Reliability and validity of the multidimensional dyspnea profile in hospitalized Chinese patients with respiratory diseases

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Abstract

Background: Dyspnea is a multidimensional experience similar to pain and is one of the most common clinical presentations in patients with respiratory diseases. Accurately evaluating the experience of dyspnea allows nurses and physicians to deliver better medical services to patients. The multidimensional dyspnea profile emphasizes the psychosocial factors of dyspnea and assesses immediate discomfort, sensory qualities, and the emotional responses of patients with dyspnea. At present, the validity, reliability, and test–retest reliability of the multidimensional dyspnea profile in patients with respiratory diseases in China are unclear.

Objectives: The aim of this study was to investigate the validity, reliability, and test–retest reliability of the Chinese version of the multidimensional dyspnea profile and to assess the convergent validity between the Chinese version of the multidimensional dyspnea profile and the modified Medical Research Council Dyspnea Scale.

Methods: The factorial construct, intraclass correlations, internal consistency, and convergent validity of the Chinese version of the multidimensional dyspnea profile was evaluated using data from 231 inpatients with dyspnea from the respiratory department of a hospital. In the principal component analysis stage, 131 inpatients were evaluated. In the test–retest reliability analysis stage, 50 out of the 131 patients responded to the questionnaire again. In the confirmatory factor analysis, 100 inpatients from an independent sample were assessed.

Results: The principal component analysis showed that the Chinese version of the multidimensional dyspnea profile had a two-factor structure: the immediate perceptual-related problem factor (6 items) and the emotional response-related problem factor (5 items). The convergent validity between the Chinese version of the multidimensional dyspnea profile and the modified Medical Research Council Dyspnea Scale was significant and acceptable based on the average variance extracted (r = .56, p < .001). The confirmatory factor analysis revealed a good model fit and provided support for the construct validity of the Chinese version of the multidimensional dyspnea profile. Overall, the internal consistency and intraclass correlation coefficient of the Chinese version of the multidimensional dyspnea profile were good.

Conclusion: The 11-item Chinese version of the multidimensional dyspnea profile has acceptable validity and reliability in patients with respiratory diseases in China. In the future, more studies should be performed to further explore its clinical application.

Keywords

Dyspnea, questionnaires, respiratory disorders

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Introduction

The original multidimensional dyspnea profile (MDP) was developed and tested by Banzett for English-speaking adults in the United States in 2008; this scale incorporated 12 items and was used to evaluate sensory intensity, immediate unpleasantness, sensory quality, and emotional responses of dyspnea.[1] The authors suggested that the unpleasantness of dyspnea is different from its perceived intensity but is consistent with the model of pain. They also believed that the original MDP could measure separate dimensions of dyspnea. The original MDP can be used in both clinical and laboratory research, enabling transformation between clinical and laboratory results. The theoretical constructs of the original MDP may be helpful for respiratory physicians and nurses to evaluate dyspnea more accurately. The literature has shown that the original MDP has high validity, reliability, test–retest reliability, and responsiveness in patients with cardiopulmonary disease and dyspnea, acute care, and follow-up care.[2,3] A substantial amount of information on dyspnea can be captured by the original MDP, which can clearly distinguish different sensory qualities from different emotional responses. One item (overall sensory intensity) was deleted from the original MDP, and it was modified from 12 items to 11 items in 2015.[4] Some studies have shown that the modified MDP also has high validity and reliability and is more concise than the original scale. It has been translated into different languages and is widely applied worldwide.[5–8] However, the modified MDP has not been translated into Chinese. The validity, reliability, test–retest reliability and responsiveness of the Chinese version of the Multidimensional Dyspnea Profile (C-MDP) are unknown. We do not yet know whether the modified MDP is suitable for the Chinese population. Therefore, in our study, we introduced a modified MDP for Chinese patients and examined the validity, reliability, and test–retest reliability of the MDP in patients with dyspnea related to respiratory diseases in a Chinese hospital. In addition, we also investigated the convergent validity between the C-MDP and the modified Medical Research Council (mMRC) Dyspnea Scale.

Currently, there are a number of available tools for assessing dyspnea in clinical research, but most of them are used to assess dyspnea with a single dimension at a specific time or to evaluate activity-related dyspnea over a period of days. These tools do not discriminate the different sensation qualities of breathing discomfort from special emotional responses and cannot comprehensively examine the real experiences of dyspnea. The advantages of the 11-item modified MDP are that it emphasizes the psychosocial factors of dyspnea and that it can be used to assess unpleasantness, sensory qualities, and the emotional experience of dyspnea based on the immediate perception domain and emotional response domain. These advantages are the reason that we performed this study.

Methods

Study design

This descriptive study was performed to examine the psychometric properties of the C-MDP.

Translation and cross-cultural adaptation

The translation and adaptation of the scale to the Chinese culture were carried out based on previously published guidelines as follows:[9,10] (1) the original English questionnaire was translated into Chinese by two independent researchers who spoke Chinese; (2) a consensus version was constructed in accordance with both researchers; (3) back-translation into English for the consensus version was performed by two English-speaking researchers; (4) the prefinal version was reviewed and constructed by an expert committee; (5) the prefinal version was tested in patients with respiratory diseases; and (6) the final version of the tool was constructed. Members of the expert panel possessed rich experience and professional knowledge in the treatment of patients with respiratory diseases and scientific research. The content validity of the scale was evaluated by the expert committee, including two respiratory specialists, one respiratory therapist, one professor of psychology, and two nurses who specialized in respiratory diseases. The expert panel constructed a prefinal version on the basis of cultural, idiomatic, semantic, and conceptual factors. The original author authorized and consented to the translation and revision of the MDP in this study.

Participants

The participants in this research were inpatients with respiratory diseases from a general hospital (Second Xiangya Hospital of Central South University) in the Changsha urban area, Hunan Province, China. There were 4000 beds in the hospital. The study was conducted from 10 May 2017 to 3 December 2017. The inclusion criteria were as follows: (1) patients diagnosed with acute or chronic respiratory diseases; (2) patients had dyspnea (defined as having a score of at least 2 on the mMRC Dyspnea Scale); and (3) patients gave informed consent. Patients without dyspnea or those who were incapable of communicating independently were excluded from the research. Sociodemographic data were collected after patients signed the consent form. The desired sample size was determined using sampling formula for the rate in cross-sectional study ($n = 178 \times (Q/p)$, n = sample size, allowable error = 0.15p, p = predicted value of population rate, $Q = 1 - p$), with an alpha error rate of .05, a beta error rate of .10, a power of .90, and an estimated p value of .05.[11,12] Effect sizes were estimated using the mean ± standard deviation, frequencies, and percentages. It has been reported that dyspnea prevalence in respiratory diseases ranges from 50% to

78.1%. Sample size was calculated by the reference of low level of dyspnea prevalence (p = 50%). Estimated sample size was 178 (n = 178 × ((1 − 0.5)/0.5) = 178).

Measurements

This 11-item MDP consists of two dimensions (immediate perception and emotional response) and assesses respiratory experience at a specific time.[4] Each item is rated from 0 to 10. For the degree of immediate "discomfort/unpleasantness of breathing," 0 represents neutral, and 10 represents unbearable. For dyspnea intensity, 0 represents none, and 10 represents "as intense as I can imagine." For emotional responses to dyspnea, 0 represents none, and 10 represents the most I can imagine. The higher scores the patient obtained, the more critical his or her symptoms of dyspnea were. Previous studies have shown that the MDP had acceptable construct validity and reliability.[2,3] The C-MDP was used in this study to assess dyspnea in patients with respiratory diseases.

The mMRC Dyspnea Scale is a self-report instrument to evaluate the severity of dyspnea in patients with respiratory diseases.[13] Symptom severity (walking) should be assessed at baseline with a scale ranging from 0 to 4, where 0 represents dyspnea only with strenuous exercise, 1 represents dyspnea when hurrying or walking up a slight hill, 2 represents walking slower than people of same age because of dyspnea or having to stop for breath when walking at their own pace, 3 represents stopping for breath after walking 100 yards (91 m) or after a few minutes, and 4 represents being too dyspneic to leave the house or feeling breathless when dressing or undressing. Previous studies have shown that the mMRC Dyspnea Scale had good validity and reliability.[14] At present, the mMRC Dyspnea Scale is widely used in China.

Data collection procedure

The survey was conducted in the respiratory department of a hospital. According to the inpatient's disease diagnosis, nurses and physicians jointly recruited potential subjects. Data were collected by three specialized respiratory nurses and one respiratory physician. Interrater reliability at each time point was measured by one statistician. A pilot test was conducted with 10 inpatients for dyspnea on 25 April 2017. Five groups of subjects who completed the questionnaire were interviewed for more than 1 h, with two subjects per group. They were asked how they understood each item and responded to it. In the formal test stage, the purpose and significance of the research were explained for inpatients with dyspnea, and we asked for their cooperation before data collection. After acquiring approval, the researchers administered the questionnaires to the subjects and collected the completed questionnaires on the spot. For the test–retest reliability analysis, the data collection requirements were the same as those of the formal test.

Statistical analysis

The standard deviation and mean were used to evaluate continuous variables. Percentages and frequencies were used to assess categorical variables. The standard error of measure (SEM) was also determined. Descriptive statistics were used to analyze the sociodemographic data. Principal component analysis was carried out to investigate the construct validity of the MDP with a varimax rotation. Preliminary principal component analysis was applied to identify the number of factors on the basis of Reda's study.[15] A loading ⩾ .50 was considered to indicate a strong factor loading, and items that exceeded this threshold were incorporated in the extracted factors. All items were reviewed to justify their deletion from the scale. The convergent validity of the C-MDP and its subscales with the mMRC Dyspnea Scale was calculated using Spearman's correlation coefficient. Cronbach's α was utilized to analyze internal consistency, and values above .90 indicated high internal consistency.[16] A Bland–Altman plot was used to evaluate the consistency between the test and retest. The level of significance was set at 0.05. The intraclass correlation coefficient (ICC) was utilized to analyze intraclass consistency, which was estimated with a 95% confidence interval (95% CI). An ICC with values between .75 and 1 indicated excellent reliability.[17] The corrected item-total correlation, squared multiple correlation, and Cronbach's α if item deleted were also examined in item analysis. Correlation coefficients were no less than the Cronbach's α value and did not decrease if the item was deleted. A confirmatory factor analysis (CFA) was performed on the basis of the principal component analysis.[18] The model fit is acceptable if the following criteria are met: ratio of the χ^2 value to the degrees of freedom less than 3.0, probability level greater than .05, comparative fit index (CFI) greater than .90, adjusted goodness-of-fit index (AGFI) greater than .90, goodness-of-fit index (GFI) greater than .90, Tucker–Lewis index (TLI) greater than .90, and root mean square error of approximation (RMSEA) less than .05. The convergent validity between the C-MDP and the mMRC Dysnpea Scale was assessed using the average variance extracted (AVE; cutoff ⩾ .50), and discriminant validity (cutoff < .50) was indicated if the AVE of each concept was more than the squared correlations (R^2) between the concept.[19] The data analyses were conducted using IBM SPSS Statistics version 22.0 (IBM SPSS, USA), GraphPad Prism version 7.0 (GraphPad Software, USA), and IBM SPSS Amos version 24.0 (Computer Program: IBM SPSS, USA).

Ethical consideration

The study was conducted in accordance with the Declaration of Helsinki. Ethics Committee approval was obtained from the Institutional Ethics Committee of the Second Xiangya Hospital of Central South University to the commencement of the study. Our institution's committee on human research gave approval for this study. (2016) Ethical approval No.S110.

Results

Sociodemographic characteristics

The estimated sample size was 178 patients, but to avoid invalid samples, we distributed 406 questionnaires. Among the 406 patients with acute and chronic respiratory diseases who were probably suitable for participation, 102 patients were ineligible, and 73 patients refused to participate. Therefore, 231 qualified patients consented to participate in this study. Males accounted for 72.3% of the sample in this study. The mean ± standard deviation of age was 60.84 ± 13.94 years. The average course of disease was 10.98 ± 7.70 years, of which 52 patients had a clinical history (22.5%) of more than 10 years. A total of 135 patients (58.4%) were hospitalized more than two times per year. A total of 116 patients' body mass index (BMI) was normal (18.6–23.9),[20] accounting for 44.9% of the sample. The average smoking time was 19.51 ± 17.72 years, of which 109 patients (47.2%) has smoked for more than 10 years. The mean ± standard deviation of the Charlson Comorbidity Index was 2.11 ± 1.84. In addition, 74 patients (32.0%) suffered from chronic obstructive pulmonary disease (COPD), 48 patients suffered from severe pneumonia, and accounting for 30.5% of the non-COPD group (Table 1). In the principal component analysis, 131 patients with respiratory diseases were evaluated. In the test–retest reliability analysis, 50 of the 131 patients were asked to respond to the questionnaire again 2 weeks after the initial reliability analysis. In the CFA, 100 patients with respiratory diseases from an independent sample were assessed. There were four parameters estimated in a given model.

Construct validity

In the principal component analysis, Bartlett and Kaiser–Meyer–Olkin (KMO) statistics indicated that the correlation matrix was adequate for its results. On the basis of Reda's[15] study, two factors were extracted. The eigenvalue of factor 1 was 6.62, and that of factor 2 was 1.28. In addition, the cumulative variance contribution rate of these factors was 71.8% (factor 1 = 39.5%, factor 2 = 32.3%) in the model. Six items were included in factor 1, which referred to immediate perception, and the factor loadings ranged from .59 to .85. Factor 2 consisted of five items related to emotional response, and the factor loadings ranged .69 to .87. For example, the item "My breathing sensations make me feel frustrated" had loadings of .59 and .69 for factors 1 and 2, respectively. However, it was loaded onto factor 2 because of the closer emotional response in patients with respiratory diseases (Table 2). By performing CFA on the 11-item C-MDP, six overall models were generated that were consistent with the cutoff value. Fit indexes showed that the two-factor model of immediate perception and emotional response has a good fit: the ratio of the χ^2 value to the degrees of freedom was 1.11, the probability level was .05, the CFI was .99, the AGFI was .91, the GFI was .95, the TLI was .99, and the RMSEA was

Table 1. Sociodemographic characteristics and clinical parameters of participants (n = 231).

Variable	Mean ± SD	n (%)
Sex		
Male		167 (72.3)
Female		64 (27.7)
Age	60.84 ± 13.94	
Course of disease (years)	10.98 ± 7.70	
≤5		146 (63.2)
6–10		33 (14.3)
>10		52 (22.5)
Times of hospitalization	3.36 ± 3.09	
1		96 (41.6)
2–5		101 (43.7)
>6		34 (14.7)
BMI	21.58 ± 3.91	
≤18.5		47 (20.3)
18.6–23.9		116 (49.9)
24–27.9		61 (26.4)
>28		7 (3.5)
Somking time (years)	19.51 ± 17.72	
0		103 (44.6)
1–10		19 (8.2)
11–30		53 (23)
>30		56 (24.2)
Charlson comorbidity index	2.11 ± 1.84	
0–1		135 (58.4)
2–3		56 (24.3)
≥4		40 (17.3)
Diagnosis		
COPD		74 (32.0)
No COPD		157 (68.0)
No COPD		
Severe pneumonia		48 (30.5)
Lung cancer		33 (21.0)
Pleural effusion		27 (17.2)
IPF		24 (15.3)
Pneumothorax		14 (9.0)
Asthma		6 (3.8)
LAM		3 (2.0)
PAP		2 (1.2)

SD: standard deviation; BMI: body mass index (normal BMI was 18.6–23.9); COPD: chronic obstructive pulmonary disease; IPF: idiopathic pulmonary interstitial fibrosis; LAM: lymphagniomyoma; PAP: pulmonary alveolar proteinosis.

.03 (Figure 1). These fit indexes indicate that the data fit the two-factor structure proposed in this study. An examination of modification indices and standardized residuals was conducted to determine areas of fit within the model.[21]

Convergent validity

Scores on the 11-item C-MDP were positively correlated with scores on the mMRC Dyspnea Scale (r = .56, p < .001). Scores on factors 1 and 2 individually were also positively

Table 2. Factor loadings for the two extracted factors after varimax rotation of the C-MDP (n = 131).

	Factor loadings	
	Factor 1	Factor 2
Immediate perception domain		
Unpleasantness or discomfort of your breathing sensations, how bad your breathing feels	.70	.17
My breathing requires muscle work or effort	.83	.32
I am not getting enough, I am smothering, or I feel hunger for air	.84	.31
My chest and lungs feel tight or constricted	.59	.35
I am breathing a lot (breathing rapidly, deeply or heavily)	.78	.30
My breathing require mental effort or concentrarion	.85	.23
Emotional response domain		
My breathing sensations make me feel depressed	.33	.76
My breathing sensations make me feel anxious	.48	.74
My breathing sensations make me feel frustrated	.59	.67
My breathing sensations make me feel angry	.30	.86
My breathing sensations make me feel afraid	.12	.87

C-MDP: Chinese version multidimensional dyspnea profile.
Extraction method: principal–component analysis; item with a factor loading greater than .50 is retained for that factor.
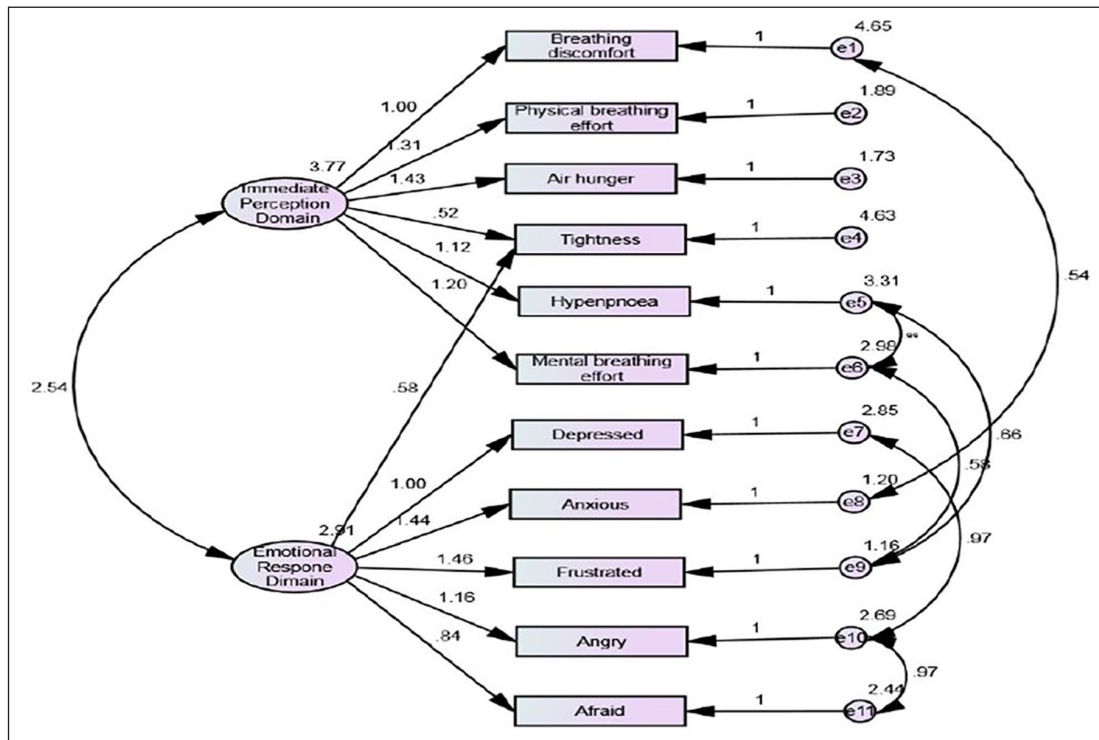
Figure 1. Best model derived from the confirmatory factor analysis of the Chinese version of the multidimensional dyspnea profile (C-MDP). The ovals signify the latent variables, while the squares signify the measured variables. The values approaching those elements denote the factor loadings. The other values denote the existing correlations.

correlated with scores on the mMRC Dyspnea Scale (factor 1: r = .58, p < .001; factor 2: r = .55, p < .001).

Reliability

The total Cronbach's alpha and Guttman Split-Half coefficient for the 11-item C-MDP indicated high internal consistency with values of .93 and .88, respectively. The total standard error of the mean (SEM) was 2.04. The test–retest reliability for the C-MDP indicated a high ICC of .82 (95% CI: .68–.90; Table 3). The corrected item-total correlations ranged from .58 to .84, which indicated good correlations (values greater than 0.4 are considered satisfactory).[22] The squared multiple correlations ranged from .47 to .80, which also indicated good

Table 3. Test–retest reliability indicators of the C-MDP (n = 50).

	Test 1 (mean ± SD)	Test 2 (mean ± SD)	SEM	ICC	95% CI
Immediate perception domain	18.91 ± 14.38	18.82 ± 11.57	1.26	.87	.77–.92
Emotional response domain	7.73 ± .95	7.57 ± 9.95	.95	.75	.55–.86
Total	26.64 ± 23.38	26.38 ± 23.38	2.04	.82	.68–.90

C-MDP: Chinese version multidimensional dyspnea profile; SD: standard deviation; SEM: standard error of mean; ICC: intraclass correlation coefficient; CI: confidence interval.

Table 4. Item analysis for factors 1 and 2 of C-MDP.

	Mean ± SD	Corrected item-total correlation	Squared multiple correlation	Cronbach's alpha if item deleted
Factor 1: Immediate perception domain				
Unpleasantness or discomfort of your breathing sensations, how bad your breathing feels (ID1)	4.53 ± 2.89	.59	.58	.93
My breathing requires muscle work or effort (ID2)	2.92 ± 2.91	.72	.71	.93
I am not getting enough, I am smothering, or I feel hunger for air (ID3)	3.02 ± 3.09	.84	.80	.92
My chest and lungs feel tight or constricted (ID4)	3.21 ± 2.87	.80	.78	.92
I am breathing a lot (breathing rapidly deeply or heavily) (ID5)	2.82 ± 2.87	.68	.59	.93
My breathing require mental effort or concentration (ID6)	2.41 ± 2.94	.76	.68	.92
Factor2: Emotional response domain				
My breathing sensations make me feel depressed (ED1)	1.33 ± 2.41	.74	.66	.93
My breathing sensations make me feel anxious (ED2)	2.36 ± 2.70	.61	.51	.93
My breathing sensations make me feel frustrated (ED3)	1.74 ± 2.75	.81	.74	.92
My breathing sensations make me feel angry (ED4)	1.26 ± 2.61	.80	.71	.92
My breathing sensations make me feel afraid (ED5)	1.05 ± 2.13	.58	.47	.93

C-MDP: Chinese version multidimensional dyspnea profile; SD: standard deviation.

correlation.[22] In addition, the Cronbach's alpha if any item was deleted did not increase (Table 4). The Bland–Altman plot indicated that there was a significant difference between the test and retest scores on the C-MDP ($P < .001$), indicating consistency in the average total score of the C-MDP between the test and retest (Figure 2).

Discussion

Through item analysis, principal component analysis and CFA, this study developed a Chinese version of the 11-item multidimensional dyspnea profile (C-MDP) that included two domains: the immediate perception domain and the emotional response domain. The cumulative variance contribution rate of the two dimensions was 71.8%. The results were consistent with the theoretical basis of the 11-item modified MDP,[4] which indicated that there was cross-cultural consistency in the structure of respiratory disease patients' experiences with dyspnea and further verified the stability of the MDP's scale structure.

In the item analysis, the corrected item-total correlation and squared multiple correlation of 11 items were higher than .50, Cronbach's alpha if item deleted was higher than .9, and the attribution of each dimension was consistent with the

11-item modified MDP. The results indicated that the 11 items have good discrimination and contribute to the dimension to which they belong and met the requirements of psychometrics. The principal component analysis verified the structure stability of the scale. The CFA showed that the fit index was acceptable. These results were consistent with those of Belo, who investigated the validity and reliability of a Portuguese version of the MDP for patients with COPD,[6] and the findings of Ekström, who examined the validity of the Swedish MDP in outpatients with cardiorespiratory diseases.[23] The two-factor model has also been verified among Chinese patients with respiratory diseases, indicating that the actual measurement results conformed to the theoretical framework of the 11-item modified MDP. The multidimensional dyspnea was a multidimensional structure, and the 11 items belonged to two different factors. Although each factor was related to each other, they also had a certain degree of relative independence. Multidimensional dyspnea was a comprehensive reflection of respiratory disease patients' immediate perception and emotional response to dyspnea.

The results of the reliability analysis showed that the total Cronbach's alpha and Guttman's split-half coefficients for the 11-item C-MDP were higher than .8, indicating that the contents of the items described in each dimension were
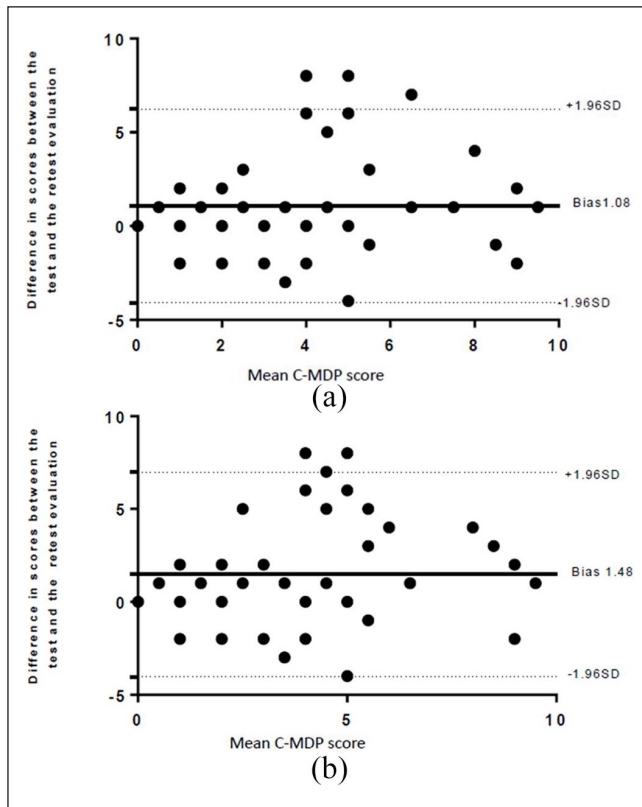
Figure 2. Bland–Altman dispersion plot of the mean total score of the Chinese version of the multidimensional dyspnea profile (C-MDP) test and retest: (a) total score of the test and (b) total score of the retest.

relatively focused and consistent.[16] The results of test–retest reliability after 2 weeks showed that the ICC of the two dimensions and the total items was between .75 and .87, and the 95% CI of the total scale was .68–.90. The SEM of the questionnaire was 2.04, which indicated that the statistics of the sample varied closely with the value of the overall parameter.[24,25] The consistency of the scale was confirmed by Bland–Altman plots.[26] These results indicated that dyspnea of respiratory disease patients had stable immediate perceptions and emotional responses and that these findings were highly consistent across time.[17]

Laboratory studies have distinguished the intensity of sensory qualities from breathing discomfort, but some individuals have found it difficult to distinguish these two aspects.[27] This study failed to separate the intensity of sensory qualities (physical breathing effort, tightness, air hunger, hyperpnoea, and mental breathing effort) from breathing discomfort but classified them into the immediate perception domain. In a study about the reliability and validity of the original MDP (12 items), the authors investigated 151 emergency department patients with dyspnea who were asked to respond to the original MDP at five time points.[2] They considered that the original MDP had acceptable reliability, validity, and responsiveness to clinical change. However, the study excluded patients who did not speak and understand

English. In another study on the test–retest reliability of the original MDP (12 items), 154 cardiopulmonary condition patients with dyspnea completed the original MDP several times.[3] Sixty-eight of these patients completed the tool again in a follow-up visit 4–6 weeks later. The authors believed that the reliability of the original MDP was reliable and stable for individual items, while the test–retest reliability was poor, which is different from the findings of our study.[3] This discrepancy may be associated with different research times and populations and different cultures in various countries and may also be associated with different items of the scale. In a multicenter, prospective, observational, real-life study of 276 patients, the authors concluded that the 11-item modified MDP could be used to recognize different emotional responses of dyspnea in clinical practice and to help describe the sensory of dyspnea for patients.[28] In addition, in a pilot study of the 11-item modified MDP, the authors found that COPD patients showed discomfort related to sensory intensity, anxiety, and frustration.[29] They considered that the medical history of COPD did not change the affective response of dyspnea and that dyspnea evoked by the laboratory was not different from dyspnea evoked by activities of daily living in the aspect of emotional responses. Although a few studies of the modified MDP have been conducted by scholars and some achievements have also been obtained,[5,7,8,28] a series of clinical studies are still needed to further confirm the application of modified MDP in special diseases.

There were several limitations in this study. First, the results of the study could not be generalized to all kinds of patients with dyspnea, since our study only included inpatients with respiratory diseases and excluded patients who were incapable of communicating independently. Second, the response of the C-MDP to clinical change was not assessed, and a heterogeneous sample was studied, that is to say, the use of the C-MDP in the respiratory department is not confined to a specific diagnosis. We suggest that in future research, the responsiveness of the C-MDP should be further examined by expanding the scope of research. In addition, this study had several notable advantages. According to the results of the literature review, there are few studies on the validity and reliability of the C-MDP in China. Psychometric analyses indicated that the C-MDP achieved good levels of validity, reliability, and test–retest reliability. In addition, our findings also show that the C-MDP is valid and reliable for discriminating immediate perception from the emotional response of patients in the respiratory department.

Conclusion

This study examined the use of the C-MDP for hospitalized patients with respiratory diseases in one general hospital in China. The final tool includes 11 items and showed high validity, reliability, and test–retest reliability. The C-MDP is a simple and effective instrument that can assess discomfort, hunger for air, muscle work, constriction, depression, anxiety, anger, fear, frustration, and so on caused by dyspnea

from immediate perception and emotional response perspectives. Therefore, during hospitalization for respiratory diseases, accurately evaluating the immediate perception and emotional response of dyspnea among patients will contribute to a deeper understanding of the challenges of respiratory nursing care, helping nurses to better deliver dyspnea services to patients for nurses and helping physicians to diagnose and treat patients. In the future, we hope that the C-MDP can be widely used in clinical patients. Therefore, we suggest that a multicenter prospective study with a larger sample should be performed to assess the C-MDP.

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Supplemental material

Supplemental material for this article is available online.

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