

Translation, Validation and Exploration of the Chinese Version of the Health Care Climate Questionnaire Among Hypertensive Patients in Healthcare Settings

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Background: Healthcare providers' autonomy support influences patients' health behaviors. The Health Care Climate Questionnaire (HCCQ) effectively measures perceived autonomy support in healthcare settings, but its Chinese version lacks proper reliability and validity testing, hindering objective evaluations in China.

Purpose: This study aimed to cross-culturally adapt and validate the HCCQ for assessing perceived autonomy support among Chinese hypertensive patients.

Methods: Following the Brislin translation model, the Chinese version of the HCCQ was adapted. From September 2023 to January 2024, 375 hospitalized hypertensive patients from a Guangzhou tertiary hospital completed the adapted questionnaire. Exploratory (EFA) and confirmatory factor analysis (CFA) were used to test the structural validity; internal consistency and item-total correlations were used to assess reliability.

Results: After excluding invalid questionnaires, this study finally analyzed data from 357 patients (with 105 cases used for EFA in the first stage and 252 cases used for CFA in the second stage). Consistent with the original questionnaire, the Chinese version of the HCCQ contains a total of 15 items and extracts one common factor, which explains 66.019% of the variance. According to the CFA results, the fitted model meets each goodness-of-fit index. The Cronbach's α coefficient of the Chinese version of the HCCQ is 0.961.

Conclusion: Within the scope of this study, the Chinese version of the HCCQ demonstrates good validity and reliability in measuring the perceived autonomy support of hypertensive patients in healthcare settings, which can provide some reference for related research. To a certain extent, the Chinese version of the HCCQ can assist health professionals in assessing and guiding patients' perceived autonomy support.

Keywords: autonomy support, self-determination theory, validation study, chronic disease

Introduction

Autonomy support, as an important environmental factor, has a multifaceted impact on patients' health behavior. Initially, providers offer patients autonomy support by furnishing them with information regarding the disease and its treatment, thereby enabling them to develop a more profound comprehension of their health. Secondly, this relates to the extent to which the provider empowers the patient with a sense of autonomy and freedom in making health-related decisions. In this process, providers will encourage patients to express any responses or opinions, which can elicit their perspective or take action to actively co-operate.¹ Finally, patients are able to identify with the value or importance of self-management and lifestyle changes, which can subsequently assist them in enhancing their self-management and adherence to health behavior in their lives. It is evident that in the process of adhering to health behaviors, in addition to the efforts of the



patients themselves, the providers of autonomy support also play an important role. Currently, healthcare providers, as well as significant others like family members and acquaintances, are the primary sources of autonomy support. In healthcare settings, such as hospitals, clinics, primary level of health care, healthcare providers can serve as a more influential guide among the numerous providers of autonomy support.^{2,3} Nowadays, there are several scales that can be used to evaluate the perceived autonomy support of patients, including the Friendship Autonomy Support Questionnaire (FASQ),⁴ and Autonomy Support Questionnaire (ASQ).⁵ However, these scales are not specifically designed for use in healthcare environments; rather, they are applicable to a diverse array of situations. Therefore, Williams et al developed the “Health Care Climate Questionnaire (HCCQ)” to measure patients’ perceptions of autonomy support within healthcare environments.⁶ The HCCQ includes 15 items and evaluates the extent to which patients’ perceived requirements are met (Details can be found in [Table S1](#)). It is a unidimensional questionnaire with a Cronbach’s α coefficient of 0.82. The assessment is designed to foster independence and encourage patients to assume greater responsibility for their own health.⁷ The HCCQ has been translated from English into Polish,⁷ German,⁸ and French.⁹ It is intended for use in the general medical practice of individuals with type 2 diabetes, as well as persons with melanoma. The Cronbach’s α coefficients for these versions were 0.945, 0.97, and 0.91, respectively. Specifically, all these versions of the HCCQ were both used Classical Test Theory for validation. The results of these studies confirm that, the validity and reliability of the original and translated questionnaires for evaluating patients in a healthcare setting have been established. Meanwhile, the application of the HCCQ helps to effectively assess the degree of autonomy support that patients perceive in healthcare settings. Moreover, patients appreciate the autonomy support provided by healthcare providers, as it makes them feel respected, which in turn enhances the impact on their health behaviors and mental well-being.^{10,11}

However, there is still a gap in objective evaluations regarding perceived autonomy support in China’s healthcare environments. The application of the HCCQ can only be found in Chan¹² and Liu’s¹³ studies. However, the researchers in the above studies have only translated the original questionnaire and have not yet conducted reliable reliability and validity tests. This renders the utilization of this questionnaire in China unscientific. Therefore, the objective of this study is to translate and psychometrically evaluate the HCCQ in order to develop a validated instrument for assessing perceived autonomy support in Chinese patients in healthcare settings, assisting them in adhering to health-promoting behaviors and improving disease prognosis.

Methods

Translation and Cultural Adaptation of the HCCQ Questionnaire

The HCCQ was translated with the consent and authorization of the original author.⁶ The Brislin model is a classic model used in the sinicization of questionnaires, which ensures the quality of questionnaire sinicization in terms of linguistic accuracy and cultural adaptability through a cyclic process of “initial translation - synthesis of translations - back translation - expert review and cultural adaptation - pretesting”¹⁴ Based on the Brislin translation model, we translated and culturally adapted the original questionnaire. In the process of forward translation, two bilingual experts, one with a master’s degree in nursing and the other in English, independently translated the English version of the HCCQ into two distinct Chinese versions. After that, the research team compared and modified two different Chinese translations to create a harmonized version. The Health Care Climate Questionnaire (HCCQ) was translated from Chinese back into English by two individuals, one a nursing faculty member with international study experience in an English-speaking country and the other an English faculty member. Both were Chinese nationals who had no prior exposure to the original English version of the questionnaire. The researchers then organized a team to discuss the differences between the two back-translations and the original questionnaire, and retranslated and back-translated the items with less than 90% agreement until agreement was reached. After that, the back-translated version of the survey was forwarded to the original author, who was asked to assess whether the content, semantics, and format were consistent with the original questionnaire. After his review, the first draft of the Chinese version of the HCCQ was created.

Two rounds of expert consultations were conducted. The cross-cultural adaptation-expert panel was made up of a psychologist, a clinical medicine specialist, a clinical nurse specialist, a nursing education specialist, a nursing research specialist, an English language specialist, and an epidemiologist. The questionnaire was independently reviewed,

proofread, and translated by each of these experts, who provided feedback on its significance, clarity, linguistic standards, and cultural compliance. In the process of cultural adaptation, we have made the following modifications in accordance with the suggestions of the experts. Firstly, item 5 “I feel that my physician accepts me”, the word “accept” in it should be translated according to the context and semantics to more closely align with the Chinese expression. The intended interpretation was that it was “acknowledgement after understanding the individual’s thoughts and emotions” rather than merely a form of acknowledgement. Secondly, item 10 “My physician listens to how I would like to do things”, the phrase in it was modified to indicate that “my healthcare provider is amenable to listening to how I deal with health-related matters”, providing respondents with a more comprehensive and in-depth explanation. Concurrent with the second round of expert consultation, the evaluation of the content validity of the questionnaire was completed.

To ensure that the questionnaire’s language was both easy to understand and well-received, we conducted a pre-test in healthcare settings. Relevant research findings indicated that the recommended sample size for questionnaire pre-tests was 30 participants.¹⁵ Therefore, this study conducted a convenience sampling survey on 30 patients. Subsequently, each respondent participated in a 15–20-minute interview, during which they deliberated on the accuracy of their understanding of each item and highlighted any unclear or incomprehensible details. During this process, patients expressed a variety of opinions regarding the content of item 13 “I don’t feel very good about the way my physician talks to me”, and upon further investigation, we found that item 13 was the sole reverse question in the original questionnaire, and it was designed entirely as an attention check item to make sure respondents were paying attention. Nevertheless, the wording of the question may have had an impact on how well the questionnaire performed for Chinese respondents. Therefore, to improve the accuracy of the survey, item 13 was modified to a direct question. The original author has been informed of and has given their approval for all modifications. Throughout this phase of the research process, the Chinese version of the HCCQ was formulated.

Psychometric Analysis of the Chinese Version of the HCCQ

Study Design and Participants

As indicated by the statistics, the current number of hypertensive patients in China is 109 million.¹⁶ However, according to the results of the Survey on Chronic Disease and Risk Factor Surveillance in China, the treatment rate and blood pressure control rate of Chinese patients with hypertension are only 34.9% and 11.0%, respectively.¹⁷ Given the high incidence and low control rate of hypertension in China, its prevention and control continue to present significant challenges. Furthermore, the control of hypertension relies more heavily on patients’ medication adherence and maintenance of healthy behaviors—behaviors that patients must continue to practice even after leaving healthcare settings. The perceived autonomy support of hypertensive patients in healthcare settings can continuously influence their health behaviors, even extending beyond the healthcare environment. So we chose hypertensive patients as the study population for this survey. The inclusion criteria were as follows: (1) according to 2018 Chinese guidelines for the management of hypertension,¹⁸ blood pressure diagnostic criteria (systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg without medication), with a clinical diagnosis of hypertension; (2) over the age of 18; (3) competent to read and write Chinese; (4) informed consent and willing involvement in the study. The exclusion criteria were as follows: (1) individuals with secondary hypertension (eg, hypertension caused by renal artery stenosis, primary aldosteronism, pregnancy hypertension, and other conditions); (2) individuals with severe visual and hearing impairment; (3) individuals with a medical diagnosis of mental abnormalities and those with slurred speech in actual communication. The subject exclusion criteria were as follows: (1) failure to complete the survey; (2) inability to participate due to other unforeseen occurrences; (3) withdrawal requests for a variety of reasons.

Assessments

A two-stage cross-sectional design was implemented in this study (Article structure: see [Table S2](#)), which implemented convenience sampling, and the inclusion and exclusion criteria remained consistent across all stages. Participants were recruited from a tertiary comprehensive hospital located in Guangdong Province, China. In stage 1, the first sampling survey is used to evaluate the questionnaire’s item analysis, exploratory factor analysis (EFA), and internal consistency. Based on the guidelines that the sample size should be 5–10 times the number of scale items,¹⁹ and that it should be at

least 100 instances.²⁰ Considering the possibility of 20% invalid responses, the final sample size determined in this stage was 120 cases.

In stage 2, participants were chosen in a manner that was distinct from that of the stage 1. A minimum sample size of 200 was generally considered necessary for the confirmatory factor analysis (CFA) of the questionnaire, which was verified using a second sampling.²¹ Considering the possibility of 20% invalid responses, the final sample size determined in this stage was 240 cases.

Instruments

General Information Questionnaire

A general information questionnaire was used to gather the participants' sociodemographic data. Gender, age, education level, marital status, occupation, family residence, living situation, per capita monthly household income, method of paying for medical expenses, and hypertension condition were all covered by the questionnaire.

The Chinese Version of the HCCQ

The Chinese version of the HCCQ is a single-dimensional questionnaire consisting of 15 items, using a 7-point scale ranging from "strongly disagree" (scored 1) to "strongly agree" (scored 7) to quantify the degree of agreement with each statement. The total score is calculated by summing the scores of each HCCQ item. This questionnaire can be used to measure the level of autonomy support perceived by patients in healthcare settings, with a higher HCCQ score indicating a higher level of perceived autonomy support.

Data Collection

Before conducting the survey, all researchers received professional training, such as using uniform language to explain the research purpose and survey methods to the respondents. The survey was conducted by researchers with a nursing background on the third day after the respondents were admitted to the hospital. During the survey, each hypertensive patient received a Chinese version of the general information questionnaire and the HCCQ. All questions could be completed by the patients themselves, and the survey took approximately 15–20 minutes. After the survey was completed, the researchers numbered the questionnaires in the order in which they were finished by the respondents.

Data Analysis

The statistical analyses were conducted using IBM SPSS software version 26.0 and AMOS software version 24.0. The sociodemographic details of patients with hypertension and the score for each item were compiled using descriptive statistics. The questionnaire's item analysis, reliability, and validity were evaluated. $P < 0.05$ is considered statistically significant in all analyses.

Item analysis is the process of evaluating the quality of each item with the aim of determining the suitability or dependability of both individual items and instruments. The outcomes might serve as the foundation for screening or modifying specific items. For item analysis in this study, the Critical Ratio method and Pearson correlation analysis were also applied. The discrimination of each item was tested using the decisive value approach. The top 27% of the overall scale scores were defined as the high group, while the bottom 27% as the low group. Using an independent samples *t*-test, the scores of the high and low groups were compared. Items that exhibited inadequate discrimination were eliminated due to their statistically insignificant differences. Pearson correlation analysis was used to test the representativeness of each item of the questionnaire. When the sample data followed a normal distribution, the correlation coefficient between the score of each item and the total score of the questionnaire was calculated. Items that did not achieve a significant level or had a correlation coefficient of less than 0.4 were excluded.²²

The Cronbach's α coefficient was utilized to assess the questionnaire's reliability. A score of at least 0.7 is considered acceptable.²³ Higher ratings are indicative of improved internal consistency, which is desirable.

Validity encompasses content validity and construct validity. The content validity assessment occurred in the cross-cultural adaptation phase by the committee of experts, the experts in consultation were requested to rate each item on a four-point Likert-type scale ranging from 1 (uncorrelated) to 4 (strongly correlated). The content validity index contains the scale-level content validity index (S-CVI) and the item-level content validity index (I-CVI). I-CVI indicates that each

item adequately represents the concept being assessed, while S-CVI represents the mean I-CVI of all items. Acceptable values for I-CVI and S-CVI are a minimum of 0.78 and 0.90, respectively.^{24,25} The construct validity of the questionnaire was examined using both exploratory and confirmatory factor analysis, which was conducted to 375 hospitalized hypertensive patients in a tertiary hospital in Guangzhou from September 2023 to January 2024. In the exploratory factor analysis (EFA), the Kaiser-Meyer-Olkin (KMO) values and Bartlett's spherical test results were initially employed to assess the appropriateness of the data, for exploratory factor analysis. A KMO value greater than 0.7 and Bartlett's test P-value less than 0.05 indicate that the scale is suitable for factor analysis.²⁶ Principal component analysis and maximum variance orthogonal rotation were used in EFA to extract common factors with eigenvalues of 1.000, whereas items with factor loadings less than 0.400 and multiple loadings were excluded.²¹ The confirmatory factor analysis (CFA) was conducted using the maximum likelihood method, and the model fitness was evaluated through the chi-squared freedom ratio (χ^2/df), goodness-of-fit index (GFI), incremental fit index (IFI), comparative fit index (CFI), and root mean square of the approximation error (RMSEA).²⁶

Results

Demographics and Sample Characteristics

In stage 1, all 120 eligible participants filled out the questionnaires, resulting in a return of 105 completed surveys. Consequently, the recovery rate of the questionnaire for stage 1 was 87.5%, with all returned questionnaires being valid, therefore attaining a 100% validity rate. In stage 2, the survey encompassed 255 hypertensive patients, all of whom submitted their questionnaires, resulting in a response rate of 100%. Upon screening for invalid responses, a total of 252 questionnaires were deemed eligible for analysis, equating to a validity rate of 98.8%. The participant characteristics and demographics at both stages are summarized in Table 1. The means and standard deviations for all 15 tested items are presented in Table 2.

Table 1 Social and Demographic Information of the Participants

Descriptive Characteristics	Stage 1 (n=105)		Stage 2 (n=252)	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Gender				
Male	55	52.4	113	44.8
Female	50	47.6	139	55.2
Education				
Primary and below	28	26.7	63	25
Secondary school	39	37.1	95	37.7
High school, technical secondary	8	7.6	48	19
Post-secondary and above	30	28.6	46	18.3
Marital status				
Married	87	82.9	201	79.8
Single/divorced/widowed	18	17.1	51	20.2
Occupation				
Retirement	75	71.4	178	70.6

(Continued)

Table 1 (Continued).

Descriptive Characteristics	Stage 1 (n=105)		Stage 2 (n=252)	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Unemployed	10	9.5	15	6
On job	20	19.1	59	23.4
Household per capita monthly income				
≤3000 RMB	25	23.8	58	23
3001–6000 RMB	43	41	104	41.3
6001–9000 RMB	13	12.4	41	16.3
≥9001 RMB	24	22.8	49	19.4
Living situation				
Living alone	10	9.5	41	16.3
Living with family	94	89.5	207	82.1
Others (Living with a nanny/ Living in the nursing institution)	1	1	4	1.6
Long-term residence				
Urban	91	86.7	224	88.9
Rural	14	13.3	28	11.1
Primary caregiver				
Family	93	88.6	206	81.7
None	10	9.5	40	15.9
Others (nanny/nursing institution)	2	1.9	6	2.4
Medical expense payment manner				
Medical insurance	74	70.5	173	68.7
New rural medical insurance	21	20.0	48	19.0
Others (eg commercial insurance)	10	9.5	31	12.3
Course of hypertension				
1–5 years	29	27.6	81	32.1
6–10 years	19	18.1	56	22.2
11–15 years	15	14.3	44	17.5
16–20 years	12	11.4	21	8.3
>20 years	30	28.6	50	19.9
Family history of the disease				
Yes	55	52.4	132	52.4
No	50	47.6	120	47.6

(Continued)

Table 1 (Continued).

Descriptive Characteristics	Stage 1 (n=105)		Stage 2 (n=252)	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Classification of hypertension				
Level 1	2	1.9	10	4.0
Level 2	31	29.5	115	45.6
Level 3	72	68.6	127	50.4
Combined with chronic diseases				
Yes	83	79.0	187	74.2
No	22	21.0	65	25.8

Table 2 Descriptive Statistical Results of the Questionnaire

Items	Mean	SD
Q1	6.24	0.967
Q2	6.34	0.800
Q3	6.39	0.643
Q4	6.27	0.759
Q5	6.39	0.744
Q6	6.15	1.065
Q7	6.23	0.844
Q8	6.37	0.668
Q9	6.31	0.800
Q10	6.29	0.864
Q11	6.21	0.965
Q12	6.18	1.076
Q13	6.30	0.765
Q14	6.20	0.952
Q15	6.40	0.690
Total	94.27	8.993

Note: "Total" refers to the average of the total scores of all questionnaires (n=357).

Abbreviation: SD, standard deviation.

In [Table 1](#), we found that the male-to-female ratio of the respondents in both stages was relatively balanced. Most of them had an education level of secondary school, and the vast majority were married and retired, with a medium income and being cared for by family members. In terms of hypertension conditions, most respondents had grade 3 hypertension and were complicated with other chronic diseases.

Item Analysis

The critical value technique was employed as the test index for examining the disparities among items in the Chinese version of the HCCQ. It indicated that statistically significant differences existed among all items ($P < 0.01$). The correlation analysis yielded findings ranging from 0.733 to 0.854 ($P < 0.01$), above 0.4, indicating the correlation coefficient between individual item scores and the overall questionnaire score. As a result, all items were reserved.

Content Validity

After review, the scoring results from the seven experts showed that the I-CVI varied from 0.875 to 1.000, while the S-CVI/UA was 0.975, indicating that both results fell within acceptable parameters.

Construct Validity

The KMO coefficient was calculated as 0.899, indicating the suitability of the data for factor analysis. Furthermore, Bartlett's test yielded a significant chi-square value of 1581.665 ($P < 0.001$), reinforcing the viability of EFA with the sample of 105 respondents from stage 1. Employing principal component analysis with varimax rotation, two distinct factors were extracted, as illustrated in Figure 1. These factors collectively accounted for 73.335% of the total variance. Although two common factors were extracted, the eigenvalue of Factor 1 was nine times higher than that of Factor 2, and it could explain 66% of the variance. Combined with the results of the scree plot, this indicates that the questionnaire may still have a unidimensional structure. Table 3 presents the EFA results for the Chinese version of the HCCQ. Notably, the factor loadings for each item exceeded the acceptable threshold, ranging from 0.653 to 0.842, with no cross-loading observed. Additionally, the communality of each item exceeded 0.4, justifying the retention of all items in the analysis.

Subsequently, the questionnaire's structure was validated through CFA utilizing a sample of 252 respondents from stage 2. Initially, the model fit indices indicated an unsatisfactory fit. To resolve this, residual pathways were introduced based on the principle of maximizing the modification index.²⁷ This modification significantly improved the model fit, resulting in the establishment of the CFA-modified model, as depicted in Figure 2. After fitting, the χ^2/df was 2.328, the GFI was 0.910, the IFI was 0.920, the CFI was 0.919, the RMSEA was 0.033.

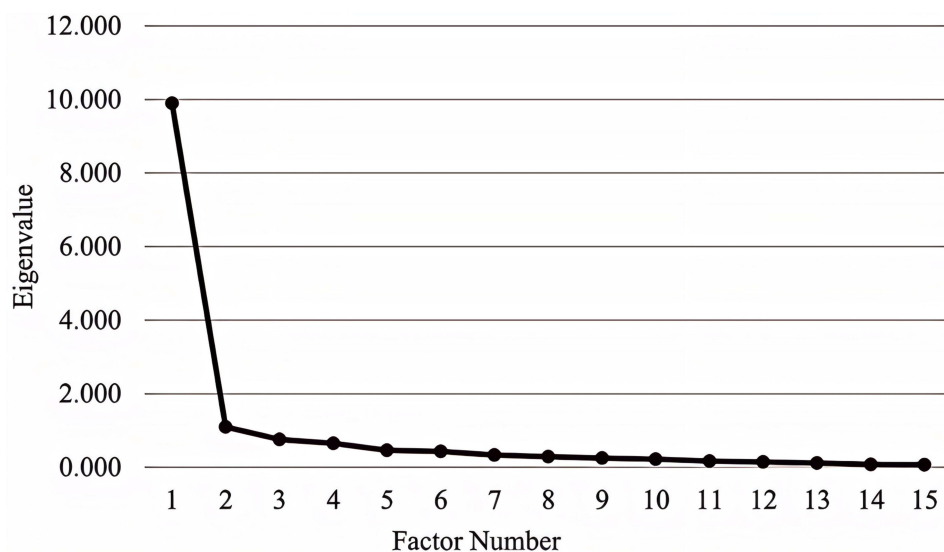


Figure 1 Screen plot of exploratory factor analysis for the Chinese version of the HCCQ ($n = 105$).

Table 3 Results of the Exploratory Factor Analysis

Items	Factor Loading		C ²
	Factor 1	Factor 2	
Q1	0.764	0.443	0.780
Q2	0.710	0.416	0.678
Q3	0.705	0.330	0.606
Q4	0.717	0.489	0.752
Q5	0.785	0.373	0.755
Q8	0.817	0.221	0.716
Q9	0.653	0.542	0.720
Q13	0.756	0.417	0.745
Q15	0.774	0.321	0.702
Q6	0.365	0.794	0.763
Q7	0.439	0.723	0.716
Q10	0.507	0.682	0.722
Q11	0.392	0.776	0.756
Q12	0.258	0.842	0.776
Q14	0.364	0.824	0.812
Eigenvalues	9.903	1.097	
Explained variance (%)	66.019	7.316	
Cumulative variance (%)	66.019	73.335	
Cronbach's α coefficient of subscale	0.948	0.934	

Abbreviation: C², communality.

Reliability

The Cronbach's α coefficient for the entire Chinese version of the HCCQ was 0.961, indicating excellent internal consistency. If any item was deleted, the Cronbach's α coefficients ranged from 0.958 to 0.960, suggesting that no item required consideration for deletion.

Discussion

In this study, from the process of cultural adaptation, we consistently maintain close contact and communication with the original author. This allowed us to translate the questionnaire in a way that not only incorporates the context specific to Chinese culture, but also retains the same semantics and concepts as the original questionnaire, enhancing the applicability of the Chinese version of the HCCQ.

In accordance with the majority of prior studies, our findings show a high mean of total questionnaire scores. The initial English validation study conducted among patients with obesity revealed a significantly high mean value for the sum scores, reaching 66.5 out of a potential 75.⁶ Schmidt et al culturally adapted the original version of the questionnaire and found that the mean of the total scores was also high (possibly 82.5 out of 105) among 550 German primary care patients.⁸ Consistently high ratings may reduce the variability of the questionnaire. For future studies, the original 7-point Likert scale can be converted to a different scoring system, allowing for a comparative analysis of results, to improve the

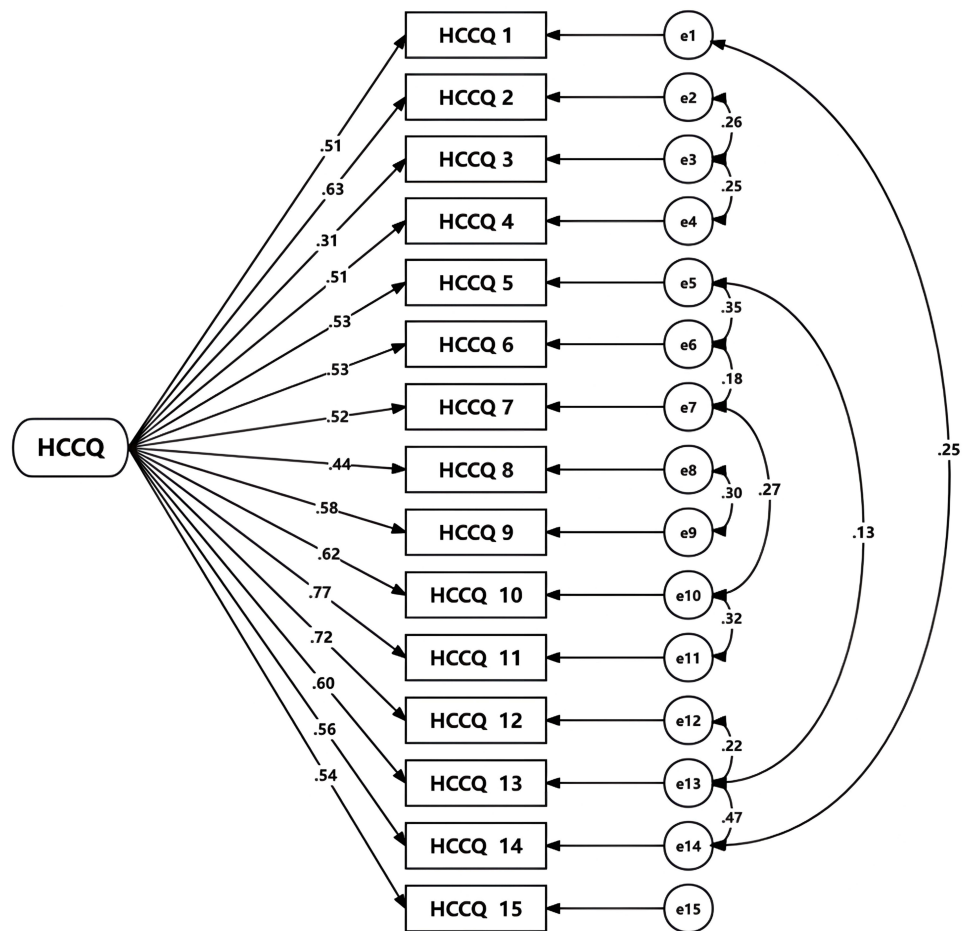


Figure 2 Confirmatory factor analysis modified model.

accuracy of the questionnaire’s measurements.²⁸ Generally, disparities in the number of items and scale points restrict precise comparisons with other studies.⁸ However, the description of each item in the analysis have not been disseminated, even for studies of the original questionnaire. In this study, item 15 “I feel able to share my feelings with my physician” received the highest score, indicating that the respondents felt trust in the healthcare providers. This may be attributed to the healthcare practitioners’ effective communication skills, during the survey process, enabling them healthcare providers demonstrated good communication skills and were able to acquire and apply the knowledge proficiently, thereby establishing a positive relationship with the respondents. Item 6 “My physician has made sure I really understand about my condition and what I need to do” received the lowest score, suggesting that the majority of patients perceived a necessity for enhanced communication with their healthcare providers in order to be better informed about health information that is relevant to them. Findings suggest that expressing concerns, wishes, and opinions in interactions with healthcare providers is an important opportunity for patients to recognize and activate autonomy in dealing with health problems.^{29,30} Therefore, healthcare providers need to assess patients’ intrinsic needs and desires for behavioral change and sustainability during communication, employing with through autonomy-supportive attitudes to facilitate patients’ self-directed behavioral regulation.

A study conducted in the country where the original questionnaire was developed (the United States) pointed out that empowerment can provide trust and motivation for patients with chronic diseases. Over 80% of health interventions in the United States are patient-centered, focusing on the development of patients’ knowledge and skills to achieve personal goal-setting.³¹ In China, however, the level of such perceived empowerment is only moderate.³² In this regard, healthcare providers should support and encourage patients as a strategy for behavior change. In this process, the Chinese version of

the HCCQ can be used to measure the level of support and encouragement that patients perceive in the healthcare settings, which helps healthcare providers evaluate and reflect on whether their behaviors are conducive to patients' adherence to healthy behaviors and improvement in self-management capabilities.

Validity is used to reflect the degree to which a measurement instrument aligns accurately with reality,³³ encompassing both content and construct validity. The I-CVI (≥ 0.875) and S-CVI ($= 0.975 > 0.9$) of the Chinese version of the HCCQ fell within acceptable ranges, showing strong content validity.

This study performed three iterations of EFA, resulting in the identification of two factors that jointly accounted for 73.355% of the questionnaire's total variance. Moreover, the factor loading for each item surpassed 0.4, indicating a strong factorial structure. However, considering that there is a significant difference in eigenvalues between the two factors, and the second factor only explains 7% of the variance, only one common factor was retained. Consistent with the original questionnaire, the revised questionnaire still has a unidimensional structure. This is also consistent with the Dutch, Polish, German and French versions.^{3,7-9} The fact that the number of extracted common factors in the Chinese version of the HCCQ is consistent with that in the original questionnaire indicates that the structural validity of the Chinese version is well-preserved. Specifically, it suggests that the translated questionnaire maintains the same underlying dimensional structure as the original one, reflecting that the core constructs and factor relationships measured by the questionnaire remain stable after translation. This consistency implies that the translation process has not distorted the essential psychological or conceptual structure of the original instrument, and the translated version can effectively capture the same latent variables or factors as intended by the original questionnaire. Such a result provides important evidence for the cross-cultural adaptability and reliability of the translated questionnaire, supporting its applicability in Chinese cultural or linguistic context.

Reliability analysis is used to measure the stability of questionnaires.³⁴ The appropriateness and reliability of the items were demonstrated by item analysis, which revealed correlation coefficients exceeding 0.4 and achieving statistical significance with respect to the crucial value between each item's score and the entire questionnaire score. In this study, the Cronbach's α coefficient for the total scale exceeded 0.9, which indicated that the Chinese version of the HCCQ had exceptional consistent dependability.

As a chronic disease that impacts human health, hypertension has a long-term effect on sufferers' lives and careers, among other things. Stress in daily life can lead to a sustained increase in blood pressure.³⁵ Autonomy support functions through two core pathways: on the one hand, it provides individuals with room for autonomous choice; on the other hand, it helps them understand the intrinsic value of stressful events. This process prompts a shift in individuals' perception of stressors—from originally viewing themselves as “objects passively enduring stress” to recognizing stressors as “opportunities for self-development that they actively choose to face.” During this cognitive restructuring, the psychological capital possessed by individuals will gradually improve.^{36,37} Given the important role of autonomy support in blood pressure control, it is necessary to measure the autonomy support that individuals perceive in the environment. The Chinese version of the HCCQ that was finally developed in this study demonstrated strong reliability and validity. The instrument can be used in further study to evaluate the autonomy support provided to hospitalized hypertension patients and, based on that assessment, to deliver tailored and evidence-based interventions.

The strength of this study lies in that the entire process of cross-cultural adaptation and psychometric evaluation follows a scientifically rigorous procedure, and reasonable statistical methods are adopted, which is conducive to enhancing the scientificity and persuasiveness of the research results. Meanwhile, the involvement of the original author enhanced the accuracy and credibility of the translation and language validation. The study does have certain shortcomings, however. First, this study only corroborates that the Chinese version of the HCCQ is a scientific tool for measuring the level of perceived autonomy support in hypertensive patients. However, this study is limited to a single tertiary hospital and has not yet been implemented on a large scale in the target population. In the future, it will be necessary to further expand the research scope and increase the sample size to verify its specific application. Second, since the respondents of this study are inpatients, the interval between their discharge and readmission is relatively long. Meanwhile, the common time interval for test-retest reliability is 2–4 weeks. Therefore, it is difficult to find the original respondents in the inpatient setting to conduct the test-retest reliability survey. Additionally, patients may be reluctant to

express their dissatisfaction with their healthcare providers while they are in the hospital for a variety of reasons, which could also bias the study's findings.

Conclusion

In this study, statistical biases were effectively controlled through reasonable sample size calculation, standardized survey procedures, and rigorous reliability and validity analysis. Patients' perceptions of autonomy support can have a significant impact on their behavioral changes. By measuring patients' perceived level of autonomy support in healthcare settings, this tool clarifies their needs and thus provides appropriate guidance for their health behaviors, which is important for the prevention, control and management of chronic diseases. Within the scope of this study, the Chinese version of HCCQ has demonstrated good validity and reliability in measuring the perceived autonomy support of hypertensive patients, which can provide some reference for related research. In the future, multi-center and multi-disease studies will be carried out to improve the generalizability of research findings. The application of the Chinese version of the HCCQ is conducive to measuring the degree of perceived autonomy support among patients with chronic diseases in the Chinese healthcare environment. Furthermore, it helps healthcare providers improve their communication methods and promote patients' adherence to health behaviors in a way acceptable to patients.

Data Sharing Statement

The author confirms that all data generated or analysed during this study are included in this published article. Furthermore, primary and secondary sources and data supporting the findings of this study were all publicly available at the time of submission.

Ethical Approval

This study was conducted in full compliance with the ethical principles outlined in the Declaration of Helsinki. Prior to the initiation of the study, the study protocol was reviewed and approved by The First Affiliated Hospital of Guangdong Pharmaceutical University Ethics Committee (Approval number: [2023] IIT NO. 36). All participants were provided with comprehensive, written information regarding the study's purpose, procedures, potential risks, benefits, and their right to withdraw from the study at any time without penalty. Written informed consent was obtained from each participant before their enrollment in the study. The authors confirm that no ethical violations occurred during the conduct of this study, and all aspects of the research adhere to the standards set forth by the Declaration of Helsinki.

Acknowledgments

We extend our heartfelt gratitude to the esteemed members of our translation team and expert panel, as well as the interview participants, for their invaluable support and insightful suggestions. We also offer special recognition to Dr. Ryan for generously allowing us to utilize the original instrument and for consistently providing assistance throughout the entire research process.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Funding

This work was supported by The Special Project on Tencent Science and Technology Innovation Education under the Industry-University-Research Innovation Fund of Higher Education Institutes of China [grant number the Department of Science and Technology Research and Development Center of Higher Education Institutions of the Ministry of Education: [2023] No. 11]; Construction project of teaching quality and teaching reform of universities in Guangdong Province, China [grant number Higher Education Department of Guangdong Provincial Department of Education: [2024] No. 9].

Disclosure

The authors declare that they have no conflicts of interest in this work.

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