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Original Article

Screening for levels of social difficulties and unemployment in head and neck cancer patients by University of Washington Quality of Life Questionnaire (UW-QOL): Current status and cut-off point establishment

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Abstract *Background/purpose:* Social function and employment are vital to the quality of life in head and neck cancer (HNC) survivors. This study aimed to (1) assess the status of social difficulties (including getting along with others, social participation and unemployment); (2) examine their associations with the University of Washington Quality of Life Questionnaire (UW-QOL); and (3) establish UW-QOL cut-off points for identifying social difficulties after primary treatment.

Materials and methods: The cross-sectional study was conducted at a medical center in Taiwan, involving HNC survivors under 65 years who completed primary treatments. Data collection included the UW-QOL, the "getting along" and "social participation" subscales of the WHO Disability Assessment Schedule 2.0 (WHODAS 2.0), employment status, and demographic and clinical characteristics.

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Results: A total of 164 HNC survivors was recruited. Among them, 49.4 % reported difficulty in social participation, 20.7 % had difficulty getting along with others, and 25.6 % were unemployed. UW-QOL scores were highly correlated with the two social function subscales and significantly differed between employed and unemployed individuals. UW-QOL cut-off scores indicating mild to severe difficulty were 75.0, 73.3, and 63.9 for social participation; 63.9, 60.8, and 58.5 for getting along; and 76.8 for unemployment.
Conclusion: The study showed that social difficulties are a concern for HNC survivors. Importantly, the study provides strong evidence to support that UW-QOL can be used to concurrently assess for QOL and the main social difficulties through the cut-off points in UWQOL.

Introduction

Cancer diagnosis and treatments may cause acute to long-term distress.[1,2] Across all types of cancers, head and neck cancer (HNC) accounts for an estimated 890,000 new cases per year around the word.[3] The median age at diagnosis is around 60 years and varies by region.[4] In Taiwan, the majority of patients with HNC were middle-aged (40—60 years, median age is 58 years) males and had an increase in 5-year survival (over 50 %).[5] Middle adulthood represents the stage of productivity with societal contributions to even as the primary providers for their families for men.[6,7] HNC survivors may experience even more severe distress due to complicated multimodalities treatments in head and neck areas and thus influence their quality of life (QOL) and social function, particularly, for those in middle age HNC survivors.[8,9] Concurrently assessment of social function, employment status and quality of life is therefore important to this population.

Social function is defined as individuals fulfilling identified roles or needs within society. Three important social functions include getting along (with others), social participation, and working/employment.[10] Getting along involves building friendships and establishing connections with people, and social participation refers to how individuals engage in various types of social activities.[11] Employment is a social task and one of the central elements of the social function.[10] Job opportunities and career choices may be restricted, making it difficult for cancer survivors to maintain employment.[12—14] A review found that HNC survivors generally require 3.6—11 months to return to work, and 32—90 % of HNC survivors had difficulty in maintaining their employment status to resume their social roles.[15] Difficulties in carrying out social function can lead to psychological distress and trigger severe psychological symptoms.[16—18] HNC survivors increase suicidal problems three times more than the general public, and the suicide rate is higher compared with survivors of other cancers.[17,19,20] Therefore, it is critically necessary to assess social function in HNC survivors and implement effective prevention measures.

However, questionnaires like the Social Adjustment Scale Self-Report, Social Adaptation Self—Evaluation Scale, or World Health Organization (WHO) Disability Assessment Schedule 2.0 (WHODAS 2.0), which are used to evaluate patients' social function, are relatively time-consuming and might not easily be applied for each HNC patients in busy clinical settings.[21—23] Thus, in the current study, we use and assume a commonly used brief and validated quality of life assessment — "University of Washington Quality of Life (UW-QOL) questionnaire"[24] can be a screening tool to concurrently reflect HNC patients' social function and employment status. The 12-item UW-QOL version 4 is psychometrically valid and widely used QOL assessment instrument for HNC patients.[25] It features a straightforward scoring system, allowing for quick measurement within 1—3 min, making it suitable for routine screening of possible symptoms and difficulties in clinical practice.[26,27]

Three indicators of social function were included in the study: (1) social participation, (2) getting along (with others) and (3) employment status. For social participation and getting along, we used the two identical scales from the World Health Organization (WHO) Disability Assessment Schedule 2.0 (WHODAS 2.0) as the self-reported measures. The WHODAS 2.0 has been widely used in research across various diseases, including cancer[13,28,29] and has shown its effectiveness in evaluating the functional status including aspects of social function.[23,30] For employment, employed and unemployed were identified as the third social function indicator.

Thus, the specific aims of the study were to (1) explore the social participation, getting along and employment status in HNC survivors; (2) to examine the degrees of correlation or association between UW-QOL scores and patients' social participation, interpersonal relationships, and employment status; and (3) to determine the UW-QOL cut-off points that correspond to varying levels of these three indicators of social function. For research purpose 3, we would identify the evidence-based risk scores/cut-off points for social difficulties and unemployment through calculating the "receiver operating characteristics" (ROC) curve on UW-QOL. This would allow researchers to quantify the diagnostic accuracy using sensitivity, specificity, positive likelihood ratio, and negative likelihood ratio.[31]

Materials and methods

Design and sample

A cross-sectional study with consecutive sampling was conducted to recruit subjects in a HNC outpatients in a medical center in Taiwan. Eligible subjects were (1) adult who diagnosed as HNC and nasopharyngeal cancer (NPC)

within 10 years and had completed major treatments, (2) patients under the age of 65 who were employed (had job) prior to diagnosis, (3) agree to participate in the research, (4) capable of verbal or written communication without psychiatric disorders. Institute Review Board (IRB) approval (201408039RINA) were obtained and patients' written consents were obtained before data collection. Eligible subjects were approached and assessed by two trained research nurses.

Measures

Quality of life (QOL)

The QOL was measured by the UW-QOL version 4. The UW-QOL was first developed in 1993 and is currently modified into version 4 to measure the QOL in patients with HNC specifically.[25,32] The validated Chinese version supports its feasibility and validity in the Chinese HNC population, with a Cronbach's α coefficient of 0.78.[33] The UW-QOL comprises 12 quality of life related items, including pain, appearance, activity, recreation, swallowing, chewing, speech, shoulder function, taste, saliva, anxiety, and mood. Each item is graded on a scale from 0 to 100 and 0 representing "severe dysfunction" and 100 representing "no problem at all.[25]

Social participation and getting along (with others)

Social participation and getting along (with others) are the two main social function which were assessed by the two identical subscales from the WHODAS 2.0. It has been developed and widely used in previous studies in assessing function and disability related to various disease. The self-administration mode of WHODAS 2.0 was chosen to be used in the current study.[34] The Chinese version of WHODAS 2.0 proved to be a valid and reliable instrument, with Cronbach's α coefficients ranging from 0.73 to 0.99.[35] Each item is scoring from "none" to "extreme" (0—4) and converted into 0—100 % (of dysfunction) based on the rule of calculation of WHODAS 2.0.[36] Based on the categorization of the levels of dysfunction from ICF, higher the scores indicate more dysfunction (difficulty), ranging from none (0—4 %), mild (5—24 %), moderate (25—49 %), severe (50—94 %) to extreme dysfunction (96—100 %).[11,34]

Employment status and background information

In this study, we assessed "employment status" (employed vs. unemployed) through the Background Information Form (BIF). Patients who were not engaged in employment prior to their diagnosis, such as housewives and retirees, were excluded from our study. Additionally, we collected other vital background and disease/treatment-related information using the BIF.

Data analysis

Descriptive statistics were used to describe background information, three indicators of social function and UW-QOL scores. Since the UW-QOL score data was not normally distributed (Kolmogorov—Smirnov$<$0.05). Spearman correlation was performed to explore the initial relationship between the overall UW-QOL and social function. Mann—Whitney U test were applied to compare the mean scores of the UW-QOL among HNC survivors between un- and employment groups.

The receiver operating characteristic curves (ROC curve) was used to analyze the cut-off points of UW-QOL overall scores in various levels of social difficulties and the unemployment. In this analysis, the "area under the curve" (AUC) of ROC reflects the diagnostic accuracy, sensitivity and specificity scores in the determined cut-off values. The optimal cut-off point on the ROC curve was determined using the Youden index for the highest sensitivity and specificity. The ROC curve is a graphical plot of sensitivity (y-axis) against 1 − specificity (x-axis) used to express diagnostic accuracy in medicine. Thus, AUC indicate how well of the diagnostic performance of cut-off point known as 0.7 to 0.8 being considered as fair, 0.8 to 0.9 as good, and more than 0.9 as excellent.[31,37]

Result

Subject characteristics

A total of 164 participants completed the assessments from 178 eligible patients, with an 92 % response rate. Of the 14 patients who did not participate, 10 refused due to a lack of interest in the study and 4 reported feeling ill. Thus, data from 164 participants were used in the final data analysis.

A majority of the participants were male (82.9 %). The average age was 50.1 (SD = 9.7) and 76.1 % patients were married. Close to two third (65.9 %) of subjects had high school of above education. More than half (54.9 %) of subjects were diagnosed as oral cavity cancer. There were 42.1 % of subjects were stage IV. The average time since diagnosis of HNC was 22.0 months (SD = 25.2) (Table 1).

UW-QOL and three indicators of social function

The overall mean score for the 12-item UW-QOL was 76.9 (SD = 15.6). Among the participants, 26.8 % (n = 44) reported mild difficulty (dysfunction) in social participation, 8.5 % (n = 14) reported moderate difficulty, and 14 % (n = 23) reported severe difficulty. For getting along with others, 3.7 % (n = 6) reported mild difficulty, 3.0 % (n = 5) reported moderate difficulty, 6.7 % (n = 11) reported severe difficulty, and 7.3 % (n = 12) reported extreme difficulty. Furthermore, 25.6 % of subjects reported unemployment as a result of their cancer diagnosis (Table 1).

Since male patients are the dominant group for HNC, our study similarly showed a smaller number of female participants. While we considered combining subjects of both genders for overall statistical analysis, we also examined characteristics by comparing the scores of the UW-QOL and three indicators of social function (getting along with others, social participation, and employment) between genders using the Mann—Whitney U test. The results indicated no significant differences between genders in overall

Table 1 Background information and social function status.

Variable	Total (N = 164)		
	N	%	Mean (SD)
Age (years)			50.1 (9.7)
Gender			
Male	136	82.9	
Female	28	17.1	
Level of education			
Senior high school and above	108	65.9	
Under junior high school	56	34.1	
Marital status			
Married	123	75.0	
Single/divorced/separated/ widowed	41	25.0	
Employment status			
Employed	122	74.4	
Unemployed	42	25.6	
Months since diagnosis			22.0 (25.2)
Type of cancer			
Oral cavity cancer	90	54.9	
Nasopharyngeal cancer	38	23.2	
Tonsillar cancer	11	6.7	
Oropharyngeal cancer	8	4.9	
Hypopharyngeal cancer	8	4.9	
Laryngeal cancer	4	2.4	
Paranasal sinuses cancer	2	1.2	
Others	3	1.8	
Disease stage			
I	46	28.0	
II	29	17.7	
III	20	12.2	
IV	69	42.1	
Treatment			
Excision only	53	32.3	
Radiotherapy only	6	3.7	
CCRT	45	27.4	
Surgery with radiotherapy	12	7.3	
Surgery with CCRT	48	29.3	
Level of difficulties in social participation			
Normal	83	50.6	
Mild	44	26.8	
Moderate	14	8.5	
Severe	23	14.0	
Extreme	—		
Level of difficulties in getting along			
Normal	130	79.3	
Mild	6	3.7	
Moderate	5	3.0	
Severe	11	6.7	
Extreme	12	7.3	

SD, standard deviation; HNC, head and neck cancer; CCRT, concurrent chemoradiotherapy.

QOL ($p = 0.920$), social participation ($p = 0.893$), getting along with others ($p = 0.293$), and employment ($p = 0.812$). These data suggest that male and female patients exhibited similar characteristics (scores) in the UW-QOL and the three social function domains, supporting the appropriateness of combining them for further statistical analysis.

Relationship between UW-QOL and three indicators of social function

A significantly high correlations were observed between UW-QOL and the WHODAS 2.0 social participation score (−0.70) as well as getting along with others (−0.52) (Table 2). In terms of employment status, significant differences were observed, with higher UW-QOL scores reported by the employed group (Table 3).

Identification of the UW-QOL cut-off points

The ROC analysis used to calculate cut-off points for detecting three indicators of social function. The cut-off points for mild-, moderate-, severe difficulty at social participation were 75.0, 73.3 and 63.9, respectively. The cut-off points for mild-, moderate-, severe/extremely severe difficulty in getting along with others were 63.9, 60.8, and 58.5, respectively. The cut-off points for unemployment was 76.8. The area under curve (AUC) of ROC are ranged from 78.8 % to 94 % in all cut-off points (Fig. 1). The UW-QOL scores demonstrated acceptable levels of accuracy in predicting the difficulties of social participation, getting along and risk of unemployment.

Discussion

As our understanding, this is the first study to provide preliminary evidences of using UW-QOL to screen the potential social difficulties and unemployment through correlations and building cut-off points. Based on the three research goals; Several important issues were discussed as follows.

First, almost half (49.4 %) HNC survivors had difficulties on the WHODAS 2.0 social participation scale which is much higher than difficulties in getting along with others (20.7 %). It suggests that there are more concerns and complex factors involved in social participation than getting along with others. While comparing with other research, HNC survivors in the current study faced much higher difficulties in social participation while comparing to patients in a big mixed typed cancer population-based study with 49.4 % vs. 30.5—31.3 %, respectively.[38] Further research to explore the influencing factors related to both social functions in HNC population is strongly suggested to enhance their function.

In this study, 25.6 % of HNC survivors were unemployed. The results were better than those previous studies with unemployed rate ranged from 32 % to 90 %.[12,14,15,39] Two possible reason might be because of 40 % of subjects being diagnosed as stage I and II with relatively better prognosis, relatively young aged and long-term survivors. Nevertheless, one-fourth of the current group of HNC survivors in middle age with mean age 50.1 was not employed. It reveals some levels of impacts on this population. Future research to explore related factors and intervene the problems are needed.

Table 2 Correlation between UW-QOL and two social function indicators.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. Social participation	1.0														
2. Getting along	−.64**	1.0													
3. Activity	−.59**	−.56**	1.0												
4. Shoulder	−.07**	−.08**	−.21**	1.0											
5. Speech	−.40**	−.31**	−.24**	−.17*	1.0										
6. Recreation	−.68**	−.59**	−.76**	−.12	−.31**	1.0									
7. Appearance	−.46**	−.34**	−.37**	−.01	−.33**	−.47**	1.0								
8. Pain	−.17**	−.21**	−.29**	−.26**	−.05	−.22**	−.05	1.0							
9. Swallowing	−.46**	−.37**	−.45**	−.20*	−.43**	−.46**	−.39**	−.23**	1.0						
10. Taste	−.29**	−.17**	−.32**	−.05	−.27**	−.27**	−.19*	−.02	−.33**	1.0					
11. Anxiety	−.47**	−.39**	−.38**	−.11	−.14	−.39**	−.30**	−.11	−.26**	−.12	1.0				
12. Chewing	−.40**	−.33**	−.28**	−.16*	−.47**	−.38**	−.37**	−.15	−.62**	−.14	−.16*	1.0			
13. Saliva	−.13**	−.05**	−.13	−.01	−.06	−.13	−.08	−.01	−.22**	.53**	−.11	−.34	1.0		
14. Mood	−.57**	−.45**	−.46**	−.11	−.21**	−.46**	−.33**	−.18*	−.36**	.28**	−.52**	−.28**	−.20**	1.0	
15. Overall QOL	−.70**	−.52**	−.68**	−.29**	−.53**	−.70**	−.55**	−.33**	−.74**	.51**	−.53**	−.70**	−.39**	.70**	1.0

UW-QOL, university of Washington quality of life questionnaire; QOL, quality of life; *P*-value *<0.05, **<0.01.

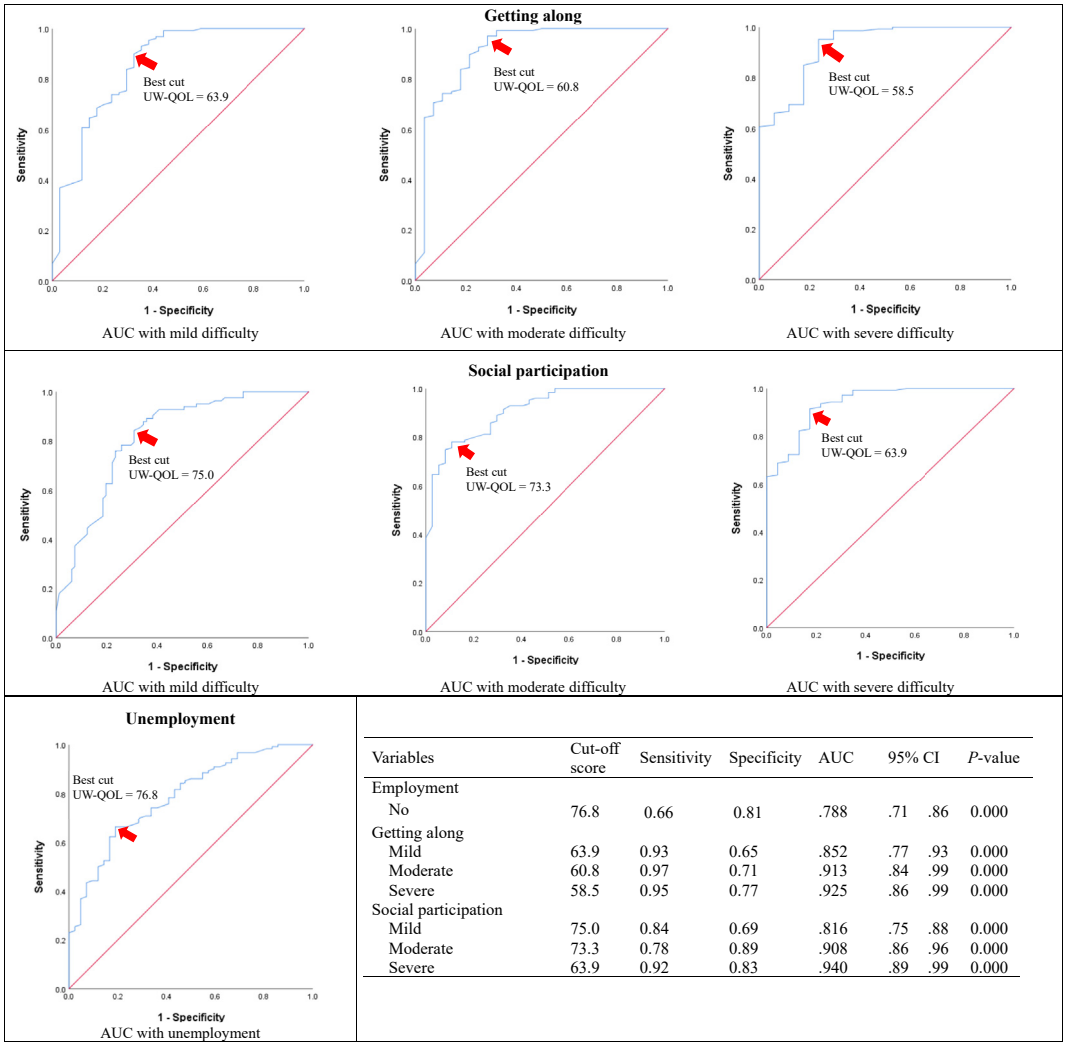
Table 3 Comparison of UW-QOL scores by employment status.

UW-QOL[a] domains	Whole group (N = 164	Employed (N = 122, 74.8 %)	Unemployed (N = 42, 25.6 %)	Mann–Whitney U test (Z value)
	Mean (SD)	Mean (SD)	Mean (SD)	
Activity	82.3 (23.2)	89.5 (19.0)	69.0 (27.5)	−4.8**
Shoulder	82.6 (20.7)	84.9 (19.0)	77.7 (23.3)	−3.3**
Speech	82.6 (23.2)	87.8 (18.2)	69.2 (29.8)	−4.1**
Recreation	82.4 (26.4)	88.9 (20.6)	63.7 (32.3)	−5.1**
Appearance	81.7 (20.7)	84.4 (19.6)	73.8 (22.1)	−3.1**
Pain	79.1 (25.4)	83.8 (22.0)	65.5 (29.7)	−3.8**
Swallowing	76.7 (24.6)	80.7 (22.6)	65.2 (26.6)	−3.4**
Taste	77.9 (29.7)	81.7 (26.5)	66.7 (35.4)	−2.5*
Anxiety	74.2 (31.0)	71.5 (32.2)	55.3 (38.5)	−2.4*
Chewing	68.9 (34.7)	72.9 (32.9)	57.1 (37.6)	−2.5**
Saliva	67.5 (30.6)	70.2 (30.4)	59.5 (30.1)	−2.0*
Mood	66.0 (35.0)	72.0 (31.8)	48.5 (38.5)	−3.6**
Overall QOL	76.9 (15.6)	81.1 (12.7)	64.5 (16.6)	−5.6**

UW-QOL, university of Washington quality of life questionnaire; SD, standard deviation.
P-value *<0.05, **<0.01.
[a] UW-QOL scoring ranged from 0 to 100, with a higher score indicating better function and quality of life.

Second, the highly correlated relationship between UW-QOL scores and the two social function indicators (WHODAS 2.0 social participation and getting along scores) supports our original assumption that UW-QOL is highly connected to HNC survivors' social function. In particular, three items of UW-QOL, including recreation, mood, and activity, show the particularly high negative relationship/correlation ($r = -0.45$ to -0.68) with both social function indicators. Following, the moderate to high correlations ($r \geq -0.4$) were identified in five aspects of UW-QOL (anxiety, appearance, swallowing, chewing and speech) with social participation. Carefully examining these items, it is not difficult to find that they are commonly involved in the individual's contact, interaction with, and even participation activities in groups of others. The impairments of the five items of UW-QOL (anxiety, appearance, swallowing, chewing and speech) may have greatly restricted HNC survivors' further participation in other activities.[8,9,23,40] Additionally, we observed that unemployed HNC survivors exhibited lower scores across all items of UW-QOL. As previous studies have indicated that unemployed HNC survivors tend to experience poorer QOL and more symptoms.[12,14,15,39]

Finally, most importantly, the findings support our assumptions to identify the cut-off points of the three social difficulties from the UW-QOL assessment. The ROC analysis and related data suggest the highly accepted and valid cut-off points (Fig. 1). The cut-off points for unemployment, mild difficulties in the WHODAS 2.0 social participation and getting along with others were 76.8, 75.0 and 63.9, respectively. Employment is a social activity involving complicated skills, factors, and participation. It basically



Variables	Cut-off score	Sensitivity	Specificity	AUC	95% CI		*P*-value
Employment							
No	76.8	0.66	0.81	.788	.71	.86	0.000
Getting along							
Mild	63.9	0.93	0.65	.852	.77	.93	0.000
Moderate	60.8	0.97	0.71	.913	.84	.99	0.000
Severe	58.5	0.95	0.77	.925	.86	.99	0.000
Social participation							
Mild	75.0	0.84	0.69	.816	.75	.88	0.000
Moderate	73.3	0.78	0.89	.908	.86	.96	0.000
Severe	63.9	0.92	0.83	.940	.89	.99	0.000

Figure 1 Cut-off points for different levels of social difficulties and unemployment identified by ROC curve analysis. AUC, area under the curve; CI, confidence interval, ROC, receiver operating characteristic curves.

needs comprehensive abilities and functions covered in UW-QOL aspects/items. Thus, while having some impairments reflected in UW-QOL scoring 76.8 in this 100 as a full theoretical scoring scale, the risk of unemployment is possible. The results help health care providers detect potential barriers to HNC patients' return to work by identifying decreases in their UW-QOL scores below cut-off points.

The study identified three impaired levels of social participation with three cut-off points. The scores show that while reporting 75.0 in UW-QOL, HNC survivors have potentially experienced mild difficulties in participating in social activities. While it is down to 63.9, the social participation could be quite severe.

The function of getting along with others is relatively less affected compared to social participation. It was reflected in its relatively low cut-off as 63.9 in UW-QOL. It suggests that the getting along function is generally maintained even though HNC patients face many QOL-related problems. However, for returning to work/employment and participation in social activities, mild to moderate impacts of UW-QOL have been detected to influence both functions which remain to be concerned clinically.

Taking together of the highly correlations between WHODAS 2.0 social function scores and UW-QOL (and aspects/items of UW-QOL), addressing these social function highly associated QOL-related problems is part of the important component to improve their QOL and potentially reducing social difficulties. While using UW-QOL as an assessment for HNC patients/survivors, the cut-off points should be adopted as a screening tool for social function to further support the referral to improve HNC survivors' social function.

The study remains some limitations. First, a majority of participants were survivors of oral cavity cancer and NPC. Future research to establish cut-off points for social difficulties that are valid for these two as well as other HNC categories is recommended. Second, the cross-sectional approach of this research does not permit observations of changes over time. Thus, a longitudinal approach to examine the validity of the cut-off points for different treatment and survival periods may provide information on

their social difficulties and cut-off points appropriate for use in improving social difficulties immediately. Third, previous research has indicated gender differences in social function, with male HNC patients often exhibiting poorer social integration.[41] In our study, despite the relatively smaller number of female patients, they demonstrated similar characteristics (scores) in UW-QOL and the three social functions. Thus, we combined data from both genders for the overall statistical analysis. Future studies should consider increasing the sample size of female participants to further explore potential gender differences in the determination of cut-off points.

Despite the abovementioned limitations, this is the first study to establish and validate the cut-off points of three important social functions based on UW-QOL. It strongly supports that the UW-QOL can be used to assess and screen both QOL and the potential social difficulties in HNC patients. We highly suggest to apply the UW-QOL clinically to detect HNC patient/survivors' QOL related problems and use the cut-off points of social difficulties to provide further clinical interventions to enhance their QOL and social function.

Declaration of competing interest

The authors declare that they have no conflicts of interest.

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