

## Cultural adaptation and reproducibility of the Breathing Problems Questionnaire for use in patients with COPD in Brazil\*

Adaptação cultural e reprodutibilidade do Questionário para Problemas Respiratórios em pacientes portadores de DPOC no Brasil

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### Abstract

**Objective:** To translate the Breathing Problems Questionnaire (BPQ) into Portuguese and adapt it to the Brazilian culture, as well as to evaluate its reproducibility in patients with COPD. **Methods:** After the BPQ had been translated and adapted to the Brazilian culture, it was administered to a subgroup of 8 patients in order to identify their uncertainties and difficulties. The questionnaire was reviewed by an expert committee, and its final version was arrived at. A second translator back-translated the final version into English, which was sent to the original author in order to verify that the original meaning of the questionnaire had been maintained. After the approval of the original author, the final Portuguese-language version of the questionnaire was administered to 50 patients with COPD, in order to evaluate its reproducibility. **Results:** The mean response time was 9.5 min. Of the 50 patients, 21 were female and 29 were male. The mean age was  $65.8 \pm 7.5$  years. Most of the patients were classified as having moderate COPD (29.16%) or severe COPD (52%). The intraclass correlation coefficient (ICC) for the total score was 0.94. The ICCs for the eleven BPQ domains and its two subscales were also above 0.70. Moderate correlations were found between the BPQ domains and subscales. **Conclusions:** The translation and cultural adaptation of the BPQ for use in Brazil was deemed appropriate, because the patients could easily understand and answer the questions. In addition, the Brazilian version of the BPQ questionnaire was found to be reliable, showing good reproducibility.

**Keywords:** Pulmonary disease; chronic obstructive; Quality of life; Reproducibility of results.

### Resumo

**Objetivo:** Traduzir para o português e adaptar para a cultura brasileira o *Breathing Problems Questionnaire* (BPQ, questionário para problemas respiratórios), assim como avaliar a sua reprodutibilidade em pacientes com DPOC. **Métodos:** Após a tradução e a adaptação do BPQ para a cultura brasileira por um tradutor, a primeira versão foi aplicada em oito pacientes visando conhecer suas dúvidas e dificuldades. O questionário foi analisado por uma comissão de especialistas e sua versão final foi definida. Foi realizada a retrotradução por um segundo tradutor, que foi enviada para o autor original com intuito de assegurar o sentido original do questionário. Após a aprovação final do autor, 50 pacientes portadores de DPOC responderam o BPQ para avaliar sua reprodutibilidade. **Resultados:** O tempo médio de resposta foi 9,5 min. Dos 50 pacientes, 21 eram do sexo feminino e 29 do sexo masculino, com média de idade de  $65,8 \pm 7,5$  anos. A maioria foi classificada com DPOC moderada (29,16%) e grave (52%). O coeficiente de correlação intraclassa (CCI) para o escore total foi de 0,94. Os onze domínios do BPQ e as suas duas subescalas também tiveram valores de CCI acima de 0,70. Houve correlações moderadas entre os domínios e as subescalas do BPQ. **Conclusões:** A tradução e adaptação do BPQ para uso no Brasil foi adequada, pois os pacientes não apresentaram dificuldades para entendê-lo e respondê-lo. Além disso, o BPQ mostrou-se confiável por apresentar boa reprodutibilidade.

**Descritores:** Doença pulmonar obstrutiva crônica; Qualidade de vida; Reprodutibilidade dos testes.

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## Introduction

A heterogeneous and multifactorial disease, COPD has a major impact on patients and the health care system. It is a complex disease that requires a multidimensional approach to clinical evaluation and treatment response.<sup>(1)</sup> It is characterized by the presence of progressive, chronic airflow limitation that is not fully reversible and is associated with an abnormal inflammatory response of the lungs to the inhalation of noxious particles or gases. It is a preventable and treatable disease, with significant extrapulmonary effects that can contribute to disease worsening.<sup>(2,3)</sup>

The projections are that COPD will rank fifth in burden of disease worldwide, as assessed by the disability-adjusted life year index, which expresses the total number of years of life lost due to premature death, as well as the total number of years of life lived with a disability, adjusted for severity.<sup>(3)</sup> In 2010, among patients over 40 years of age, COPD was the fifth leading cause of hospitalization via the Brazilian public health system, accounting for 121,197 admissions, and expenditures amounted to approximately 86 million Brazilian reals.<sup>(4)</sup> In Brazil, the number of deaths from COPD in males and females has increased in the last 20 years; the COPD-related mortality rate, which was 7.88/100,000 population in the 1980s, increased to 19.04/100,000 population in the 1990s (i.e., a 340% increase).<sup>(3,5)</sup>

The health-related quality of life (HRQoL) of patients with COPD is impaired in comparison with that of healthy individuals, functional capacity being a relevant factor in the HRQoL of such patients.<sup>(6)</sup> The administration of questionnaires is a practical way of assessing HRQoL in patients with COPD. The Breathing Problems Questionnaire (BPQ) is a disease-specific questionnaire for patients with chronic respiratory disease, consisting of 13 domains and only 33 questions.<sup>(7)</sup> The BPQ was developed on the basis of subjective experiences associated with the disease and allows the evaluation of two distinct subscales. One of the scales evaluates emotional aspects of health, and the other evaluates health knowledge regarding the physical aspects of the disease. Both subscales correlate well with other questionnaires that measure the impact of disease on the quality of life of individuals and that are well established in the literature.

The BPQ has proved to be easy to administer, as well as being reproducible and responsive to

therapeutic interventions in the evaluation of patients with COPD in the USA.<sup>(8)</sup> However, in order to be used in Brazil, the BPQ had to be translated and culturally adapted, and its reproducibility had to be evaluated. The translation of the BPQ into Brazilian Portuguese and its adaptation to the Brazilian culture would allow its use in Brazil and provide yet another efficient tool for the evaluation and management of patients with COPD with a view to pulmonary rehabilitation programs and therapeutic strategies. Therefore, the objective of the present study was to adapt the BPQ to the Brazilian culture and evaluate its reproducibility in patients with COPD.

## Methods

The study was approved by the Research Ethics Committee of the *Universidade Estadual de Ciências da Saúde de Alagoas* (UNCISAL, Alagoas State University of Health Sciences), located in the city of Maceió, Brazil (Protocol no. 930). This was a cross-sectional study conducted at the UNCISAL Physical Therapy Outpatient Clinic and at the Federal University of São Paulo Pulmonary Rehabilitation Center, located at the *Lar Escola São Francisco*, in the city of São Paulo, Brazil. All participants gave written informed consent before the evaluations.

The BPQ is a disease-specific questionnaire for patients with chronic lung disease, having been developed by Hyland in 1994 and consisting of 33 questions divided into 13 domains. A higher score translates to a greater impact of respiratory problems on the HRQoL of patients with chronic lung diseases.<sup>(7)</sup> The domains and their corresponding questions are shown in Chart 1. The BPQ has two versions (i.e., the long version and the short version). In the present study, we evaluated the reproducibility of the long version. The short version of the BPQ consists of 10 questions, and this reduces the time to complete the questionnaire. In addition, the short version correlates well with the total score on the long version of the questionnaire. However, the short version does not allow the construction of health subscales. Had we chosen to validate the short version, this would have limited the amount of information on the health status of the participants and the correlations thereof. Therefore, we decided to validate the long version of the BPQ for use in Brazil. However, if the

**Chart 1** – Breathing problems questionnaire domains and corresponding questions, together with the scoring range for each domain.

Domain	Corresponding question	Scoring range
Walking	1, 2, 3	0-9
Bending or reaching	6, 10	0-6
Washing and bathing	4, 5	0-6
Household chores	7, 8, 9	0-6
Social interactions	12, 13, 14	0-9
Effects of weather and temperature	15, 16, 17, 18	0-12
Effects of smells and fumes	30, 31	0-6
Effects of catching colds	23	0-3
Sleeping	19, 20	0-6
Medicine	21, 22	0-6
Dysphoric states	11, 24, 25, 26, 27	0-15
Eating	28, 29	0-6
Excretion urgency	32, 33	0-6
Health-appraisal subscale	13, 23, 24, 25, 26, 27	0-18
Health-knowledge subscale	1-12, 14-22, 28-33	0-81
Total score	All questions (1-33)	0-99

long version proves to be reproducible, the short version can also be used if necessary.

The study sample consisted of 58 patients. Of those, 8 participated in the cultural adaptation of the BPQ and the remaining 50 participated in the evaluation of the reproducibility of the questionnaire. The inclusion criteria were as follows: having COPD, as diagnosed by clinical and spirometric criteria in accordance with the recommendations of the Global Initiative for Chronic Obstructive Lung Disease<sup>(2,3)</sup>; being over 40 years of age; presenting with good cognitive function, as assessed by the Mini-Mental State Examination; and having been clinically stable for at least 30 days before the first interview, i.e., without worsening cough, increased secretions, or medication changes. The exclusion criteria were as follows: failing to report for the sequential interviews; presenting with clinical instability; being visually impaired; having another chronic, disabling disease; and belonging to vulnerable populations, such as Indians, pregnant women, and prisoners.

The questionnaire was translated into Brazilian Portuguese by a native speaker of Portuguese, proficient in English. That version was adapted to the Brazilian culture by an expert committee, who made the necessary changes. Subsequently, that version was administered to a subgroup of 8 patients in order to record their response time and identify their uncertainties and difficulties. A

second Brazilian Portuguese-language version of the BPQ was developed, including the adaptations that were made on the basis of the results obtained with the first version. The second version of the questionnaire was back-translated into English by a second translator, proficient in English. The expert committee compared the final English-language version of the BPQ with the original English-language version in order to verify that the original meaning of the questionnaire had been maintained. The final English-language version was sent to the original author in order to determine whether it had the same properties as those of the original questionnaire. The expert committee comprised three experts in the subject, proficient in both languages; the first author of the present study; and the original author of the questionnaire. This allowed the adaptation of the questionnaire without changing its essence.

The final Brazilian Portuguese-language version of the BPQ was administered to 50 patients with COPD in two visits, 15 days apart, by the same observer, in order to determine intraobserver reproducibility. In the two visits, the questionnaire was evaluated in terms of the domains, the subscales, and the total score.

The sample size required to evaluate reproducibility was calculated to be 50 patients with COPD. The sample size calculation was based on other studies conducted in Brazil and investigating the cultural adaptation and

reproducibility of quality-of-life questionnaires, including the validation studies of Brazilian Portuguese-language versions of the Saint George's Respiratory Questionnaire (SGRQ),<sup>(9)</sup> the Airways Questionnaire 20,<sup>(10)</sup> and the Medical Outcomes Study 12-item Short-form Health Survey.<sup>(11)</sup> The sample size calculation was also based on recommendations for obtaining a lower margin of error.<sup>(12)</sup>

Continuous variables are expressed as means and standard deviations. Categorical data are expressed as absolute values and proportions.

The mean scores for the BPQ domains and subscales were compared between the two visits by the paired t-test.

The kappa statistic was used in order to assess the level of agreement among the responses to the questions. Kappa values above 0.75 indicate a strong correlation; kappa values between 0.4 and 0.75 indicate a moderate correlation; and kappa values below 0.4 indicate a weak correlation.

The intraclass correlation coefficient (ICC), together with its respective 95% CI, was used in order to evaluate reproducibility, values above 0.75 having been considered excellent. The level of significance was set at 5%.

## Results

We evaluated 73 patients with COPD. Of those, 8 were evaluated during the cultural adaptation phase and 65 were evaluated during the reproducibility evaluation. Of the patients evaluated during the reproducibility evaluation, 15 were excluded: 5 because of COPD exacerbation and 10 because they failed to report for the second visit. Therefore, 50 patients completed the evaluation of the reproducibility of the questionnaire. The sample evaluated during the cultural adaptation phase consisted of 2 men (25%) and 6 women (75%). The mean age was 61 years, and the spirometry results indicated mild obstructive lung disease. During the cultural adaptation phase, 2 of the patients reported uncertainties regarding item 32 (related to urination) and item 33 (related to defecation). In the original English-language version of the BPQ, the question was "I find that getting breathless makes me want to go to the toilet to pass water (urine) or to open my bowels (stool)", and the translation into Brazilian Portuguese was "*eu acho que sentir falta de ar me faz querer ir ao banheiro para urinar ou defecar*". The following interpretations were

offered: do respiratory problems make patients want to go to the toilet or does going to the toilet worsen their respiratory problems? The question was discussed by the expert committee, and the original intent of the question was made clear—worsening shortness of breath makes the patient want to go to the toilet to urinate (item 32) or defecate (item 33)—the original question being therefore maintained.

In the original version, item 7, which refers to household chores, reads "*because of breathing problems, housework takes me a little longer; longer; twice as long; more than three times as long; I cannot do housework any more; or don't know/not interested*". Among the possible responses, there is not one that reads "I can do housework with no problems", the only other response available being "don't know/not interested". Therefore, the patients were told that the response "don't know/not interested" should be read as "I can do housework with no problems", and the original response remained unchanged.

During the evaluation of the reproducibility of the BPQ, 29 men and 21 women were evaluated, the mean age being 65.6 years. Most of the patients were classified as having moderate or severe COPD.

**Table 1** - Characteristics of the study sample.<sup>a</sup>

Variable	Result
Age, years	65.8 ± 7.5
Gender <sup>b</sup>	
Male	29 (58)
Female	21 (42)
Mini-Mental State Examination score	27 ± 3.8
Pre-bronchodilator FEV <sub>1</sub> /FVC	0.49 ± 0.13
Pre-bronchodilator FEV <sub>1</sub> , L	1.15 ± 0.40
Pre-bronchodilator FEV <sub>1</sub> , % of predicted	44 ± 17.8
Pre-bronchodilator FVC, L	2.39 ± 0.66
Post-bronchodilator FEV <sub>1</sub> /FVC	0.51 ± 0.11
Post-bronchodilator FEV <sub>1</sub> , L	1.24 ± 0.47
Post-bronchodilator FEV <sub>1</sub> , % of predicted	47.4 ± 19.6
Post-bronchodilator FVC, L	2.56 ± 0.76
GOLD staging <sup>b</sup>	
Mild	4 (8)
Moderate	14 (28)
Severe	26 (52)
Very severe	6 (12)

GOLD: Global Initiative for Chronic Obstructive Lung Disease.

<sup>a</sup>Values expressed as mean ± SD, except where otherwise indicated. <sup>b</sup>Values expressed as n (%).

**Table 2** – Breathing problems questionnaire scores (domain scores, subscale scores, and total score) and reproducibility.

Domain	Score <sup>a</sup>		ICC	95% CI
	Visit 1	Visit 2		
Walking	5.74 ± 1.59	5.32 ± 1.78	0.73	0.53-0.85
Bending or reaching	2.36 ± 1.88	2.32 ± 1.94	0.86	0.75-0.92
Washing and bathing	3.34 ± 2.05	3.34 ± 2.46	0.73	0.52-0.85
Household chores	3.28 ± 2.67	3.38 ± 2.41	0.90	0.83-0.95
Social interactions	2.42 ± 2.91	1.92 ± 1.91	0.60	0.29-0.77
Effects of weather and temperature	5.00 ± 2.68	5.38 ± 2.60	0.73	0.52-0.85
Effects of smells and fumes	2.76 ± 1.86	2.62 ± 1.91	0.91	0.84-0.95
Effects of catching colds	1.88 ± 1.08	2.26 ± 1.05	0.44	0.10-0.68
Sleeping	0.84 ± 1.18	1.06 ± 1.41	0.81	0.67-0.89
Medicine	0.96 ± 1.24	0.86 ± 1.18	0.87	0.78-0.93
Dysphoric states	6.76 ± 4.30	6.50 ± 3.36	0.82	0.68-0.90
Eating	1.14 ± 1.31	1.28 ± 1.34	0.84	0.71-0.91
Excretion urgency	1.66 ± 2.03	1.66 ± 2.10	0.90	0.82-0.94
Health-appraisal subscale	7.32 ± 4.76	7.06 ± 3.63	0.80	0.66-0.89
Health-knowledge subscale	30.27 ± 14.05	30.84 ± 14.20	0.94	0.89-0.97
Total score	37.43 ± 17.73	37.90 ± 17.03	0.94	0.90-0.97

ICC: intraclass correlation coefficient. <sup>a</sup>Values expressed as mean ± SD.

Spirometry showed that there was no positive bronchodilator response. Cognitive assessment with the Mini-Mental State Examination showed that the patients had good cognitive function. The characteristics of the participants, including data on pulmonary function, disease severity, socioeconomic status, and the Mini-Mental State Examination score, are shown in Table 1.

After cultural adaptation, the reproducibility of the BPQ was evaluated, 50 patients having completed the questionnaire at two different time points. Comparing the domain scores, subscale scores, and total scores between the two visits, we found that all of them were similar, with small variations in standard deviation. Of the 13 domains, 11 showed excellent ICCs. The exceptions were the domains “effects of catching colds” and “social interactions”, which had a moderate ICC. The analysis of the subscale scores and total score revealed excellent ICCs (Table 2). The minimum response time was 4 min and 11 s, and the maximum response time was 15 min and 45 s (mean, 9 min and 30 s).

Regarding the level of agreement among the questions (as assessed by the kappa statistic), 3, 15, and 5 of the 33 questions, respectively, showed poor, moderate, and strong agreement, whereas 10 could not be calculated, because they were not repeated.

## Discussion

The present study showed that the translation and cultural adaptation of the BPQ was appropriate, because the patients could easily understand the questions and answers. The analysis of the contents of the BPQ shows that the questionnaire can be beneficial for the evaluation of patients with COPD, being therefore a new instrument available to health professionals who interact with patients with COPD. Most domains, the two subscales, and the total score showed excellent reproducibility; only the domains “social interactions” and “effects of catching colds” had a moderate to good ICC; none of the domains had ICCs that could be considered weak, a finding that is similar to those of the studies in which the long and short versions of the BPQ were developed.<sup>(7,8)</sup> Usually, ICCs equal to or greater than 0.75 are considered to show good reproducibility.

There is a short (10-item) version of the BPQ, consisting of questions identical to those in the long version. The correlation between the long and short versions in terms of the total score was 0.91 ( $p < 0.001$ ),<sup>(7,8)</sup> similar to the correlation of reproducibility found in our study of the long version, which had an ICC of 0.94. We observed that the long version questions that had the lowest kappa values were the same as those that were eliminated from the short version, which

indicates that those questions might not have shown good concordance in the studies by the questionnaire developers.<sup>(7,8)</sup>

At the end of the process, we observed that the questionnaire required few cultural adaptations and showed excellent reproducibility. Most quality-of-life questionnaires for patients with COPD have originally been written in a language other than Portuguese, therefore requiring adaptation before they can be used in our country. The long version of the BPQ was developed to be administered to any patient with chronic respiratory disease.<sup>(7)</sup> It contains pictures and reflects the impact of the disease on HRQoL. It is easy to read and administer, as well as allowing rapid interpretation.

The 13 domains of the BPQ can give us an idea of how respiratory problems affect activities of daily living and how they behave in face of weather changes, smells, and emotional states, as well as of the need to use drug therapy or oxygen therapy. In addition, the BPQ allows an analysis of two subscales. One of the subscales, known as the health-appraisal subscale, identifies the emotional state of individuals, analyzing dysphoric states, such as anxiety, anger, concern, depression, and shame. The other subscale, known as the health-knowledge subscale, addresses the physical functioning of patients, i.e., the extent to which their health problems affect their activities of daily living and social interactions. Therefore, the BPQ is complete in its evaluation and monitoring of the quality of life of patients with chronic lung disease.<sup>(7)</sup>

We found that the completion time was shorter for the BPQ than for the SGRQ<sup>(9)</sup> and the Chronic Respiratory Questionnaire (CRQ).<sup>(13)</sup> The BPQ was completed in 4-15 min (mean, 9 min and 30 s), which makes it useful in clinical practice because, in addition to the rapid completion time, it evaluates domains that are not addressed by other questionnaires and is responsive to interventions.

Although more severe COPD is frequently associated with significantly impaired work productivity and activities of daily living, patients often tend to provide an optimistic self-assessment of their health status.<sup>(14)</sup> When we observed the minimum and maximum scores obtained for each domain in our sample, we found that the patients self-scored their responses with less than half of potential points, meaning that the

impact of the disease on their health-appraisal and health-knowledge subscale scores was low, despite the fact that more than 50% of the patients were classified as having severe COPD.<sup>(14)</sup> Therefore, among patients with COPD, it is not uncommon that there is a discrepancy among general health status, dyspnea severity, physical activity limitation, and airway obstruction, probably because such patients have a poor perception of the actual severity of the disease. This discrepancy underscores the need to improve the evaluation of patients with COPD, so that this evaluation can be increasingly clearer and more time-specific.<sup>(14)</sup> Patients with stage IV COPD might generally perceive their health to be good, which does not reflect the severity of their condition.

One of the conclusions that can be drawn from this finding is that more investment in information and education is needed to improve patient perception of disease severity and make it possible to catalog more reliably patient-related data and patient profile, thereby improving overall understanding.

There are many instruments for measuring health status, and the use of such instruments has become increasingly widespread, to the point that they have also been used in the evaluation of pulmonary rehabilitation. Previously published studies comparing short-term and long-term effects of pulmonary rehabilitation on the quality of life of patients with COPD<sup>(15)</sup> using the BPQ and two other widely used disease-specific questionnaires for patients with respiratory disease, i.e., the CRQ and the SGRQ, demonstrated that the instruments were responsive to pulmonary rehabilitation.<sup>(16)</sup> These results show that the BPQ can also be a valuable instrument in monitoring HRQoL in patients with COPD.

The sample size was based on the lowest margin of error, i.e., a larger number of patients and a larger number of times the questionnaire is administered translate to a lower likelihood of errors. The sample size should not be viewed as a limitation of the present study, given that our sample was larger than were those in previously published studies conducted in Brazil and involving the cultural adaptation of questionnaires.

In conclusion, it is essential that, in order to be used in Brazil, questionnaires originally developed in languages other than Portuguese be translated and adapted to the Brazilian culture and that this process follow internationally

recognized rules, among which is the need for an expert committee proficient in the language in which the instrument was originally written. The Brazilian version of the BPQ was easily understood by patients and showed good reproducibility, providing the same HRQoL information as that provided by the original version.

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# Errata

This corrects the article “Cultural adaptation and reproducibility of the breathing problems questionnaire for use in patients with COPD in Brazil” on page 345.

In J Bras Pneumol. 2012;38(3):339-45, Silva PN, Jardim JR, Souza GM, Hyland ME, Nascimento AO, Cultural adaptation and reproducibility of the breathing problems questionnaire for use in patients with COPD in Brazil, the author Patrícia Nobre Calheiros da Silva is a professor at the *Centro de Estudos Superiores de Maceió* – CESMAC, Maceió Center for Higher Education – Maceió, Brazil, and not at the Alagoas State University of Health Sciences.