Original Article

Translation and validation of the Chinese version of the acceptance and action questionnaire for cancer in patients with advanced lung cancer

Huiyuan Li [a], Marques Shek Nam Ng [a], Xiaohuan Jin [b], Cho Lee Wong [a,*]

[a] *The Nethersole School of Nursing, Faculty of Medicine, The Chinese University of Hong Kong, Hong Kong SAR, China*
[b] *The School of Nursing, Nanjing University of Chinese Medicine, Nanjing, China*

ABSTRACT

Objective: This study aimed to examine the reliability and validity of the Chinese version of the Acceptance and Action Questionnaire for Cancer (C-AAQ–Cancer) in patients with advanced lung cancer.
Methods: In Phase I, the AAQ-Cancer was translated from English to Chinese. In Phase II, an expert panel was invited to examine the content validity of the translated instrument, and pilot testing was performed. In Phase III, a total of 200 patients with advanced lung cancer from a university-affiliated hospital in central China were recruited to test the construct validity of the translated AAQ-Cancer using exploratory factor analysis, and reliability was assessed based on internal consistency and test–retest reliability.
Results: The semantic equivalence and content validity index of the C-AAQ–Cancer were satisfactory. Exploratory factor analysis indicated that the C-AAQ–Cancer contained the following five subscales: cancer concerns, blunting, blame, distancing, and behavioral disengagement. These subscales explain 68.28% of the total variance. The Cronbach's α coefficient of the scale was 0.87, and the test–retest reliability was 0.839.
Conclusions: This study evaluated the psychometric properties of the C-AAQ–Cancer. The findings support the reliability and validity of this instrument in evaluating experiential avoidance or acceptance levels in patients with advanced lung cancer.

Introduction

Lung cancer is among the most pressing global health problems.[1] According to the Chinese National Cancer Centre, lung cancer has the highest incidence rate in men ($57.26/10^5$; 7,870,000 newly diagnosed cases annually) and the highest mortality rate ($45.87/10^5$) in both men and women of all cancer types.[2] Patients with lung cancer, especially those diagnosed at advanced stages, experience more physical, psychological, and social burdens and a poorer quality of life than those with other cancer types.[2,3]

Evidence explaining the contribution of experiential avoidance to the psychopathology and physiopathology of cancer has been reported.[4,5] Experiential avoidance, a concept developed within the Acceptance and Commitment Therapy framework, refers to an individual's ability to be fully in contact with the present moment as a conscious human being and to change or persist in behaviors in the service of worthy goals by cultivating psychological flexibility.[6] Experiential avoidance is defined as an attempt to escape from or avoid undesired feelings, thoughts, memories, and sensations, even when the attempt to do so causes

psychological harm.[7] A mixed-methods systematic review of 13 quantitative and six qualitative studies indicated that patients with advanced cancer are more prone to engage in experiential avoidance.[8] They may show experiential avoidance with regards to their cancer diagnosis, physical discomfort during treatment, fear of death, or bothering others.[3] They tend to catastrophize or stay in a debilitating cycle of constant negative thoughts about the future.[9] They attempt to not think about advanced cancer, keep away from circumstances that may become reminders of their cancer,[10] avoid dwelling on their feelings related to advanced cancer, and even avoid cancer-related treatments and physical exercise.[11] However, these behavioral patterns hinder their access to supportive relationships with their family and healthcare professionals,[12] impair treatment effects, exacerbate physical functioning and psychological problems, and further affect their health-related quality of life.[13] Experiential avoidance is the most common coping strategy used by patients with cancer and is a predictor of a poorer quality of life[4] and psychological issues, especially depression and anxiety.[14,15] However, no studies of patients with advanced cancer have primarily examined experiential avoidance, and the potential role of experiential avoidance

in the mechanisms underlying cancer-related distress has received limited attention, especially regarding different cancer types and cultural contexts. Considering that experiential avoidance is regarded as a source of physical and psychological issues in patients with advanced lung cancer, the investigation of the level of experiential avoidance in this population using a validated instrument is warranted.

The Acceptance and Action Questionnaire (AAQ), which was developed within the Acceptance and Commitment Therapy framework by Hayes et al,[6] is the only instrument widely used to assess experiential avoidance in the general population. In the original validation study, 9- and 16-item single-factor versions were developed.[6] However, two significant deficiencies existed in the original version, namely low internal consistency and an unsteady factor structure.[16] In 2011, Bond et al[16] revised the AAQ and developed the second version (AAQ-II). Subsequent results indicated that the AAQ-II has similar psychometric properties as the AAQ but is more robust and stable as a unidimensional measurement across different groups.[16] The AAQ-II contains seven items, and each item is rated on a 7-point Likert scale ranging from 1 (never true) to 7 (always true).[16] The total scale score ranges from 0 to 49, with higher total scores indicating more severe experiential avoidance. The AAQ-II has also been translated into different languages, such as Portuguese, Dutch, Greek, Chinese, and Persian.[17–21] Shari[22] translated the AAQ-II into a Malay version and validated it in patients with different types of cancer. The scale-level content validity index (S-CVI) and item-level CVI (I-CVI) values for relevance were 0.95 and 0.83, respectively. Good internal consistency has been reported, with a Cronbach's α coefficient of 0.91. Although it shows acceptable psychometric properties, the AAQ-II has commonly been adopted to evaluate psychological inflexibility as a whole. Experiential avoidance is one of the most important components of psychological inflexibility[6]; however, the items of the AAQ-II cannot be used to deeply explore avoidant thoughts or behaviors or accurately target cancer-related avoidance in patients with cancer.

In view of these limitations, Arch[23] adapted the AAQ-II into the 18-item Acceptance and Action Cancer Questionnaire (AAQ–Cancer). In this version, each item is correlated to a cancer diagnosis or treatment. For example, "My memories and painful experiences make it difficult for me to live a life that I would value" in the AAQ-II[16] was changed to "My memories and painful experiences with cancer make it difficult for me to live a life that I would value" in the AAQ–Cancer.[23] This wording is more specific and suitable for application in patients with cancer. In addition, some items related to specific avoidant behaviors in cancer, such as "I avoid cancer-related medical appointments and tests because I don't want to think about cancer"[23] and "I don't exercise regularly because it reminds me that I had/have cancer", were added.[23] The reported Cronbach's α for this scale is 0.91.

Given that a Chinese version of the AAQ-Cancer (C-AAQ–Cancer) is not yet available, this study aimed to translate the AAQ-Cancer into Chinese and examine the psychometric properties of the C-AAQ–Cancer in patients with advanced lung cancer in mainland China.

Methods

Study design

This study consisted of three phases. First, the English version of the AAQ-Cancer was translated into simplified Chinese. Second, content validation through expert consultation and pilot testing were conducted. Third, a cross-sectional study with a correlation design and convenience sampling was used to test the psychometric properties of the C-AAQ–Cancer in patients with advanced lung cancer.

Phase 1: translation

Permission to translate the AAQ-Cancer was obtained from the original author. In accordance with the guideline for instrument translation, adaptation, and validation processes developed by Sousa and Rojjanasrirat,[24] the translation process in this study included forward translation, monolingual assessment, backward translation, and comparison. First, two bilingual researchers (a PhD candidate with experience in translating and a PhD student with expertise in psychological nursing) independently translated the original English version into Chinese. Another native bilingual Chinese reviewer was invited to assess the appropriateness of the wording and grammar of the forward-translated version of the AAQ-Cancer. After some revisions, two other bilingual researchers (a PhD student in language and a PhD student in cancer nursing) translated the revised C-AAQ–Cancer into English. Finally, the original version of the AAQ-Cancer and the backward-translated version were consolidated to identify inconsistencies. Modifications were then implemented based on the reviewers' comments. Four translators and the reviewer who recorded each issue compared and weighed the versions verbatim, resolved any discrepancies, and merged them into one version after reaching a consensus.

Phase 2: content validation and pilot testing

The translated AAQ-Cancer was then reviewed by an expert panel for semantic and content equivalence. The expert panel included two oncologists specializing in lung cancer, a psychologist, a respiratory nurse, a psychiatric nurse, and a nursing professional. Semantic equivalence was rated on a 4-point Likert scale, with "1" representing "not appropriate" and "4" representing "most appropriate".[25] Items rated at more than 20% (ie, a bilingual health professional was sought to rate with l = "not equivalent" or 2 = "somewhat equivalent") were treated as inappropriate translations and were revised accordingly.[25]

The content validity of the C-AAQ–Cancer items was tested by the expert group using a CVI on a 4-point Likert scale. The items were scored from 1 (not relevant) to 4 (most relevant). The CVI was used to show the percentage of total items rated by the experts as either 3 or 4. The I-CVI scores, which were used to determine the relevance and clarity of each item, were calculated by dividing the number of experts who evaluated the item as 3 or 4 by the number of content experts.[26] If the I-CVI score was higher than 0.79, the item was regarded as appropriate. A score from 0.70 to 0.79 indicated that the item needed revising, and a score below 0.70 indicated that the item should be eliminated.[26] The average-scale level CVI (S-CVI/Ave) was calculated by dividing the sum of the I-CVI scores by the total number of items. The universal agreement (UA) score was recorded as 1 when the item reached 100% agreement among experts; otherwise, the UA score was recorded as 0. The universal-scale level CVI (S-CVI/UA) was calculated by dividing the sum of the UA scores by the total number of items, which reflected the proportion of items in an instrument that achieved a rating of 3 or 4 by all experts. A total CVI score of 80% or higher was considered to indicate good content validity.[27] Items rated by the expert panel as somewhat relevant or not relevant were revised.

The translated AAQ-Cancer was pretested with a convenience sample of 30 patients with advanced lung cancer. The patients were invited to comment on the clarity of the items, the overall presentation of the scale, and whether they had difficulty in answering the items using a simple dichotomous choice (clear or unclear). Subsequently, the finalized AAQ-Cancer was administered to eligible participants with advanced lung cancer for psychometric testing.

Phase 3: psychometric testing

Study setting and participants

The study was conducted at a university-affiliated hospital in central China. Participants were recruited from the respiratory medicine department by convenience sampling. The inclusion criteria were: (1) an age of 18 or older and (2) a diagnosis of stage III or IV lung cancer by pathological section or cytology. Patients were excluded if they had (1) cognitive impairment or (2) a severe disease that meant they were unable to complete the questionnaires.

The sample size was determined based on the statistical power of factor analysis, which was used to reflect the construct validity of the C-AAQ–Cancer. Based on the principle of 5–10 participants for each of the 18 items,[28] a total of 180 participants were required (taking the maximum number). Finally, considering a 10% attrition rate, a sample of 200 participants was recruited.

Measurements

Sociodemographic data.
Demographic data, such as age, sex, marital status, educational level, economic level, work status, classification and stage of disease, and type of medical treatment were collected.

Experiential avoidance: the C-AAQ–cancer.
The AAQ-Cancer[23] is an 18-item tool used to measure experiential avoidance in patients with cancer. The participants responded to the possibility of whether they accept or avoid repulsive thoughts and feelings about each item using a 7-point Likert scale (1 = "never true" to 7 = "always true"). The total score of the AAQ-Cancer was calculated as the sum of all scored items. A higher overall score indicated a greater level of experiential avoidance or a lower level of acceptance. The AAQ-Cancer scale was modified from the AAQ-II [16] and the Acceptance and Action Diabetes Questionnaire.[29] The AAQ-Cancer scale has been validated in cancer survivors, with acceptable internal consistency (Cronbach's α = 0.90).[23] The current study adopted the C-AAQ–Cancer and evaluated its psychometric properties.

Depressive symptoms: the patient health questionnaire.
The patient health questionnaire (PHQ-9) is a 9-item scale developed by Spitzer et al in 1999 that measures the severity of depressive symptoms, with total scores ranging from 0 to 27.[30] Each item is scored from 0 (not at all) to 3 (nearly every day).[31] Previous studies have suggested that the PHQ-9 has reliable internal consistency (Cronbach's α = 0.85).[32] It was translated into Chinese by Wang et al with good reliability (Cronbach's α = 0.86) and validated with a stable one-factor structure. The Chinese version of the scale has concurrent validity with other measurements in the general population.[33] The Chinese version of the PHQ-9 has also shown good reliability in patients with cancer, with a Cronbach's α coefficient of 0.80.[34] Higher scores indicate a higher level of depressive symptoms.

Anxiety: generalized anxiety disorder scale.
The generalized anxiety disorder (GAD-7) scale is a brief self-reporting instrument developed by Spitzer et al in 2006[35] measuring the severity of anxiety using seven items. It has been widely used and reported to have good internal consistency (Cronbach's α = 0.92) and test–retest reliability (correlation coefficient = 0.83).[35] The Chinese version of the GAD-7, developed by Zeng et al, has shown satisfactory psychometric properties, with a Cronbach's α of 0.91 and explained variance of 72% within a single-dimensional structure.[36] Higher scores indicate more severe anxiety symptoms.

Data collection

Eligible participants were approached by the respiratory department nurse. The research assistant screened the eligible participants according to the selection criteria. The nature of the study was explained to them, and a research information sheet was given to those who showed interest. Potential participants were required to sign an informed consent form if they were willing to participate. After obtaining the participants' written informed consent form, the research assistant assisted the participants to complete the questionnaires and explained any items that the participants did not understand using standard instructions. The research assistant helped participants who could not write down their answers because of discomfort to complete the questionnaire. The questionnaire assessment took approximately 5–10 min for each participant to complete. To evaluate the test–retest reliability of the instrument, a total of 50 participants were randomly selected from the 200 participants and asked to repeat the questionnaire evaluation 2 weeks after it was first administered.

Data analysis

SPSS 24.0 (IBM, Armonk, NY, USA) was used for data analysis. All continuous outcome variables were examined for normality using skewness statistics and Q–Q plots. Descriptive statistics were used to describe the participants' demographic information, including the use of frequencies and percentages to summarize categorical variables and means and SDs to summarize continuous variables. The level of significance was set at $P < 0.05$.

Validity

Construct validity was evaluated by exploratory factor analysis (EFA) to assess the factor structure using principal component analysis with maximum variance orthogonal rotation to extract factors.[37] The number of potential factors was determined according to the formula eigenvalue > 1 and a scree plot representing all factors above the elbow.[38] A factor loading > 0.5 for an item in the corresponding component indicated that the item was attributed to that component.[39] The suitability of data for factor analysis was examined before undertaking the factor extraction procedure using Bartlett's test of Sphericity and the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy.[40] If the KMO value was greater than 0.7 and Bartlett's test of Sphericity reached statistical significance ($P < 0.05$), the appropriateness and suitability of using factor analysis were supported.

Convergent validity was measured by assessing the relationship between the scores for the C-AAQ–Cancer and the PHQ-9 and GAD-7 instruments. Experiential avoidance is one of the coping strategies used by patients having cancer and is a predictor of psychosocial problems, such as depression and anxiety.[14,15] Therefore, it was hypothesized that the C-AAQ–Cancer score would demonstrate a statistically significant positive relationship with the PHQ-9 and GAD-7 scores. Pearson's correlation coefficients were calculated to determine the relationships.

Known-group validity was evaluated by comparing the average C-AAQ–Cancer scores between various groups of participants. A previous study demonstrated that the cancer stage plays a moderate role in the relationship between the acceptance of cancer and distress.[41] It was hypothesized that participants with stage III cancer would have lower AAQ-Cancer scores than those with stage IV cancer. An independent t-test was used to compare the mean scores for the AAQ-Cancer between participants with stage III and stage IV cancer.

Reliability

The reliability of the C-AAQ–Cancer was evaluated based on internal consistency and test–retest reliability. Cronbach's α and correlated item-to-total correlations were used to assess internal consistency. A Cronbach's α coefficient of 0.7 or above is acceptable for an instrument.[42] Items with a correlated item-to-total correlation < 0.3, whose deletion caused an increase of 0.1 or more in the overall scale's alpha coefficient value, were considered non-homogenous and were excluded.[43] A 2-week interval was chosen for test–retest reliability, as it is unlikely that participants recalled their responses after this interval. The intra-class correlation coefficient (ICC) was calculated to examine the scale's test–retest reliability. Adequate test–retest reliability of a scale is indicated by an ICC value of 0.7 or greater.[44]

Ethical considerations

The study was conducted following the principles of the Helsinki Declaration. Ethical approval was obtained for this study from the Survey and Behavioral Research Ethics Committee at the Chinese University of Hong Kong (IRB No. SBRE-20-041), and permission was obtained from the research hospital. Written consent was obtained from participants

Table 1
Content validation on an 18-item scale by six experts: Items rated 3 or 4 on a four-point relevance scale.

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	UA	I-CVI
1	X	X	X	X	X	X	1.00	1.00
2	X	X	X	X	X	X	1.00	1.00
3	X	X	X	X	X	X	1.00	1.00
4	X	X	X	X	X	X	1.00	1.00
5	X	X	X	X	X	X	1.00	1.00
6	X	X	X	X	X	X	1.00	1.00
7	X	X	X	X	X	X	1.00	1.00
8	X	X	X	X	X	–	0	0.83
9	X	X	X	X	X	X	1.00	1.00
10	X	X	X	X	X	X	1.00	1.00
11	X	X	X	X	X	X	1.00	1.00
12	–	X	X	X	X	X	0	0.83
13	X	X	X	X	X	X	1.00	1.00
14	X	X	X	X	X	X	1.00	1.00
15	X	X	X	–	X	X	0	0.83
16	X	X	X	X	X	X	1.00	1.00
17	X	X	X	X	X	X	1.00	1.00
18	X	X	X	X	X	X	1.00	1.00
Proportion of relevance	0.94	1.00	1.00	0.94	1.00	0.94	S-CVI/UA = 0.83	S-CVI/Ave = 0.97

X, Items rated 3 or 4; –, Items rated 1 or 2. I-CVI, Item-level content validity index; S-CVI/Ave, Average-scale level content validity index; S-CVI/UA, Scale-level content validity/Universal agreement; UA, universal agreement.

Table 2
Characteristics of the participants with advanced lung cancer ($N = 200$).

Characteristics	n (%) or Mean (SD)
Age, Mean (SD)	59.00 (7.66)
Gender	
Male	156 (78.00)
Female	44 (22.00)
Marital status	
Married	193 (96.50)
Divorced/Widowed	7 (3.50)
Educational level	
Primary school or below	57 (28.50)
Junior high school	78 (39.00)
High school	52 (26.00)
Tertiary or above	13 (6.50)
Residence	
City	42 (21.00)
Town	82 (41.00)
Rural	76 (38.00)
Employment status	
Employed	29 (14.50)
Unemployed	6 (3.00)
Retired	79 (39.50)
Farming	77 (38.50)
Other	9 (4.50)
Income per month (RMB)	
< 1000	39 (19.50)
1000–3000	71 (35.50)
3000–5000	58 (29.00)
> 5000	32 (16.00)
Type of lung cancer	
SCLC	40 (20.00)
NSCLC	160 (80.00)
Stage of lung cancer	
IIIA	24 (12.00)
IIIB	17 (8.50)
IIIC	5 (2.50)
IVA	92 (46.00)
IVB	62 (31.00)
Time since diagnosis (month)[a]	4.00 (2.00, 11.00)
Cancer treatment received	
Only chemotherapy	96 (48.00)
Two combination therapies including chemotherapy	73 (36.50)
Three combination therapies including chemotherapy	23 (11.50)
Four combination therapies including chemotherapy	2 (1.00)
Only targeted therapy	3 (1.50)
Only immunotherapy	3 (1.50)

NSCLC, non-small cell lung cancer; RMB, Renminbi (1USD = 6.37 RMB); SCLC, small cell lung cancer; SD, standard deviation.
[a] Presented as median (inter-quartile range).

before beginning the interviews. The participants were informed of the aim of the study, the data collection procedure, the benefits and potential risks, data confidentiality, and their right to leave the study at any time without penalty. Data collected in the study and the transcripts were kept confidential and stored in locked filing cabinets and password-protected computers that could only be accessed by members of the research team.

Results

Phase I results: translation

The backward-translated and original versions of the AAQ-Cancer were compared, and several minor wording differences were identified. During the forward translation of Item 5, "problems" was translated into "trouble", which is more widely used in the Chinese language context. "Unable" and "take care of" were translated into "cannot" and "take on", respectively, in Item 16. After backward translation, these two items and others retained their original meaning.

Phase II results: content validation

All items were semantically equivalent, with less than 20% (1/6) of the experts rating the items at less than 3 on the Likert scale. The item-level semantic equivalence of the translated version ranged from 83% to 100%, and the scale-level semantic equivalence was 94%, showing the good representativity of the translated AAQ-Cancer items.

The I-CVI scores ranged from 0.83 to 1. The S-CVI/UA and the S-CVI/Ave were 0.83 and 0.97, respectively, indicating good content validity (Table 1). The results also demonstrated that the scale was conceptually and culturally relevant for measuring acceptance or experiential avoidance by Mandarin Chinese speakers with cancer.

All 30 participants agreed that the instructions and the questionnaire items were clear and easily understood. It took less than 5 min for the participants to complete all the items.

Phase III results

Participant characteristics

Two hundred patients with advanced lung cancer were recruited. The mean age of the participants was 59.00 years (SD = 7.66) and ranged from 34 to 76 years. Most of the participants were male ($n = 156$, proportion = 78.00%), married ($n = 193$, proportion = 96.5%), diagnosed with non-small cell lung cancer ($n = 160$, proportion = 80.00%), and had

stage IV cancer (n = 154, proportion = 77.00%). The median time since their first diagnosis of advanced lung cancer was 4 months. Chemotherapy was the most common treatment type (Table 2).

EFA

The KMO test and Bartlett's test of sphericity were performed before performing principal component analysis. The KMO value was 0.846, and Bartlett's test of sphericity for the scale was found to be significant (χ^2 = 1757.853, P < 0.01). These results indicated that the scale was suitable for factor analysis. EFA was conducted under the condition of an undefined number of factors. The results showed that five common factors were extracted from the scale, and they explained 68.28% of the total variance of the scale scores (Table 3). Factor loadings were greater than 0.50 for all items, ranging from 0.53 to 0.91. In addition, the screen plot suggested the generation of a five-factor model (Fig. 1). Item 1 had factor loading in both factor 1 and factor 3 but was retained in factor 1 for its content coherence. Thus, the final version consisted of five factors and 18 items.

Factor 1 had seven items, accounting for 33.61% of the variance. This factor refers to participants' concerns about their distressing cancer-related experiences, labelled as cancer concerns. Factor 2 contained three items, accounting for 13.47% of the variance. This factor refers to the participants' responses to cancer-related things and the impact of cancer, including people, objects, and experiences, labeled as blunting. Factor 3 had three items, accounting for 9.41% of the variance. This factor refers to the family social influence on the cancer-related experience and participants' expectations, which were labeled as blame. Factor 4 had three items, accounting for 6.03% of the variance. This factor refers to the participants' responses to the ultimate ending of their cancer experience, which were labeled as distancing. Factor 5 involved two items, accounting for 5.76% of the variance. This factor refers to the participants' responses to related behaviors that benefit cancer treatment

efficacy, which were labeled as behavioral disengagement.

Convergent validity

The total score of the translated AAQ-Cancer showed significant positive correlations with the overall scales of depressive and anxiety symptoms (r = 0.663 and r = 0.701, respectively, P < 0.05). These findings indicated the convergent validity of the translated AAQ-Cancer.

Known-group validity

Known-group validity was evaluated by comparing the mean scores of the AAQ-Cancer between different cancer-stage groups. The results showed that participants with stage IV cancer had significantly higher AAQ-Cancer mean scores than participants with stage III cancer, providing evidence for known-group validity (P < 0.01, Table 4).

Reliability

The Cronbach's α coefficient of the translated AAQ-Cancer was 0.87, and the Cronbach's α coefficients for the five factors were 0.88, 0.86, 0.68, 0.67, and 0.63, respectively, demonstrating good internal consistency. The Cronbach's α coefficient of the translated scale did not increase by more than 0.1 upon the deletion of any item. The item-to-total correlations ranged from 0.333 to 0.749 (Table 5). Additionally, the ICC for test–retest reliability in a sub-sample of 50 participants was 0.839 (P < 0.01). Significant correlations were also found between the five factors, suggesting a significant degree of distinction among these factors (P < 0.01, Table 6).

Discussion

This cross-sectional psychometric instrumental study was the first to determine the reliability and validity of the C-AAQ–Cancer, which was used to evaluate experiential avoidance in patients with cancer. The
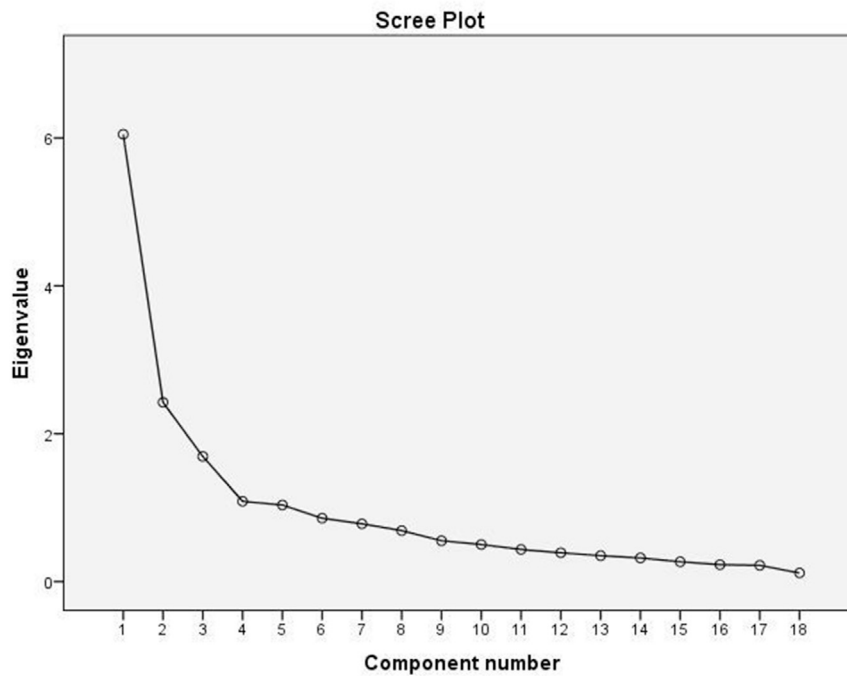
Table 3

Summary of the factor analysis for the Chinese version of the AAQ-Cancer items.

Item	Factor 1 Cancer concerns	Factor 2 Blunting	Factor 3 Blame	Factor 4 Distancing	Factor 5 Behavioural disengagement
1. My memories and painful experience with cancer make it difficult for me to live a life that I would value	0.658		0.539		
2. I'm afraid of my feelings about cancer	0.831				
3. I worry about not being able to control my worries and feelings about cancer	0.776				
4. My painful memories of cancer prevent me from having a fulfilling life	0.682				
5. Emotions about cancer cause problems in my life	0.759				
6. It seems life most cancer survivors are handling their lives better than I am	0.656				
9. I have thoughts and feelings about cancer that are distressing	0.634				
8. I try to avoid reminders of my cancer		0.804			
10. When I have an upsetting feeling or thought about my cancer, I try to get rid of that feeling or thought		0.897			
11. I avoid thinking about what cancer can do to me		0.909			
7. I avoid thinking about what cancer can do to me			0.657		
16. When I feel depressed or anxious about cancer, I am unable to take care of my responsibilities			0.783		
17. If I could magically remove all my painful experiences of cancer, I would do so			0.546		
13. I avoid thinking about cancer because someone I knew died from cancer				0.711	
14. I avoid thinking about cancer because I fear it will come back				0.755	
15. I avoid cancer-related medical appointments and tests because I don't want to think about cancer				0.698	
12. I don't exercise regularly because it reminds me that I had/have cancer					0.526
18. If applicable: I avoid taking or forget to take my anti-hormonal or other cancer-related mediations because it reminds me that I have cancer					0.773

Principal component analysis with maximum variance rotation.
AAQ, Acceptance and Action Questionnaire.

Fig. 1. A scree plot illustrating the factor loadings of the Chinese version of the acceptance and action questionnaire for cancer.

Table 4
Known-group comparison between participants in stage IV and those in stage III (N = 200).

Item	Stage IV group (n = 154) Mean (SD)	Stage III group (n = 46) Mean (SD)	t	P
AAQ-Cancer total score	61.31 (10.62)	55.93 (8.37)	−3.58	0.001**

AAQ-Cancer, Acceptance and Action Questionnaire for Cancer; SD, standard deviation.
**P < 0.01.

findings suggest that the C-AAQ–Cancer may be adopted to test advanced cancer patients' experiential avoidance or acceptance levels in China. Acceptable CVI scores were obtained for the C-AAQ–Cancer, which indicated that the scale was conceptually and culturally relevant for measuring experiential avoidance in the local population and setting.

EFA was conducted to explore the factor structure of the C-AAQ–Cancer. A five-factor structure for the scale was identified in the study, and the overall cumulative variance contribution rate was 68.28%, with factor loadings ranging from 0.53 to 0.91, supporting the feasibility of EFA and the dimensionality of the scale. The five-factor structure identified in this study is inconsistent with the one-factor original scale. Discrepancies may be seen when the factor structure of a scale is tested within a different cultural context.[45] This is likely because different cultures conceptualize, experience, and express avoidance in different ways, and thus, there may be no equivalent concepts of avoidance shared between Western and non-Western cultures.[46] In the original English version, a single-factor structure of the AAQ-Cancer was identified. One possibility is that the idea of avoidance may be simple enough that it is defined in a common way across cultures and languages. Meanwhile, in the Chinese version, due to the deep impact of Confucianism in the Chinese culture (eg, family responsibility, and self-esteem) and the tendency to avoid negative emotions in response to distressing experiences (ie, advanced cancer),[47] participants may respond to cancer with diverse avoidant behaviors, manifesting as thought control, emotional repression, and behavioral evasion. These different interpretations of avoidance may require a different scale structure. Therefore, it is suggested

that there is a need for researchers and clinicians to be careful when administering the AAQ-Cancer in different languages, as well as a need to take structural differences into account when interpreting the results of the AAQ-Cancer. However, the five-factor structure is consistent with the multidimensional nature of experiential avoidance summarized by Davis et al,[8] which manifests as cognitive, behavioral, and emotional avoidance. For example, the first (cancer concerns) and third (blame) factors echo the domain of cognitive avoidance, which refers to a person suppressing and excluding distressing thoughts and memories. The second factor (blunting) echoes the domain of emotional avoidance, which refers to an individual avoiding negative information and engaging in wishful thinking. The fourth (distancing) and fifth (behavioral disengagement) factors echo the domain of behavioral avoidance, which refers to an individual moving away from stressful situations and withdrawing from social interactions. However, the five-factor structure of the C-AAQ–Cancer requires further examination using confirmatory factor analysis.

Convergent validity was established using the significant correlations between the overall score of the AAQ-Cancer and depressive and anxiety symptoms. The results showed that the C-AAQ–Cancer exhibited moderate positive correlations with depressive and anxiety symptoms (r = 0.663 and r = 0.701, respectively, P < 0.05). These correlations reflect the fact that the C-AAQ–Cancer measures similar constructs with emotional variables and indicate that psychological flexibility may act as a mechanism of change in psychological treatments for the advanced cancer population. These findings were congruent with those of previous studies in patients with chronic diseases, including cancer.[48] The possible reason for the similar findings may be that avoidance enables patients to take fewer actions and escape from actual situations where unpleasant experiences are evoked.[49] However, when avoidance becomes a habit over a long period of time, energy is expended to prevent exposure to unwanted experiences, leading to high levels of psychological distress and feelings of a meaningless life with cancer.[50] Additional studies designed to examine avoidance levels in patients with cancer are suggested to confirm the associations between avoidance and psychological distress in this population.

With regard to known-group validity, the findings confirmed that patients with advanced stage IV lung cancer had significantly higher C-

Table 5

Reliability of the simplified Chinese version of the 18-item acceptance and action questionnaire for cancer (N = 200).

Item	Item-to-total correlation	Cronbach's α if item deleted
1. My memories and painful experience with cancer make it difficult for me to live a life that I would value 对癌症的痛苦经历和记忆使我难以过上我认为有价值的生活	0.749	0.853
2. I'm afraid of my feelings about cancer 对癌症的那种感觉让我感到害怕	0.447	0.864
3. I worry about not being able to control my worries and feelings about cancer 我担心自己不能够控制自己对癌症的担忧和感觉	0.435	0.865
4. My painful memories of cancer prevent me from having a fulfilling life 我对癌症的痛苦记忆阻碍我过上充实的生活	0.593	0.859
5. Emotions about cancer cause problems in my life 与癌症有关的情绪给我的生活造成困扰	0.730	0.854
6. It seems life most cancer survivors are handling their lives better than I am 似乎大多数癌症幸存者都能比我更好地应对生活	0.369	0.867
7. Worries about cancer get in the way of my success 对癌症的担忧会阻碍我的成功	0.587	0.858
8. I try to avoid reminders of my cancer 我尽量避开那些让我想起我得了癌症的人事物	0.396	0.867
9. I have thoughts and feelings about cancer that are distressing 我对癌症有一些令人痛苦的想法和感觉	0.697	0.855
10. When I have an upsetting feeling or thought about my cancer, I try to get rid of that feeling or thought 当我对癌症产生令人沮丧的想法或感觉时，我会尽量摆脱这种想法或感觉	0.452	0.864
11. I avoid thinking about what cancer can do to me 我避免去想癌症会对我产生什么影响	0.333	0.868
12. I don't exercise regularly because it reminds me that I had/have cancer 我没有规律锻炼，因为这会提醒我（曾）患有癌症	0.348	0.868
13. I avoid thinking about cancer because someone I knew died from cancer 我避免去想有关癌症的事，因为我认识的一个人死于癌症	0.348	0.868
14. I avoid thinking about cancer because I fear it will come back 我避免去想有关癌症的事，因为我害怕它会复发	0.538	0.861
15. I avoid cancer-related medical appointments and tests because I don't want to think about cancer 我逃避与癌症有关的诊疗预约和检查，因为我不希望想起癌症	0.422	0.866
16. When I feel depressed or anxious about cancer, I am unable to take care of my responsibilities 当我对癌症感沮丧或焦虑时，我就无法承担起自己的（工作或家庭）责任	0.360	0.872
17. If I could magically remove all my painful experiences of cancer, I would do so 如果我能神奇地去除所有癌症带来的痛苦体验，我会这样做的	0.652	0.855
18. If applicable: I avoid taking or forget to take my anti-hormonal or other cancer-related mediations because it reminds me that I have cancer 我逃避或忘记服用抗激素药或其他与癌症有关的药物，因为它让我想起我患有癌症	0.358	0.867

AAQ–Cancer scores than those with stage III cancer. This finding indicates that the C-AAQ–Cancer can distinguish between distinct groups[51] and, thus, confirms the construct validity of the scale from a different perspective. These results concur with those of previous studies in which the cancer type and the extent of cancer were identified as important factors in coping with cancer[52] and essential moderators between avoidance and psychological distress.[41] Advanced cancer causes repetitive and cumulative trauma and requires a large allocation of resources.[53] Experiential avoidance may be a patient's adaptive mechanism to obtain some respite in a short period of time when he/she feels overwhelmed.[53] Heavily influenced by traditional Chinese culture, such as Confucian thought, Chinese patients with advanced cancer tend to avoid socializing to save face, and they endure distress when continuing to take on family responsibilities to maintain self-esteem and family roles.[54] However, long-term avoidance may bring about maladaptive distress and impair

functioning. Acceptance may be an alternative way to improve adaptability during the cancer trajectory. Further longitudinal studies using the C-AAQ–Cancer to explore the function of experiential avoidance in Chinese patients with cancer in the short- and long-term are recommended.

In the test of reliability, the C-AAQ–Cancer showed acceptable internal consistency. The Cronbach's α value of the total scale was 0.87, and the values for its five dimensions ranged from 0.63 to 0.88, which were slightly lower than those of the original version.[23] The item-to-total correlation data also indicated the homogeneity of the scale. In addition, the ICC score for test–retest reliability demonstrated the stability of the scale.

Limitations

This study had several limitations. First, the participants were recruited through convenience sampling from the respiratory department of a single hospital from March to September 2021, leading to inadequate representativeness of the sample. Future studies with adequate samples size of participants from different regions with different types of cancer, recruited using randomized sampling, are warranted. Second, as a five-factor structure was identified for the C-AAQ–Cancer, and Item 1 was retained in Factor 1 despite double-factor loading, further studies are recommended to confirm the structure using confirmatory factor analysis in a representative sample and to consider item deletion.

Table 6

Correlations between the factors of the 18-item C-AAQ–cancer (N = 200).

Factor	F1	F2	F3	F4
F1				
F2	0.223**			
F3	0.532**	0.221**		
F4	0.350**	0.287**	0.481**	
F5	0.397**	0.340**	0.419**	0.358**

C-AAQ–Cancer, Chinese version of the Acceptance and Action Questionnaire.
**P < 0.01.

Implications for research and clinical practice

Cancer is a major contributor to the global disease burden, and projections indicate that the global cancer burden will continue to increase for at least the next two decades.[55] Moreover, it is crucial for oncology professionals to pay attention to cancer patients' psychological well-being when they are suffering distress. As experiential avoidance is regarded as an important psychological response to cancer, the validated C-AAQ–Cancer provides a powerful tool to evaluate avoidance levels in patients with advanced cancer in China. Future studies should be conducted to confirm the generalizability and acceptability of the scale for patients with diverse stages and types of cancer. Understanding the status of avoidance in patients with advanced cancer can be used by healthcare providers to adjust clinical care modes and help patients with cancer cultivate a willingness to accept cancer and engage in a valuable life, despite their illness. By examining avoidance coping in patients with cancer, appropriate acceptance-based strategies or interventions may be developed and applied in this population to provide psychological assistance and improve their ability to cope flexibly with cancer.

Conclusions

This study provides initial support for the psychometric properties of the 18-item C-AAQ–Cancer. The C-AAQ–Cancer showed acceptable reliability and validity in patients with advanced lung cancer, indicating that the scale can be adopted to evaluate the level of experiential avoidance in Chinese patients with advanced lung cancer. This scale may also be valuable to oncology health professionals to understand patients' coping status and improve their mental well-being.

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CRediT author statement

Conceptualization, HL, MSNN and CLW; methodology, HL, MSNN and CLW; formal analysis, HL; investigation, HL; writing – original draft preparation, HL; writing – review and editing, HL, MSNN, XJ and CLW; supervision, MSNN and CLW; project administration, MSNN and CLW. All authors had full access to all the data in the study, and the corresponding author had final responsibility for the decision to submit for publication. The corresponding author attests that all listed authors meet authorship criteria and that no others meeting the criteria have been omitted.

Declaration of competing interest

All authors have none to declare. The corresponding author, Dr. Cho Lee Wong, is an Editorial board member of Asia-Pacific Journal of Oncology Nursing. The article was subject to the journal's standard procedures, with peer review handled independently of Dr. Wong and their research groups.

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Ethics statement

The study involving human participants was conducted following the Helsinki Declaration. Ethical approval was obtained for this study from the Survey and Behavioral Research Ethics Committee at the Chinese University of Hong Kong (IRB No. SBRE-20-041), and permission was obtained from the research hospital. Written informed consent was obtained from all individual participants included in the study.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author, [CLW]. The data are not publicly available due to ethical restrictions.

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