adaptation of Brislin’s translation model for cross-cultural research. *Nursing Research, 50*(5), 300–304.

Kang, H. L., Chen, V. C. H., Hung, W. L., Hsiao, H. P., & Wang, W. H. (2019). Preliminary comparison of neuropsychological performance in patients with non-small-cell lung cancer treated with chemotherapy or targeted therapy. *Neuropsychiatric Disease and Treatment, 15*, 753–761. https://doi.org/10.2147/NDT.S194642

Karnofsky, D. K., & Burchenal, J. H. (1949). The clinical evaluation of chemotherapeutic agents. In McLeod, C. M., ed, *Evaluation of chemotherapeutic Agents* (pp. 191–205). New York, NY: Columbia University Press.

Lee, Y., Wu, Y. S., Chien, C. Y., Fang, F. M., & Hung, C. F. (2016). Use of the Hospital Anxiety and Depression Scale and the Taiwanese Depression Questionnaire for screening depression in head and neck cancer patients in Taiwan. *Neuropsychiatric Disease and Treatment, 12*, 2649–2657. https://doi.org/10.2147/NDT.S112069

Lee, Y. H., Lai, Y. H., Yueh, B., Chu, P. Y., Chen, Y. J., Chen, S. C., & Wang, C. P. (2017). Validation of the University of Washington Quality of Life Chinese Version (UWQOL-C) for head and neck cancer patients in Taiwan. *Journal of the Formosan Medical Association, 116*(4), 249–256. https://doi.org/10.1016/j.jfma.2017.01.002

Li, Q., Lin, Y., Zhou, H., Xu, Y., & Xu, Y. (2019). Supportive care needs and associated factors among Chinese lung cancer survivors: A cross-sectional study. *Supportive Care in Cancer, 27*(1), 287–295. https://doi.org/10.1007/s00520-018-4315-x

McElduff, P., Boyes, A., Zucca, A., & Girgis, A. (2004). *The Supportive Care Needs Survey: A guide to administration, scoring and analysis*. Newcastle, Australia: Centre for Health Research & Psycho-Oncology.

Miller, K. D., Nogueira, L., Mariotto, A. B., Rowland, J. H., Yabroff, K. R., Alfano, C. M., ... Siegel, R. L. (2019). Cancer treatment and survivorship statistics, 2019. CA: A *Cancer Journal for Clinicians, 69*(5), 363–385. https://doi.org/10.3322/caac.21565

Mor, V., Laliberte, L., Morris, J. N., & Wiemann, M. (1984). The Karnofsky performance status scale: An examination of its reliability and validity in a research setting. *Cancer, 53*(9), 2002–2007. https://doi.org/10.1002/1097-0142(19840501)53:9<2002::AID-CNCR2820530933-3.0.CO;2-W

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York, NY: McGraw-Hill.

Peterson, R. A. (2000). A meta-analysis of variance accounted for and factor loadings in exploratory factor analysis. *Marketing Letters, 11*(3), 261–275. https://doi.org/10.1023/A:1008191211004

Renovanz, M., Hickmann, A. K., Coburger, J., Kohlmann, K., Janko, M., Reuter, A. K., ... Hechtner, M. (2018). Assessing psychological and supportive care needs in glioma patients—Feasibility study on the use of the Supportive Care Needs Survey Short Form (SCNS-SF34-G) and the Supportive Care Needs Survey Screening Tool (SCNS-ST9) in clinical practice. *European Journal of Cancer Care, 27*(1), e12598. https://doi.org/10.1111/ecc.12598

Sanson-Fisher, R., Girgis, A., Boyes, A., Bonevski, B., Burton, L., & Cook, P., Supportive Care Review Group (2000). The unmet supportive care needs of patients with cancer. *Cancer, 88*(1), 226–237.

Sarkar, S., Sautier, L., Schilling, G., Bokemeyer, C., Koch, U., & Mehnert, A. (2015). Anxiety and fear of cancer recurrence and its association with supportive care needs and health-care service utilization in cancer patients. *Journal of Cancer Survivorship, 9*(4), 567–575. https://doi.org/10.1007/s11764-015-0434-2

Schmitt, T. A. (2011). Current methodological considerations in exploratory and confirmatory factor analysis. *Journal of Psychoeducational Assessment, 29*(4), 304–321. https://doi.org/10.1177/0734282911406653

Shun, S. C., Yeh, K. H., Liang, J. T., Huang, J., Chen, S. C., Lin, B. R., ... Lai, Y. H. (2014). Unmet supportive care needs of patients with colorectal cancer: Significant differences by type D personality. *Oncology Nursing Forum, 41*(1), E3–E11. https://doi.org/10.1188/14.ONF.E3-E11

Tsatsou, I., Parpa, E., Tsilika, E., Katsaragakis, S., Batistaki, C., Dimitriadou, E., & Mystakidou, K. (2019). A systematic review of sexuality and depression of cervical cancer patients. *Journal of Sex and Marital Therapy, 45*(8), 739–754. https://doi.org/10.1080/0092623X.2019.1610125

Wang, T., Molassiotis, A., Chung, B. P. M., & Tan, J. Y. (2018). Unmet care needs of advanced cancer patients and their informal caregivers: A systematic review. *BMC Palliative Care, 17*(1), 96. https://doi.org/10.1186/s12904-018-0346-9

Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica, 67*(6), 361–370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x