

Quality of life in head and neck cancer survivors at 1 year after treatment: the mediating role of unmet supportive care needs

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Abstract

Purpose The aim of the study was to test a hypothesised model that supportive care needs (SCNs) have a mediating effect on the relationship between characteristics of (Chinese) head and neck cancer (HNC) survivors and their quality of life (QoL).

Methods A total of 285 Chinese HNC survivors who had finished cancer treatment 1 year earlier completed a self-reported survey covering demographic and clinical characteristics, the Chinese version of the Short-Form Supportive Care Needs Questionnaire (SCNS-SF34-C), the supplementary module of access to healthcare and ancillary support services and the Functional Assessment of Cancer Therapy for Head and Neck Cancer (FACT-H&N).

Results The final path model showed that optimism, educational level, any coexisting disease, number of somatic symptoms, household income, eating ability, support from others, whether the cancer is under control or not and travelling time

from home to hospital have direct or indirect effects, or both, on the QoL of HNC survivors, by way of unmet SCNs in the psychological, physical and/or health system information domains, which account for 64 % of the variance in the total FACT-H&N score.

Conclusions Our study demonstrated the mediating effects of SCNs in the association between HNC survivors and their QoL. Early needs assessment may help healthcare professionals to identify the actual needs of these survivors, and providing the information that HNC survivors want is a significant factor in meeting their psychological needs and thereby improving their overall QoL.

Keywords Head and neck cancer survivors · Supportive care needs · Quality of life · Chinese · Path analysis

Introduction

Head and neck cancer (HNC) is prevalent in Hong Kong. It includes cancer of the lip, oral cavity, pharynx, larynx, paranasal sinuses and salivary glands [1]. In 2010, 1,586 people were diagnosed with HNC in Hong Kong, of whom 575 died. The majority of HNC survivors were middle-aged males of 45–64 who were likely to be the breadwinners of their families [2].

With advancements in early cancer detection and treatment, the prognosis of survivors is relatively favourable, and the population is increasing [2]. However, prolonged life does not necessarily mean a good quality of life (QoL), as studies have reported that HNC survivors experience poor QoL and, because of the treatment, may continue to suffer from obviously debilitating problems concerned with swallowing, speech and hearing as well as psychological effects due to

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loss of functions and changes in body image [3–6]. Study results also suggest that HNC survivors display more impaired QoL than survivors of other cancer types [7].

One review study evaluated the QoL of HNC survivors a year after treatment [6] and found that deterioration in physical functioning, fatigue, xerostomia and sticky saliva, age, cancer site, stage of disease, social support, smoking, feeding tube placement and alcohol consumption were all significant determinants of QoL at that point. Other studies have suggested that cancer survivors who are more optimistic seem to have better QoL and posttreatment prognosis than those who are less so [8–10]. Prolonged distress may bring long-term consequences for the survivor's health and increase the burden on health and social care services [11–13]. Thus, it is essential that service providers put more effort into identifying unmet needs and provide person-centred care to HNC survivors [14].

The term 'supportive care needs' (SCNs) can refer to any care given to cancer patients and their families from diagnosis to death and bereavement [15]. Bonevski et al. [16] identified five domains of SCNs in patients with cancer: psychological state, health system and information, physical and daily living, patient care and support, and sexuality. One systematic review reported that the prevalence of unmet SCNs among cancer survivors varied from 30 to 50 % across studies [15], and other work has shown that a higher number of unmet SCNs is significantly associated with psychological morbidity and impaired QoL [6, 17].

A few studies have been concerned with associations between demographic and clinical factors and SCNs among cancer survivors. Barg et al. [18] examined the unmet psychosocial needs of 614 cancer survivors, with the results suggesting that a higher prevalence of unmet SCNs was associated with lower age, female sex, presence of comorbidities, lower socioeconomic status and a poorer supporting network. So et al. [6] investigated perceived unmet SCNs and QoL among 376 Chinese cancer survivors who had completed treatment less than a year earlier. The findings showed that lower age, advanced stage of cancer, remission, higher education level and higher household income were all significantly associated with one or more unmet SCN domains. However, evidence for the factors influencing cancer survivors' unmet SCNs may not be able to apply to specific cancer types, including HNC [15].

Though previous research has evaluated the association between the unmet SCNs and QoL of cancer survivors [19], surprisingly little empirical knowledge exists about any possibility that the unmet SCNs of HNC survivors may play a mediating role between their demographic and clinical characteristics and their QoL.

Identifying this mediating role may help to meet the actual needs of HNC survivors and improve their QoL—the ultimate goal of quality care services. However, earlier studies concerned with cancer survival were conducted on Western populations, and there was only limited work on Chinese populations [20–22]. More investigation of the unmet SCNs and their relationship with the QoL of Chinese HNC survivors was needed to fill the knowledge gap concerning this vulnerable group.

We therefore set up a hypothetical model conceptualising the notion that SCNs might play a mediating role in relating different demographic and clinical characteristics to QoL among HNC survivors (see Fig. 1). Confirmation of the hypothetical model is important as such a body of knowledge could inform healthcare professionals about how to improve the QoL of HNC survivors by meeting their SCNs and would suggest a research agenda for a future model of care to meet the SCNs of cancer survivors.

According to a published study protocol about perceived unmet SCNs and determinants of QoL among HNC survivors [23], we tested the following research questions arising from the proposed model:

1. What are the characteristics of HNC survivors, at 1 year after treatment, associated with their quality of life?
2. Is there a mediating effect of perceived unmet SCNs in the association between QoL and demographic and clinical characteristics in these survivors?

Methods

Sample and procedure

The study was conducted at outpatient clinics of the oncology departments of three local public hospitals. Eligible patients were Chinese who (1) were 18 years or older at the time of diagnosis, (2) were diagnosed with primary HNC, (3) had finished all treatment for HNC not more than 1 year before, and (4) were able to communicate in Chinese. However, those who had a history of psychiatric problems or metastatic brain disease, any other type of cancer or recurrence of the original condition or who had received additional treatment in the year after the conclusion of all cancer treatment were excluded from the study. A total of 285 out of 320 eligible subjects took part in the study (response rate=89.1 %) and were asked to fill in a structured self-report survey at the clinic. Medical records were reviewed by research staff to obtain

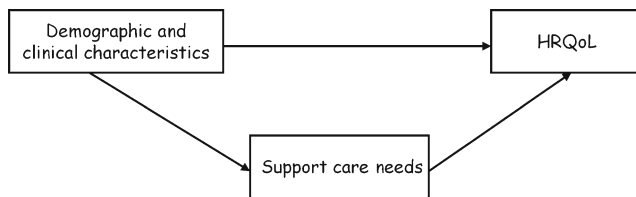


Fig. 1 Hypothesised mediation model relating support care needs, demographic and clinical characteristics with health-related quality of life

participants' clinical histories, which together with their demographic characteristics are presented in Table 1. The study protocol was approved by the clinical research ethics committee at each site. An informed consent was obtained from all subjects participated in the study.

Sample size consideration

Since structural path model is essentially a matrix representation of sets of simultaneous multivariable regression equations, we thus adopted multivariable regression approach to estimate the sample size for developing an initial path model based on our hypothesised mediation model (Fig. 1). We aim to detect a small effect size of Cohen's $f^2=0.03$ (i.e. proportion of variance explained, $R^2=f^2/1+f^2=0.0299$) for all the potential explanatory variables of the outcome variable (QoL) [24]. Using PASS 12 (NCSS, Kaysville, USA), it was estimated that a sample size of at least $n=256$ would be able to detect explanatory variables with such a small effect size of $f^2=0.03$ at 80 % power and 5 % level of significance. A leading expert in the field of structural equation modelling (SEM), Loehlin [25] recommended that 200 or more subjects for performing SEM [25]. By this standard, our proposed sample size $n=256$ would also be sufficient for modifying our initial path model to obtain a final path model using SEM. Allowing for 10 % listwise missing values, we aimed to recruit a total of 285 ($=256/0.9$) subjects into the study.

Measures

Demographic and clinical characteristics

The following demographic information was collected from participants during interviews: age, gender, marital status, educational level, employment status, average monthly income, number of family members, living arrangements, social networks and any coexisting disease(s). They were also asked about their eating ability, optimism and experience of symptoms. Clinical data obtained from patients' medical records included the stage of disease, type of cancer treatment, major surgery, time since diagnosis and completion of treatment, and whether a feeding tube was used.

Table 1 Sociodemographic and disease characteristics of the study sample ($n=285$)

	Mean (SD)/ Median (IQR)
Sociodemographic characteristics	
Age (years) ^a	55.3 (12.3)
Sex, n (%)	
Male	219 (76.8)
Female	66 (23.2)
Marital status, n (%)	
Single/divorced/widowed	51 (17.9)
Married/cohabitation	234 (82.1)
Educational level, n (%)	
No formal education/primary	93 (32.6)
Secondary	156 (54.7)
Post-secondary or above	36 (12.6)
Employment status, n (%)	
Unemployed/retired/homemaker	181 (63.5)
Employed	104 (36.5)
Household monthly income (HK\$)	
$\leq 10,000$	110 (39.6)
10,001–30,000	115 (41.4)
$> 30,000$	53 (19.1)
Living alone, n (%)	
No	266 (93.3)
Yes	19 (6.7)
Number of household members, n (%)	
1–2	69 (24.3)
3–4	163 (57.4)
≥ 5	52 (18.3)
Number of people whom you can count on for help and support, n (%)	
0–1	84 (29.5)
2–3	100 (35.1)
≥ 4	101 (35.4)
Time travelling from home to hospital (min) ^b	40 (30–60)
Disease characteristics	
Time since diagnosis (months) ^a	8.0 (3.8)
Time since after treatment (months) ^a	4.5 (3.4)
Stage of disease, n (%)	
I	65 (22.8)
II	67 (23.5)
III	148 (51.9)
Unsure	5 (1.8)
Specific sites of the cancer, n (%)	
Pharynx	209 (73.3)
Larynx	36 (12.6)
Tongue	19 (6.7)
Salivary gland	12 (4.2)
Oral cavity	5 (1.8)
Nasal cavity	2 (0.7)
Accessory sinus	2 (0.7)

Table 1 (continued)

Type of treatment received, <i>n</i> (%)	
Radiotherapy only	88 (30.9)
Surgery only	4 (1.4)
Chemotherapy only	2 (0.7)
Radiotherapy and surgery	38 (13.3)
Radiotherapy and chemotherapy	145 (50.9)
Radiotherapy, chemotherapy and surgery	8 (2.8)
Presence of feeding tube, <i>n</i> (%)	
No	279 (97.9)
Yes	6 (2.1)
Any coexisting disease, <i>n</i> (%)	
No	269 (94.4)
Yes	16 (5.6)
Cancer is under control or diminishing, <i>n</i> (%)	
Yes	180 (63.2)
No/unsure	105 (36.8)
Somatic symptoms, <i>n</i> (%)	
Fatigue	217 (76.1)
Mouth/throat sores	143 (50.2)
Problem with mucus	131 (46.3)
Problem with teeth or gum	132 (46.3)
Difficulty swallowing or chewing	183 (64.2)
Dry mouth	272 (95.4)
Taste change	236 (82.8)
Difficulty with speech or communication	86 (30.2)
Skin pain/burning	77 (27.1)
Neck and shoulder pain	124 (43.5)
Reduced range of motion in neck and shoulder	115 (40.4)
Feeling sad	93 (32.6)
Feeling anxious	129 (45.3)
Tinnitus	19 (6.7)
Numbness	5 (1.8)
Hearing impairment	17 (6.0)
Vision impairment	5 (1.8)
Cough	5 (1.8)
Nasal secretion	4 (1.4)
Headache	4 (1.4)
Edema	2 (0.7)
Dizzy	2 (0.7)
Others (hair loss, stomachache, nausea, back pain)	15 (5.3)
Number of somatic symptoms ^a	7.1 (3.2)
Perceptions related to eating ability and attitude towards life	
Eating ability [range: 0=very bad to 10=very good] ^a	6.0 (2.4)
Attitude towards life [range: 0=completely pessimistic to 10=completely optimistic] ^a	7.5 (1.9)

Data with no marks are presented as frequency (percentage)

^a Data are presented as mean (standard deviation)

^b Data are presented as median (interquartile range)

Supportive care needs

Supportive care needs of the participants were examined by means of the Chinese version of the Short-Form Supportive Care Needs Questionnaire (SCNS-SF34-C), which comprises 34 items divided into five domains (physical/daily living, psychological state, patient care and support, sexuality, and health system and information needs). Participants were questioned about their level of need for help over the previous month. Their needs were measured on a five-point scale: no

need—not applicable, no need—satisfied, low need, moderate need or high need. Subscale scores were then calculated according to the guideline [26]. The English version of SCNS-SF34 has been used by patients with different types of cancer [27–30]. The SCNS-SF34-C is a valid and reliable instrument [31] and has been used to assess SCNs in women with breast cancer [32]. In the current study, the Cronbach alpha coefficient for the subscales ranged from 0.72 to 0.91.

Quality of life

The Functional Assessment of Cancer Therapy for Head and Neck Cancer (FACT-H&N)—Chinese version was used to examine survivors' QoL. The instrument consists of 38 items divided into five domains: physical, emotional, social and functional well-being, and HNC subscales. Each item is rated on a five-point scale (0=not at all, 1=a little bit, 2=somewhat, 3=quite a bit, 4=very much). Both total and subscale scores for each domain of well-being are calculated, with higher scores indicating better functional status. The Chinese version of FACT-H&N is available with acceptable results in validity and reliability tests [33]. In this study, the Cronbach alpha coefficient for the entire scale was 0.75.

Statistical analyses

Data were summarised and presented using appropriate descriptive statistics. Skewed and normally distributed continuous variables were presented by their medians (interquartile ranges) and means (standard deviations), and categorical variables by frequencies (percentages). The normality of the variables was assessed by means of skewness statistics and normal probability plots. Time spent travelling from home to hospital was positively skewed and naturally log-transformed before being entered into inferential analyses.

The total FACT-H&N score was used to measure the survivors' overall QoL, and their unmet SCNs were measured by the five domain scores on the SCNS-SF34.

Stepwise multivariable regressions, with standard entry and removal criteria set at $p < 0.05$ and $p > 0.1$ respectively, were conducted to identify participants' demographic and clinical characteristics associated with the total scores on FACT-H&N. Those characteristics with $p < 0.25$ in univariate association analysis [34] with the total score of FACT-H&N were chosen as candidate-independent variables for the stepwise multivariable regression analyses.

Path analysis was used to examine relationships among the studied demographic and clinical characteristics, unmet SCNs and QoL of H&N cancer survivors. In particular, the hypothesised mediation model presented in Fig. 1 was built and assessed using path analysis.

The approach of Lee et al. [35] was adopted to conduct the path analysis. Exploratory univariate

analyses were first performed to assess the association between each of the studied demographic and clinical variables and each of the five domain scores of SCNS-SF34 and the total FACT-H&N score. Demographic and clinical variables with $p < 0.25$ in the univariate analysis [34] were used to build up an initial mediation model based on the hypothesised model in Fig. 1. The initial model was then modified by subsequently adding plausible paths with the use of modification indices and trimmed to obtain the final model by subsequently deleting insignificant paths.

The path analyses were performed using LISREL 8.8 (Scientific Software International Inc), and the parameters were estimated by the maximum likelihood method. Chi-square testing and several goodness-of-fit indices were used to assess the overall fit of the path models. Guided by Schermelleh-Engel et al. [36], the following goodness-of-fit indices were chosen: (1) root mean square error of approximation (RMSEA), (2) standardised root mean square residual (SRMR), (3) adjusted goodness-of-fit index (AGFI), (4) comparative fit index (CFI) and (5) nonnormed fit index (NNFI). Smaller values of RMSEA and SRMR indicate a better fit, with values ≤ 0.08 (for RMSEA) and 0.10 (for SRMR) indicating an acceptable fit, and with values ≤ 0.05 (for both RMSEA and SRMR) indicating a good fit [37]. The AGFI, CFI and NNFI usually range from 0 to 1, with $AGFI \geq 0.85$, $CFI \geq 0.95$ and $NNFI \geq 0.95$ indicating an acceptable fit to the data, and $AGFI \geq 0.9$, $CFI \geq 0.97$ and $NNFI \geq 0.97$ indicating a good fit [37]. All other statistical analyses were performed by using SPSS 18.0 (SPSS Inc, Chicago). All statistical tests were two-sided, and a p value < 0.05 was considered statistically significant.

Results

Participants' characteristics associated with their quality of life

Multivariable regression analyses using all the patient characteristics listed in Table 2 as candidate-independent variables revealed that (1) household income (standardised regression coefficient $\beta = 5.190$, $p = 0.018$), (2) number of people able to offer help ($\beta = 4.370$, $p = 0.026$), (3) travelling time between home and hospital ($\beta = -1.231$, $p = 0.003$), (4) whether the cancer was under control ($\beta = -3.624$, $p = 0.025$), (5) number of symptoms ($\beta = -2.257$, $p < 0.001$), (6) eating ability ($\beta = 1.877$, $p < 0.001$) and (7) attitude towards life ($\beta = 2.713$, $p < 0.001$) were significantly associated with the total FACT-H&N score. Participants with a low household

income, few people to help them and longer travelling time to hospital for medical follow-up, and those whose cancer was unsure/not under control, had more symptoms and poorer perceived eating ability and showed more pessimism towards life were independently associated with poorer HRQoL than their counterparts (Table 2).

Mediating role of unmet needs in the relationship between patient characteristics and QoL

Path analyses were conducted to examine the mediating effect of different unmet SCNs in the association between participant characteristics and QoL at 1 year after treatment. Since all the studied demographic and clinical characteristics listed in Table 2 had p values < 0.25 in univariate association analysis with either the five domain scores of the SCNS-SF34 or the total FACT-H&N score, all of them were used to construct an initial path model on the basis of the hypothesised mediation model (Fig. 1). By subsequently deleting the nonsignificant paths ($p \geq 0.05$) from the initial path model and adding plausible paths on the basis of modification indices, the final model was obtained and is shown in Fig. 2.

The χ^2 of the final model is 88.2 with $df = 80$ and $p = 0.249$. The insignificance of the chi-square test and goodness-of-fit indices (RMSEA = 0.02, SRMR = 0.038, CFI = 0.99, NNFI = 0.98 and AGFI = 0.94) indicate that the final model is a good fit to the data [36].

The final path model shows that attitude towards life, educational level, coexisting diseases, somatic symptoms, household income, eating ability, support from others, whether cancer is under control or not and travelling time from home to hospital have direct or indirect effects or both on survivors' QoL, by way of unmet SCNs in psychological, physical and/or health system information domains, accounting for a total 64 % of the variance on the overall FACT-H&N score.

The mediating effect of the physical aspect of SCNs was identified in the relationship between attitudes towards life, number of symptoms, travelling time, whether cancer was under control or not and support from others. Also, health system information and psychological needs demonstrated their mediating role in the association between QoL and the attitude towards life score, number of symptoms, education, coexisting diseases and travelling time. In other words, although HNC survivors with fewer people providing support and longer travelling time, and who were unsure whether their cancer was under control, had more symptoms and were pessimistic about their lives and were more likely to perceive poorer QoL, which could be improved if they were able to meet their physical needs. Those who had

Table 2 Patient characteristics associated health-related quality of life (FACT-H&N) among head and neck cancer patients

	Bivariate analysis		Multivariable analysis		
	Correlation/mean (SD)	<i>p</i> value	β	SE	<i>p</i> value
Demographic characteristics					
Age (years)	0.163	0.006	NS	NS	NS
Sex					
Male (ref)	100.3 (19.3)	0.104	NS	NS	NS
Female	96.0 (17.7)				
Marital status					
Single/divorced/widowed (ref)	97.1 (18.2)	0.372	_ ^b	_ ^b	_ ^b
Married/cohabitation	99.8 (19.1)				
Educational level					
No formal education/primary (ref)	100.3 (18.7)	0.170	NS	NS	NS
Secondary	97.7 (19.3)				
Post-secondary or above	103.9 (17.7)				
Employment status					
Unemployed/retired/homemaker (ref)	97.0 (18.9)	0.006	NS	NS	NS
Employed	103.4 (18.5)				
Household monthly income (HK\$)					
≤10,000 (ref)	95.6 (17.9)	0.010			
10,001–30,000	101.3 (19.2)		0.652	1.730	0.707
>30,000	104.4 (18.8)		5.190	2.184	0.018
Living alone					
No (ref)	99.0 (19.0)	0.301	_ ^b	_ ^b	_ ^b
Yes	103.9 (18.0)				
Number of household members					
1–2 (ref)	101.6 (17.5)	0.573	_ ^b	_ ^b	_ ^b
3–4	98.6 (18.4)				
≥5	99.1 (22.2)				
Number of people whom you can count on for help and support					
0–1 (ref)	96.3 (19.2)	0.007			
2–3	97.1 (19.2)		−0.030	1.961	0.988
≥4	104.1 (17.8)		4.370	1.956	0.026
Time travelling from home to hospital (minutes) ^a	−0.151	0.011	−1.231	0.412	0.003
Disease characteristics					
Time since diagnosis (months)	0.010	0.870	_ ^b	_ ^b	_ ^b
Time since after treatment (months)	0.076	0.203	NS	NS	NS
Stage of disease					
I (ref)	104.2 (17.1)	0.007	NS	NS	NS
II	101.5 (19.4)				
III	96.0 (19.2)				
Treatment received					
Single treatment only (ref)	101.0 (17.4)	0.293	_ ^b	_ ^b	_ ^b
Combined treatment	98.5 (19.7)				
Presence of feeding tube					
No (ref)	99.7 (18.9)	0.016	NS	NS	NS
Yes	81.0 (10.7)				
Any coexisting disease					
No (ref)	99.6 (19.0)	0.309	_ ^b	_ ^b	_ ^b
Yes	94.5 (19.0)				

Table 2 (continued)

	Bivariate analysis		Multivariable analysis		
	Correlation/mean (SD)	<i>p</i> value	β	SE	<i>p</i> value
Cancer is under control or diminishing					
Yes (ref)	101.7 (19.5)	0.004			
No/unsure	95.1 (17.3)		-3.624	1.604	0.025
Somatic symptoms					
Number of somatic symptoms	-0.626	<0.001	-2.257	0.282	<0.001
Perceptions related to eating ability and attitude towards life					
Eating ability [range: 0=very bad to 10=very good]	0.532	<0.001	1.877	0.365	<0.001
Attitude towards life [range: 0=completely pessimistic to 10=completely optimistic]	0.525	<0.001	2.713	0.466	<0.001

β regression coefficient, *SE* standard error of the regression coefficient, *NS* not statistically significant in stepwise multivariable regression

^a Square root-transformed to correct its skewness when entering into the statistical analyses

^b Not being entered into multivariable regression (bivariate analysis of *p* value ≥ 0.25)

obtained higher education, showed more symptoms, were pessimistic, had a longer travelling time, suffered from a coexisting disease and were able to meet health system information needs were more likely to have poorer QoL. However, their QoL would be improved when their health system information and psychological needs were met.

Discussion

Demographic and clinical-related factors associated with quality of life

The findings of regression analyses showed that poorer quality of life was associated with low household income, few

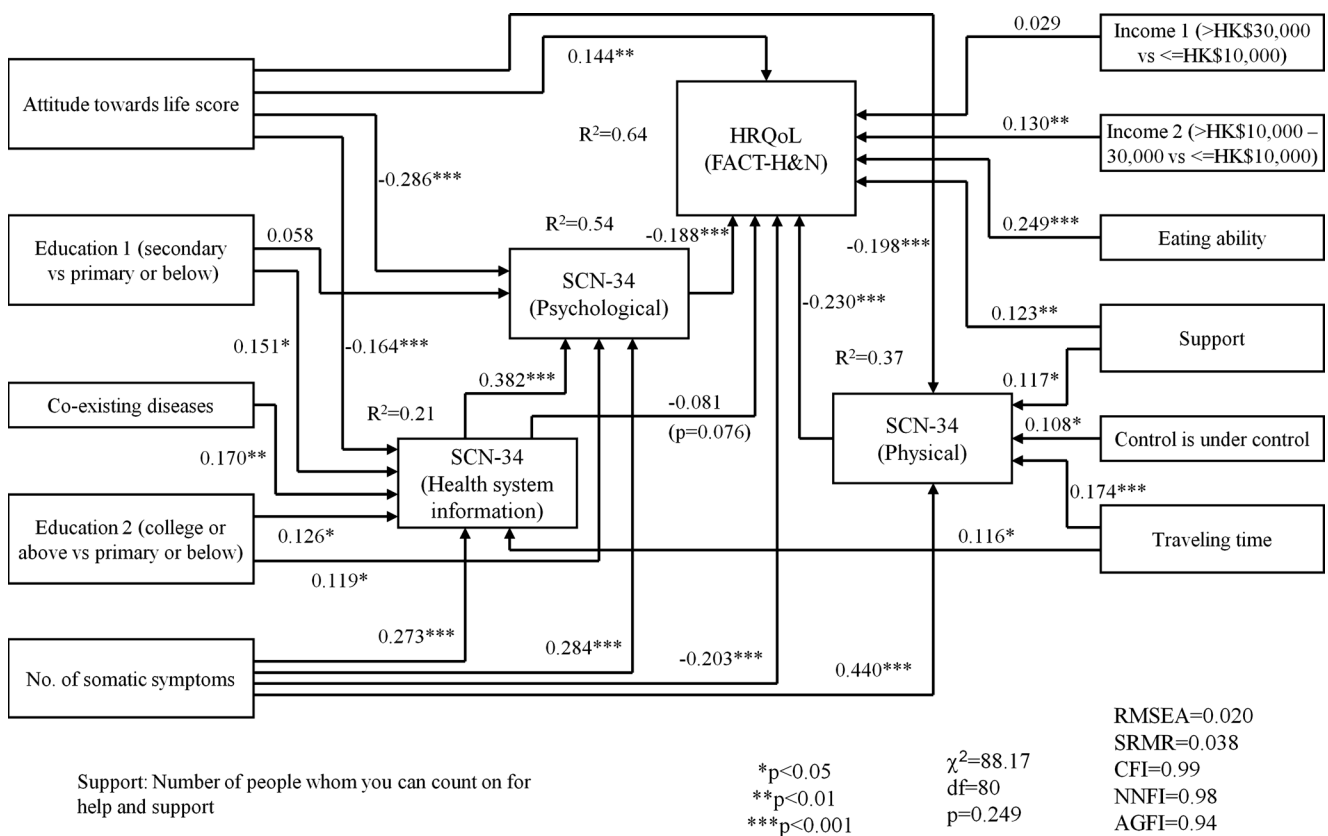


Fig. 2 Path diagram relating support care needs, demographic and clinical characteristics with health-related quality of life among head and neck Chinese cancer survivors

people offering help, longer travelling time to hospital for medical follow-up, poorer or uncertain disease prognosis, more symptoms, lower perceived eating ability and more pessimism towards their lives. The results were partly consistent with those of previous studies [6], which is not surprising considering the heterogeneous nature of HNC survivors in demographic background, diverse cancer treatment and different stages of the disease. One of the strengths of this study is that determination of selected study variables for regression analysis was based on the previous literature. The findings identified a high-risk group of Chinese HNC survivors who may perceive poorer QoL, providing useful information for healthcare professionals and directing them to pay more attention to this particular group of survivors after treatment.

Mediating effect of SCNs in the association between quality of life and characteristics of HNC survivors

The main purpose of the study was to test the hypothesis that SCNs may play a mediating role relating different demographic and clinical characteristics with QoL among HNC survivors. To the best of the researchers' knowledge, this is the first study to use a hypothesised model to examine the nature of the association between survivor characteristics, SCNs and quality of life. The findings of the study reported the mediating effect of SCNs on QoL and the survivors' demographic and clinical characteristics. In particular, physical, psychological and health system/information needs play a vital role in influencing QoL among HNC survivors with specific demographic and clinical characteristics ($R^2=64\%$).

The mediating effect of physical needs was reported in the relationship between HNC survivors who had specific demographic and clinical backgrounds (less social support, longer travelling time, unsure whether cancer was under control, more symptoms and a pessimistic attitude) and their QoL. This implies that the QoL of this particular group of survivors can be improved when their physical needs are met. It is interesting to identify the relationship between psychosocially related constraints and physical needs. Even though survivors are relatively pessimistic with limited social support, their overall QoL can be improved when their physical needs can be met.

Another interesting finding of this study was the indirect mediating effect of health system and information in the association between specific backgrounds of HNC survivors and their QoL. A significant relationship was identified between health system/information and psychological needs. While controversial findings of an inverse relationship between the provision of information and levels of psychological distress have been reported in the literature [38, 39], HNC survivors suffered less fear and distress in this study when they were told what they wanted to know about the disease, diagnosis, treatment or related follow-up issues [40]. The effects of meeting psychological needs are more apparent

among HNC survivors who had had a higher education, suffered from a coexisting disease and more symptoms and were less optimistic. The results of this study may encourage healthcare professionals to provide all necessary information to HNC survivors to relieve their fear and anxiety and, in turn, improve their overall QoL.

Limitations of the study

There are several limitations to the present study that need to be addressed. First, a cross-sectional design was used, which could not examine the mediating effects of SCNs over time in the association between the survivors' QoL and their demographic and clinical characteristics. Second, the target population in this study was limited to HNC patients who had completed cancer treatment within the previous year, and the findings may therefore not be applicable to long-term HNC survivors. Third, the results of the study revealed that SCNs and survivors' characteristics explained 64 % of the variance in overall QoL. The remaining 36 % indicates the existence of unexpected factors such as the percentage of weight loss throughout the treatment yet to be examined. Fourth, a convenience sample was used, although eligible subjects were recruited from three oncology units in different geographical areas. These limitations should be borne in mind when interpreting the findings of the study or generalising them to other settings.

Conclusions

The study illustrates the mediating effect of SCNs in the relationship between specific characteristics of Chinese HNC survivors and their overall QoL. Early assessment of SCNs perceived by HNC survivors may help healthcare professionals to work with these patients to develop a targeted care plan. Interventions that aim at meeting the specific needs of these survivors and delivering what they really want may be more effective in enhancing their QoL. The hypothesised model used here can be applied to other types of cancer survivors in future studies.

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

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