

# Evidence of validity of the Brazilian version of the Cancer Behavior Inventory – Brief Version



*Evidências de validade da versão brasileira do Cancer Behavior Inventory – Brief Version*  
*Evidencia de validez de la versión brasileña del Cancer Behavior Inventory – Brief Version*

Cláudia Jeane Lopes Pimenta<sup>a</sup>

Thaíse Alves Bezerra<sup>b</sup>

Cleane Rosa Ribeiro da Silva<sup>a</sup>

Kaisy Martins de Albuquerque Madruga<sup>c</sup>

Tatiana Ferreira da Costa<sup>d</sup>

Rômulo Lustosa Pimenteira de Melo<sup>e</sup>

Kátia Neyla de Freitas Macedo Costa<sup>a</sup>

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## ABSTRACT

**Objective:** To analyze the validity evidence of the Brazilian version of the Cancer Behavior Inventory – Brief Version.

**Method:** Methodological study, conducted between November and December 2021, with 140 patients undergoing hospital cancer treatment in João Pessoa, Paraíba, Brazil. Psychometric analyses were performed in the adapted version, using exploratory factor analysis and correlation with correlated constructs.

**Results:** A two-factor and 10-item model was evidenced. The cumulative variance explained about 61% the shared variance of the items. Satisfactory values were observed for the factors in the analyses of composite reliability (0.89 and 0.91, respectively), internal consistency (0.86 and 0.91, respectively) and ORION (0.89 and 0.85, respectively). The expected correlations of self-efficacy with quality of life (convergent) and with anxiety and depression (divergent) were evident.

**Conclusion:** The Brazilian version of the instrument showed evidence of validity, being considered reliable to assess the self-efficacy of patients undergoing cancer treatment.

**Descriptors:** Self Efficacy. Medical oncology. Validation study. Reproducibility of results. Nursing methodology research.

## RESUMO

**Objetivo:** Analisar as evidências de validade da versão brasileira do *Cancer Behavior Inventory – Brief Version*.

**Método:** Estudo metodológico, realizado entre os meses de novembro e dezembro de 2021, com 140 pacientes em tratamento oncológico hospitalar em João Pessoa, Paraíba, Brasil. Foram realizadas análises psicométricas na versão adaptada, mediante a análise fatorial exploratória e correlação com constructos correlacionados.

**Resultados:** Evidenciou-se um modelo de 2 fatores e 10 itens. A variância acumulada explicou cerca de 61% da variância compartilhada dos itens. Foram observados valores satisfatórios para os fatores nas análises de confiabilidade composta (0,89 e 0,91, respectivamente), consistência interna (0,86 e 0,91, respectivamente) e ORION (0,89 e 0,85, respectivamente). Evidenciaram-se as correlações esperadas da autoeficácia com a qualidade de vida (convergente) e com a ansiedade e depressão (divergente).

**Conclusão:** A versão brasileira do instrumento mostrou evidências de validade, sendo considerada como confiável para avaliar a autoeficácia dos pacientes em tratamento oncológico.

**Descritores:** Autoeficácia. Oncologia. Estudo de validação. Reprodutibilidade dos testes. Pesquisa metodológica em enfermagem.

## RESUMEN

**Objetivo:** Analizar las evidencias de validez de la versión brasileña del *Cancer Behavior Inventory – Brief Version*.

**Método:** Estudio metodológico, realizado entre noviembre y diciembre de 2021, con 140 pacientes en tratamiento oncológico hospitalario en João Pessoa, Paraíba, Brasil. Se realizaron análisis psicométricos en la versión adaptada, mediante análisis factorial exploratorio y correlación con constructos correlacionados.

**Resultados:** Se evidenció un modelo de 2 factores y 10 ítems. La varianza acumulada explicó alrededor del 61% de la varianza compartida de los ítems. Se observaron valores satisfactorios para los factores en el análisis de confiabilidad compuesta (0,89 y 0,91, respectivamente), consistencia interna (0,86 y 0,91, respectivamente) y ORION (0,89 y 0,85, respectivamente). Se evidenciaron las correlaciones esperadas de la autoeficacia con la calidad de vida (convergente) y con la ansiedad y la depresión (divergente).

**Conclusión:** La versión brasileña del instrumento mostró evidencias de validez, siendo considerado confiable para evaluar la autoeficacia de pacientes en tratamiento oncológico.

**Descriptorios:** Autoeficacia. Oncología médica. Estudio de validación. Reproducibilidad de los resultados. Investigación metodológica en enfermería.

<sup>a</sup> Universidade Federal da Paraíba (UFPB). Centro de Ciências da Saúde. Programa de Pós-Graduação em Enfermagem. João Pessoa Paraíba, Brasil.

<sup>b</sup> Universidade de Pernambuco (UFPE). Departamento de Enfermagem. Recife, Pernambuco, Brasil.

<sup>c</sup> Universidade Federal de Campina Grande (UFCG). Centro de Ciências Biológicas da Saúde. Campina Grande, Paraíba, Brasil.

<sup>d</sup> Universidade Federal de Pernambuco (UFPE). Departamento de Enfermagem. Vitória de Santo Antão, Pernambuco, Brasil.

<sup>e</sup> Universidade Federal da Paraíba (UFPB). Programa de Pós-Graduação em Psicologia Social. João Pessoa, Paraíba, Brasil.

## ■ INTRODUCTION

Cancer is a complex and multifactorial disease, which has a significant impact on the current health scenario, standing as one of the main causes of morbidity and mortality worldwide. The continuous increase in the incidence of the disease represents a global burden for society and healthcare systems, with high costs associated with screening, diagnosis, treatment and palliative care<sup>(1-3)</sup>.

The number of cancer cases has been increasing over the decades. In 2020 alone, there were more than 19 million new cases of cancer worldwide, and it is predicted that one in five individuals will develop the disease during their lifetime<sup>(4)</sup>. In Brazil, an estimated 704 thousand new cases are expected for the three-year period from 2023 to 2025, with a higher incidence of non-melanoma skin cancer (31.3%), breast (10.5%), prostate (10.2 %), colon and rectum (6.5%), lung (4.6%) and stomach (3.1%)<sup>(5)</sup>.

Coping with cancer requires coordinated efforts at different levels of health care, upon the implementation of oncology care management in a broad, comprehensive, continuous and individualized manner<sup>(1,6)</sup>. In this context, each patient's needs, preferences, socioeconomic and cultural contexts, as well as the particularities of cancer type and stage must be understood. When considering these factors, it becomes possible to develop a care plan based on updated scientific evidence, which promotes better results and increases the well-being of affected patients<sup>(2,3,7,8)</sup>.

Among these evidence, the use of self-efficacy stands out as an important tool for cancer care, playing a crucial role in strengthening the patient's personal beliefs, in self-management of health, in promoting adherence to treatment, in establishing realistic expectations, managing stress and coping with unpleasant symptoms<sup>(9-13)</sup>.

Self-efficacy refers to the judgments that individuals make about their competence to organize and execute actions necessary to achieve a certain performance. The perception of self-efficacy can be a powerful trigger for individuals to seek and achieve their goals, directly influencing behavior, choices, the amount of effort that will be invested and the persistence in keeping even in the face of obstacles or temporary failures<sup>(13,14)</sup>.

The assessment of self-efficacy is essential in the care of individuals with cancer, as it allows a deeper understanding of the specific needs and challenges faced by each patient. By assessing self-efficacy, nursing professionals can identify specific areas that require additional support and develop targeted interventions to strengthen confidence and the ability to deal with obstacles during treatment<sup>(13,15,16)</sup>.

Although the importance of self-efficacy in healthcare is widely recognized, the availability of specific instruments to assess this concept in clinical practice is still limited, especially in specific contexts, such as oncology<sup>(7,9,10,13,17)</sup>. At the Brazilian scenario, the absence of an adapted instrument to measure the self-efficacy of cancer patients represents a gap in the care for this population.

Among the specific instruments for measuring self-efficacy in cancer treatment, the Cancer Behavior Inventory – Brief Version (CBI-B) stands out for having been subjected to rigorous psychometric validation processes<sup>(16)</sup>. The CBI-B is an instrument developed in the United States, which allows obtaining a general estimate of self-efficacy in cancer treatment, supporting the implementation of interventions to reduce patient suffering<sup>(16)</sup>.

Due to its relevance in oncology, the CBI-B is used worldwide, with versions adapted for Saudi Arabia<sup>(2)</sup>, Turkey<sup>(3)</sup>, China<sup>(7)</sup>, Italy<sup>(9)</sup> and Portugal<sup>(10)</sup>, which shows its adaptability and usefulness in different clinical contexts. In this sense, adapting the CBI-B to Brazilian culture will result in the availability of a culturally relevant, linguistically appropriate and psychometrically valid instrument to assess the self-efficacy of cancer patients in the Brazilian context. This can enable a deeper understanding of these patients' needs and contribute to individualized, effective and safe nursing care.

The hypothesis of the present study is that the Brazilian version of the CBI-B presents evidence of satisfactory validity and reliability to adequately assess the self-efficacy of patients undergoing oncological treatment. Therefore, the objective was to analyze the validity evidence of the Brazilian version of the CBI-B.

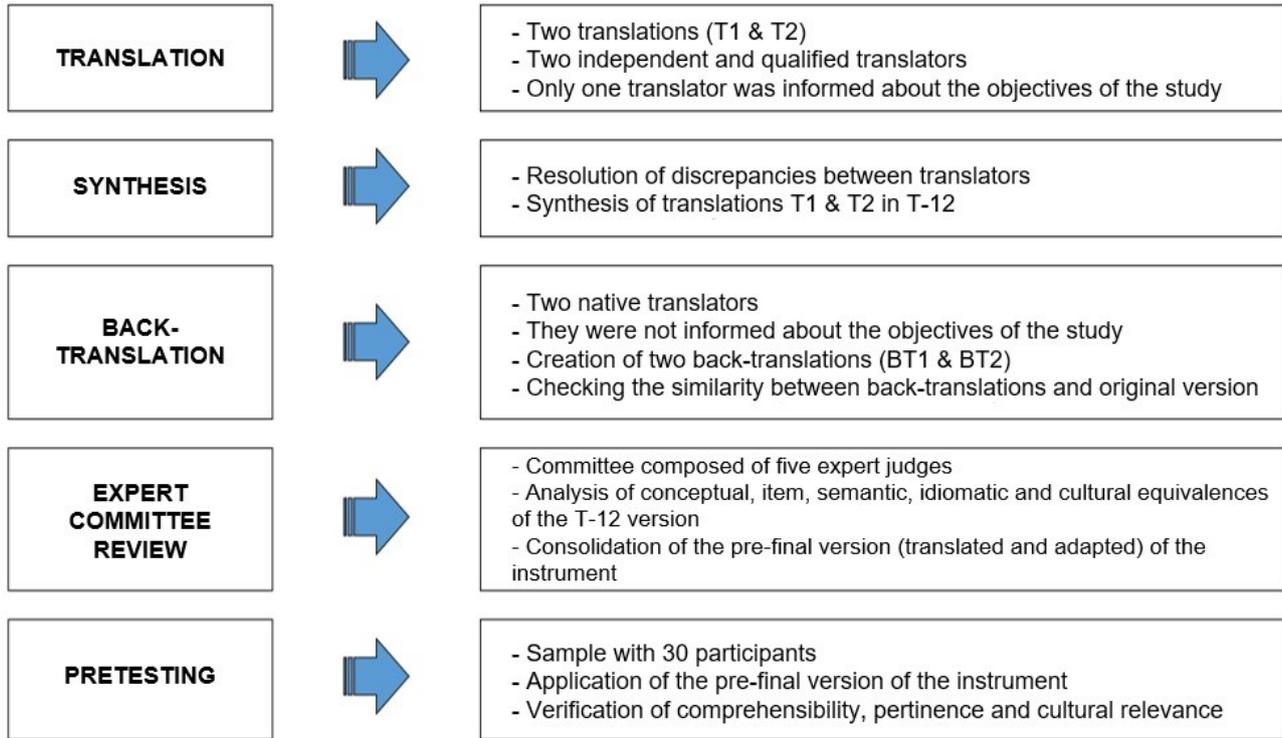
## ■ METHOD

This is a methodological research conducted in two stages. Initially, the cross-cultural adaptation of the CBI-B was carried out, which followed five interrelated stages (Figure 1)<sup>(18)</sup>. Afterwards, psychometric analyses were carried out to seek evidence that proves the validity of its adapted version for Brazilian culture.

The study was conducted between November and December 2021, in a High Complexity Oncology Care Center in the capital of Paraíba, with the study population consisting of adults and elderly people who were undergoing treatment at the institution.

The sample was defined based on literature, which suggests that instrument validation requires at least 10 individuals per item<sup>(19)</sup>. In this case, we chose to use the version with 14 items, as occurred in other versions of the CBI-B<sup>(2,3,7,9,10)</sup>, given

**Figure 1** – Stages of the cross-cultural adaptation process of the Cancer Behavior Inventory – Brief Version for Brazil. João Pessoa, Brazil, 2021



Source: Research data, 2021.

that the two items excluded in the original version<sup>(16)</sup> could be maintained when evaluated in different cultures. Thus, the sample consisted of 140 participants.

The inclusion criteria were: being 18 years old or over; have a medical diagnosis of cancer; and undergoing oncological treatment for at least 30 days, allowing the patient to have undergone at least four chemotherapy sessions and/or 20 radiotherapy sessions<sup>(16)</sup>. The following exclusion criteria were defined: being in palliative/specialized care for end-of-life; having a severe communication deficit, such as aphasia, apraxia of speech, dysarthria, receptive-expressive language disorders, hearing impairment, among others; and presenting clinical complications at the time of data collection after two attempts.

Patients were selected for convenience, among individuals who were in the waiting room for oncological care. All those who met the inclusion criteria were invited to participate in the individual interview. These individuals were then guided about the research and were asked to sign the Informed Consent Form. There were no sample losses throughout the research.

The characterization of the sociodemographic profile and clinical condition of patients was made using the following

variables: age, gender, marital status, education level, type of cancer, time since diagnosis and current treatment. To measure self-efficacy, the Brazilian version of the CBI-B, called CBI-B/BR, was used, which is consisted of 14 items distributed on a 9-point Likert scale. The score is calculated by the sum of the responses of each item, where the higher the value, the greater the self-efficacy<sup>(16)</sup>.

Convergent validity was measured by the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire – Core 30 (EORTC QLQ-C30), which assesses the impact of cancer and its treatment on the patient's quality of life<sup>(20)</sup>. To measure divergent validity, the Hospital Anxiety and Depression Scale (HADS) was used, an instrument that allows the detection of mild degrees of affective disorders in non-psychiatric environments<sup>(21)</sup>.

Descriptive analyses were performed to characterize the studied sample and psychometric analyses to measure the validity and reliability of the CBI-B/BR. The Bootstrap resampling technique was used to increase the chance of representativeness of the sample within the universe of patients undergoing oncological treatment. Thus, based on the original sample of 140 individuals, another 500 samples

were simulated to estimate the characteristics presented in the real population, obtaining a 90% confidence interval.

The sampling adequacy index was assessed by the Kaiser-Meyer-Olkin (KMO) measure and the Bartlett Test of Sphericity, being used as introductory analyses to indicate the possibility of carrying out exploratory factor analysis<sup>(22)</sup>. After confirmation of indication, the calculation was made to evaluate the factorial structure of the instrument, being implemented based on a polychoric correlation matrix.

Exploratory factor analysis allows the internal assessment of the instrument, based on the definition of the data structure, which demonstrates the interrelationships between the items and the way in which their grouping explains the formation of one (one-dimensional) or more factors/dimensions (two-dimensional or multidimensional)<sup>(23)</sup>.

The selection of the common number of factors, their extraction, and the indication of the importance degree of each item for the factor were carried out. The common number of factors that should be removed from the instrument was determined by the Robust Promin rotation<sup>(24)</sup>. Additionally, the possibility of unidimensionality was assessed using the factor determination index<sup>(25)</sup>. Factor reliability was estimated using Cronbach's Alpha Coefficient, Composite Reliability and Overall Reliability of previous fully informative oblique N-EAP scores (ORION), with results above 0.70 being recommended<sup>(25)</sup>.

The model fit adequacy was assessed by the indices of root mean square error of approximation, comparative fit index and non-normative fit index<sup>(26)</sup>. Convergent and divergent validity were measured by the correlation between the CBI-B/BR, the EORTC QLQ-C30<sup>(20)</sup> and the HADS<sup>(21)</sup>, using Pearson's bivariate correlation test.

The research project was approved by the Research Ethics Committee of the Health Sciences Center of the *Universidade Federal da Paraíba*, under opinion number 4,622,548. The study was developed in compliance with the ethical standards recommended by Resolution No. 466/2012. Formal authorization for the cross-cultural adaptation of the CBI-B was granted by the author of the original instrument, upon electronic message.

## ■ RESULTS

Among the 140 participants, a higher frequency of women (63.6%), elderly (60.1±15.5), married or in a stable union

(63.6%), education level with a median of 5.5 years was observed. (Q1=2.0; Q2=5.50; Q3=12.0), diagnosis of breast cancer (32.9%), time since diagnosis with a median of 1 year and 1 month (Q1=10 months; Q2=1 year and 1 month; Q3=1 year and 11 months) and who were undergoing radiotherapy treatment (51.4%), as shown in Table 1.

The sampling adequacy index showed acceptable results, with a good KMO (0.822; 90% CI: 0.618-0.830) and a statistically significant Bartlett test of sphericity (654.9; gl=45; p<0.001), which indicates the interpretability of the item correlation matrix. The two-factor model was the most representative for the data.

Among the 14 items in the adapted version of the CBI-B/BR, four were excluded. Items 3 – “Maintain good mood” and 7 – “Remain calm during all treatments and do not allow negative thoughts to upset me” presented factor loadings lower than recommended (< 0.50).

On the other hand, items 9 – “Ask healthcare professionals questions about the treatment” and 13 – “Being able to adapt to the physical changes caused by the treatment” exhibited a pattern of cross-loadings, with a value above 0.30 in both factors. The best adjustment was found in the factorial structure composed of two factors and 10 items, which required the reorganization of the instrument after the exclusion of the 4 items (Chart 1).

The accumulated variance of the factors (46% and 15%, respectively) explained about 61% of the shared variance of the items. The instrument did not support unidimensionality, showing the presence of a second factor (FDI=0.94 and 0.92, respectively). Satisfactory values were observed for both factors in the analyses of composite reliability (0.89 and 0.91, respectively), internal consistency (0.86 and 0.91, respectively) and ORION (0.89 and 0.85, respectively), as observed in Table 2.

The instrument's adjustment indices presented appropriate values ( $X^2 = 32.626$ , gl = 26; p < 0.001; RMSEA = 0.043; NNFI = 0.988; CFI = 0.993) (Table 3).

The expected correlations of self-efficacy with the EORTC QLQ-C30 (convergent) and with the HADS (divergent) were evident. Significant and positive correlations were observed between self-efficacy and total health-related quality of life (HRQoL) and its scales. On the other hand, self-efficacy showed significant and negative correlations with the HADS domains (Table 4).

**Table 1** – Sociodemographic and clinical profile of patients undergoing oncological treatment. João Pessoa, Brazil, 2021

Variables	n	%
<b>Gender</b>		
Female	89	63.6
Male	51	36.4
<b>Age group (years)</b>		
≤ 19	2	1.4
20 – 29	2	1.4
30 – 39	11	7.9
40 – 49	23	16.4
50 – 59	24	17.1
60 – 69	31	22.1
70 – 79	41	29.3
80 or more	6	4.3
<b>Marital status</b>		
Married or stable union	89	63.6
Single	26	18.6
Widowed	17	12.1
Divorced	8	5.7
<b>Education level (years of study)</b>		
Illiterate	20	14.3
1 – 4	46	32.8
5 – 8	42	30.0
9 – 11	19	13.6
≥ 12	13	9.3
<b>Type of cancer</b>		
Breast	46	32.9
Prostate	25	17.9
Cervix	16	11.4
Head and neck	16	11.4
Ovary	6	4.3
Skin	5	3.6
Lung	4	2.9
Others	22	15.6

**Table 1** – Cont.

Variables	n	%
<b>Time since diagnosis (years)</b>		
< 1	44	31.4
1 – 2	70	50.0
3 – 4	20	14.3
5 or more	6	4.3
<b>Current treatment</b>		
Radiotherapy	72	51.4
Chemotherapy	38	27.1
Chemotherapy + radiotherapy	25	17.9
Surgery	5	3.6
<b>Total</b>	<b>140</b>	<b>100.0</b>

Source: Research data, 2021.

**Chart 1** – Validated version of the “Cancer Behavior Inventory – Brief Version (CBI-B/BR)”. João Pessoa, Brazil, 2021

<b>Factor 1 – Maintenance of routine</b>	
1.	Maintain independence (being able to perform actions and make your own decisions, without help or influence from other people)
2.	Maintain a positive attitude
4.	Distract from negative thoughts
5.	Maintain routine activities (work, studies, home, leisure and social life)
9.	Manage nausea and vomiting
10.	Remain calm while waiting for my appointment
<b>Factor 2 – Coping with the disease and emotional control</b>	
3.	Express negative feelings about cancer
6.	Participate in treatment decisions
7.	Seek social support (family, friends, community and professionals)
8.	Share my concerns with others

Source: Research data, 2021.

**Table 2** – Description of the factorial structure of the “Cancer Behavior Inventory – Brief Version”. João Pessoa, Brazil, 2021

Items	Factor 1	90% CI	Factor 2	90% CI
<b>Item 1</b>	<b>0.487</b>	0.303 – 0.644	0.221	-0.014 – 0.394
<b>Item 2</b>	<b>0.832</b>	0.691 – 0.958	0.123	-0.031 – 0.276
<b>Item 4</b>	<b>0.659</b>	0.521 – 0.783	0.220	0.058 – 0.380
<b>Item 5</b>	<b>0.669</b>	0.471 – 0.818	-0.001	-0.203 – 0.190
<b>Item 9</b>	<b>0.740</b>	0.556 – 0.890	-0.109	-0.284 – 0.089
<b>Item 10</b>	<b>0.699</b>	0.518 – 0.905	-0.232	-0.463 – -0.041
<b>Item 3</b>	0.222	0.080 – 0.360	<b>0.558</b>	0.318 – 0.680
<b>Item 6</b>	-0.001	-0.139 – 0.152	<b>0.773</b>	0.549 – 0.909
<b>Item 7</b>	0.028	-0.095 – 0.130	<b>0.849</b>	0.717 – 0.969
<b>Item 8</b>	0.262	0.117 – 0.388	<b>0.531</b>	0.375 – 0.683
<b>Eigenvalue</b>	4.66	-	1.54	-
<b>Explained variance</b>	0.46	-	0.15	-
<b>Factor Determination Index – Factor Determination Index</b>	0.94	-	0.92	-
<b>Composite reliability</b>	0.89	-	0.91	-
<b>Internal consistency</b>				
<i>Cronbach's alpha</i>	0.86	-	0.91	-
<i>ORION</i>	0.89	-	0.85	-

Source: Research data, 2021.

**Table 3** – Distribution of adjustment indicators for validation of the “Cancer Behavior Inventory – Brief Version”. João Pessoa, Brazil, 2021

Items	Criteria	Bifactor model	90% CI
Root mean square error of approximation – RMSEA	0.010 – 0.050	0.043	0.000 – 0.055
Tucker–Lewis index – TLI	> 0.90	0.988	0.977 – 1.006
Comparative fit index – CFI	> 0.90	0.993	0.987 – 1.003

Source: Research data, 2021.

**Table 4** – Description of the convergent and divergent analysis of the “Cancer Behavior Inventory – Brief Version”. João Pessoa, Brazil, 2021

Variables	Self-efficacy					
	Factor 1		Factor 2		Total	
	r	p-value*	r	p-value*	r	p-value*
<b>Quality of life</b>						
Global Health Scale	0.263	0.002	0.202	0.016	0.264	0.002
Functional Scale	0.413	<0.001	0.285	0.001	0.398	<0.001
Symptom Scale	-0.173	0.041	-0.026	0.765	-0.119	0.161
<b>HADS</b>						
Anxiety	-0.402	<0.001	-0.316	<0.001	-0.407	<0.001
Depression	-0.682	<0.001	-0.518	<0.001	-0.698	<0.001

Source: Research data, 2021.

\* Pearson's correlation test; significant value:  $p \leq 0.05$ .

## DISCUSSION

The structure of the Brazilian version of the CBI-B was composed of two factors and 10 items, while the original American version is composed of four factors and 12 items<sup>(16)</sup>. In all versions of the CBI-B<sup>(2,3,7,9,10)</sup>, the validation process also had a different structure from the original version<sup>(16)</sup>.

Modifications to the structure of the instrument in relation to the original version are frequent and expected during the validation process. Culture influences people's behaviors, beliefs and attitudes, therefore, instruments need to be sensitive to these differences<sup>(18,19)</sup>.

The exclusion of items does not necessarily mean a loss in the instrument, as it is based on scientific evidence and careful evaluation by expert judges in the area. In fact, the removal of problematic or inappropriate items can improve the quality of the adapted instrument, better reflecting the cultural reality of the country and the customs adopted by its population<sup>(17-19,23)</sup>.

The analysis of the factorial structure of the CBI-B/BR revealed that the instrument was composed of two distinct factors that measured self-efficacy. Therefore, it was necessary to change the wording of the factors to accurately reflect the associated actions or behaviors.

Factor 1 was defined as “Maintenance of routine” as it included items that dealt with the efforts made by the patient to preserve their daily activities, despite facing difficulties from the disease and its treatment. When an individual is diagnosed with cancer, they face a series of physical, emotional and social challenges. Therefore, maintaining a daily routine during this period can be an important way of coping, as it promotes a sense of normality and a feeling of control over own life<sup>(13,27)</sup>.

Preserving a routine, even with difficulties, contributes to actively face problems related to the disease and treatment, in addition to support the desired objectives and results, which may include keeping external activities, such as work, studies, personal care, leisure and relationships, which are important for overall well-being and improve quality of life<sup>(14,15,27)</sup>.

Factor 2 of the CBI-B/BR was called “Coping with the disease and emotional control”. This definition was assigned based on the items that compose the factor, which address behaviors related to two fundamental aspects to promote self-efficacy in cancer patients: facing obstacles resulting from the disease and maintaining emotional control during the different stages of oncological treatment.

Coping with the disease refers to the efforts that patients make to deal with the complex challenges due to cancer and

to take control of the situation, promoting a greater sense of self-efficacy. Furthermore, emotional control is an essential part of the process of coping with cancer, as patients deal with a variety of intense emotions on a daily basis, such as fear, anxiety, sadness and stress. Thus, these individuals need to develop and mobilize internal and external controls to face these emotions in a healthy and constructive way<sup>(13,14,16,28)</sup>.

The reliability and internal consistency indicators of the CBI-B/BR showed that the instrument is capable of measuring self-efficacy in patients undergoing oncological treatment in a reliable and consistent manner, which strengthens the validity of the instrument and increases confidence in the results obtained from its use in the Brazilian population.

The reliability of an instrument is a fundamental aspect in scientific research, as it indicates the ability to provide accurate and consistent results, even when applied repeatedly under the same conditions or in different cultures. When an instrument presents strong reliability values, this suggests that the scientific process used in its construction and/or adaptation was rigorous and reliable<sup>(24–26)</sup>.

The convergent and divergent validity analysis confirmed the expected results, in which self-efficacy showed a positive correlation with HRQoL, corroborating the data obtained in the Turkish<sup>(2)</sup>, Italian<sup>(9)</sup> and Portuguese<sup>(10)</sup> versions. The HRQoL encompasses several domains that can be significantly affected during cancer treatment. In this context, self-efficacy emerges as an important element to positively influence the HRQoL of these patients<sup>(11,13)</sup>.

When an individual has a high level of self-efficacy, they tend to feel more confident and able to face the challenges associated with cancer treatment, which favors autonomy, active participation in decision-making on health care, management of symptom unpleasant, adherence to treatment and adoption of healthy behaviors<sup>(14,28)</sup>.

A study conducted in an oncology rehabilitation clinic in Germany showed that self-efficacy was a predictor of HRQoL, in which patients who felt more competent and confident in dealing with the challenges associated with treatment had better quality of life results. This indicates that the perception of self-efficacy plays an important role in the way patients face and deal with the disease<sup>(14)</sup>.

Similarly, a research conducted with Italian patients undergoing esophagectomy observed that higher self-efficacy scores before surgery were strong predictors of better overall health and higher levels of quality of life in the three months following the procedure. This result suggests that personal belief in one's own ability to deal with the challenges of treatment and recovery can have a positive impact on HRQoL and psychosocial adaptation<sup>(28)</sup>.

In light of this, it becomes crucial to develop actions based on scientific evidence that prove their effectiveness in increasing self-efficacy levels. Strengthening personal efficacy beliefs in cancer patients does not replace conventional medical treatment, but can complement it, through the implementation of a more integrated approach for overall well-being and improvement of quality of life<sup>(14,27)</sup>.

In the analysis of divergent validity, negative correlations were identified between self-efficacy and anxiety and depression. These findings are consistent with previous research that highlights the inverse relationship between the concepts, as evidenced in the validations for the Italian<sup>(9)</sup> and Portuguese<sup>(10)</sup> languages.

In oncological patients, the presence of psychological problems such as anxiety and depression is frequent, since the diagnosis of the disease is often perceived as a synonym for death. Furthermore, cancer treatment can be a significant source of stress, uncertainty and drastic changes in an individual's routine, which can trigger a series of emotional challenges and affect mental health and psychological well-being<sup>(1,14,15,28)</sup>.

Self-efficacy stands out as an important mediator of anxiety and depression levels in oncology. Patients with greater self-efficacy are more likely to seek effective strategies to deal with problems triggered by cancer, which contributes to a greater perception of control over their own lives and reduces levels of anxiety and depression<sup>(12,13,15)</sup>.

The CBI-B/BR can be used as an assessment tool and to support nursing care in oncology, encompassing the physical and emotional needs of patients. As practical applications of the instrument, there are: identify adaptive and maladaptive behaviors; understand the patient's coping mechanisms; highlight areas in which the patient may be experiencing emotional difficulties; monitor progress over time, note positive or negative changes in behavior; and plan specific care aimed at addressing the emotional and behavioral challenges that the patient is experiencing<sup>(8,13,15,16,29,30)</sup>.

The construction of a more assertive and customized nursing care plan using the CBI-B/BR requires a detailed analysis of sociodemographic characteristics (such as age, gender, education level and income), the clinical-pathological profile (type of cancer, stage of disease, time of diagnosis, therapy, associated comorbidities, among others), the patient's coping resources (emotional aspects, self-esteem and resilience), the support/social support network (family, friends and community) and the cultural aspects of the patient (customs, spirituality and beliefs). Furthermore, it is important to include the patient in this process, which makes healthcare more focused on individuals and their needs<sup>(8,12,13,16,29,30)</sup>.

The outcomes of this research have some limitations. The use of a 9-point Likert scale may have posed a barrier to the accurate assessment of self-efficacy, since there is difficulty in distinguishing the most appropriate response for each item, leading to a bias of underestimation or overestimation.

The generalization of findings to the entire national territory is limited by the following factors: data collection taking place in a public oncology service; the cultural differences that exist between the states and regions of the country; and the heterogeneity of the studied population regarding age, different types of cancer and time since diagnosis. Therefore, for future studies, it is suggested to focus on a single type of cancer to make the sample more homogeneous.

Despite these limitations, the composition of a considerable sample size and the use of a gold standard method for cross-cultural adaptation and validation of the CBI-B/BR are strengths of the study, which increase the reliability of the results obtained.

## ■ CONCLUSION

The assessment of the psychometric properties of the CBI-B/BR showed that the instrument adapted for Brazilian culture maintained the characteristics of the original version, demonstrating its robustness and ability to appropriately measure self-efficacy in cancer patients. The study hypothesis was confirmed, as the instrument presented satisfactory evidence of validity and reliability to adequately measure the self-efficacy of patients undergoing oncological treatment.

The CBI-B/BR can be used in different clinical, care, and educational contexts. In nursing care for cancer patients, its use can bring significant benefits to care management at all levels of care. Through its application in clinical practice, professionals can have a better understanding of the patient's perceptions, expectations, and resources for coping with the disease and treatment, in addition to favoring the construction of an accessible care plan, in which all actions would be agreed with the individual and their family members.

In nursing education, the CBI-B/BR can be used in the classroom as teaching material during the oncology courses and/or in practical, university extension programs and scientific initiation activities to assess levels of self-efficacy and its variations after the application of specific interventions.

Within the scope of nursing research, the CBI-B/BR can be used as a data collection instrument for exploratory and cross-sectional studies, aiming at a better understanding of factors related to self-efficacy in various types of cancer. In longitudinal research, the application of this scale allows the assessment of self-efficacy over time, identifying cause

and effect relationships with other variables relevant to the theme of oncology.

## ■ REFERENCES

1. Contiero P, Tagliabue G, Gatta G, Galceran J, Bulliard JL, Bertoldi M, et al. Variation of cancer incidence between and within GRELL countries. *Int J Environ Res Public Health*. 2021;18(17):9262. doi: <https://doi.org/10.3390/ijerph18179262>
2. Algamdi MM, Hanneman SK. Development of an Arabic translation of the cancer behavior inventory-brief. *J Nurs Meas*. 2016;24(3):379-87. doi: <https://doi.org/10.1891/1061-3749.24.3.379>
3. Iyigun E, Tastan S, Gezginci E, Korkmaz S, Demiral S, Beyzadeoglu M. Cross-cultural adaptation and psychometric evaluation of the Turkish version of the cancer behavior inventory-brief version. *J Pain Symptom Manage*. 2017;54(6):929-35. doi: <https://doi.org/10.1016/j.jpainsymman.2017.08.006>
4. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin*. 2021;71(3):209-49. doi: <https://doi.org/10.3322/caac.21660>
5. Ministério da Saúde (BR). Instituto Nacional de Câncer. Estimativa 2023: incidência de câncer no Brasil [Internet]. Rio de Janeiro: INCA, 2022 [cited 2023 Jul 28]. Available from: <https://www.inca.gov.br/sites/ufu.sti.inca.local/files//media/document//estimativa-2023.pdf>
6. Ferlay J, Colombet M, Soerjomataram I, Parkin DM, Piñeros M, Znaor A, et al. Cancer statistics for the year 2020: an overview. *Int J Cancer*. 2021;149(4):778-89. doi: <https://doi.org/10.1002/ijc.33588>
7. Li Q, Yinghua X, Yi L, Huang W, Zhao J. Factorial structure and measurement invariance of the cancer behavior inventory-brief Chinese version in cancer patient and family caregiver dyads. *Curr Psychol*. 2023;42:5559-69. doi: <https://doi.org/10.1007/s12144-021-01903-4>
8. Cao Q, Gong J, Chen M, Lin Y, Li Q. The dyadic effects of self-efficacy on quality of life in advanced cancer patient and family caregiver dyads: the mediating role of benefit finding, anxiety, and depression. *J Oncol*. 2022;2022:3073358. doi: <https://doi.org/10.1155/2022/3073358>
9. Serpentine S, Del Bianco P, Chirico A, Merluzzi TV, Martino R, Lucidi F, et al. Self-efficacy for coping: utility of the cancer behavior inventory (Italian) for use in palliative care. *BMC Palliat Care*. 2019;18(1):34. doi: <https://doi.org/10.1186/s12904-019-0420-y>
10. Pereira M, Izdebski P, Pereira MG. Validation of the brief version of the cancer behavior inventory in breast cancer Portuguese patients. *J Clin Psychol Med Settings*. 2021;28(3):491-502. doi: <https://doi.org/10.1007/s10880-021-09773-5>
11. Anderson A, Starkweather A, Cong X, Kim K, Schulman-Green D, Judge M, et al. Self-efficacy survey study of pain self-management in patients with cancer. *Pain Manag Nurs*. 2022;23(4):486-93. doi: <https://doi.org/10.1016/j.pmn.2021.10.002>
12. Manne SL, Hudson SV, Kashy DA, Imanguli M, Pesaneli M, Frederick S, et al. Self-efficacy in managing post-treatment care among oral and oropharyngeal cancer survivors. *Eur J Cancer Care*. 2022;31(6):e13710. doi: <https://doi.org/10.1111/ecc.13710>
13. Merluzzi TV, Pustejovsky JE, Philip EJ, Sohl SJ, Berendsen M, Salsman JM. Interventions to enhance self-efficacy in cancer patients: a meta-analysis of randomized controlled trials. *Psychooncology*. 2019;28(9):1781-90. doi: <https://doi.org/10.1002/pon.5148>

14. Hinz A, Friedrich M, Kuhnt S, Zenger M, Schulte T. The influence of self-efficacy and resilient coping on cancer patients' quality of life. *Eur J Cancer Care*. 2019;28(1):e12952. doi: <https://doi.org/10.1111/ecc.12952>
15. Thilges S, Mumby P, Sinacore J, Clark J, Czerlanis C. Implementing a cognitive behavioral intervention for patients with head and neck cancer. *Support Care Cancer*. 2023;31(8):476. doi: <https://doi.org/10.1007/s00520-023-07948-4>
16. Heitzmann CA, Merluzzi TV, Jean-Pierre P, Roscoe JA, Kirsh KL, Passik SD. Assessing self-efficacy for coping with cancer: development and psychometric analysis of the brief version of the Cancer Behavior Inventory (CBI-B). *Psychooncology*. 2011;20(3):302-12. doi: <https://doi.org/10.1002/pon.1735>
17. Huang FF, Yang Q, Wang AN, Zhang JP. Psychometric properties and performance of existing self-efficacy instruments in cancer populations: a systematic review. *Health Qual Life Outcomes*. 2018;16(1):241. doi: <https://doi.org/10.1186/s12955-018-1066-9>
18. Beaton D, Bombardier C, Guillemin F, Ferraz MB. Recommendations for the Cross-Cultural Adaptation of the DASH & QuickDASH Outcome Measures [Internet]. Canada: Institute for Work & Health; 2007 [cited 2022 Aug 08]. Available from: [https://www.dash.iwh.on.ca/sites/dash/files/downloads/cross\\_cultural\\_adaptation\\_2007.pdf](https://www.dash.iwh.on.ca/sites/dash/files/downloads/cross_cultural_adaptation_2007.pdf)
19. Pasquali L. Instrumentação psicológica: fundamentos e práticas. Porto Alegre: Artmed; 2010.
20. Michels FAS, Latorre MRDO, Maciel MS. Validity, reliability and understanding of the EORTC-C30 and EORTC-BR23, quality of life questionnaires specific for breast cancer. *Rev Bras Epidemiol*. 2013;16(2):352-63. doi: <https://doi.org/10.1590/S1415-790X2013000200011>
21. Botega NJ, Bio MR, Zomignani MA, Garcia Jr C, Pereira WAB. Transtornos do humor em enfermagem de clínica médica e validação de escala de medida (HAD) de ansiedade e depressão. *Rev Saúde Pública*. 1995;29(5):359-63. doi: <https://doi.org/10.1590/S0034-89101995000500004>
22. Schreiber JB. Issues and recommendations for exploratory factor analysis and principal component analysis. *Res Social Adm Pharm*. 2021;17(5):1004-11. doi: <https://doi.org/10.1016/j.sapharm.2020.07.027>
23. Echevarría-Guanilo ME, Gonçalves N, Romanoski PJ. Psychometric properties of measurement instruments: conceptual basis and evaluation methods – Part II. *Texto Contexto Enferm*. 2019;28:e20170311. doi: <https://doi.org/10.1590/1980-265X-tce-2017-0311>
24. Lorenzo-Seva U, Ferrando PJ. Unrestricted factor analysis of multidimensional test items based on an objectively refined target matrix. *Behav Res Methods*. 2020;52(1):116-30. doi: <http://doi.org/10.3758/s13428-019-01209-1>
25. Ferrando PJ, Lorenzo-Seva U. On the added value of multiple factor score estimates in essentially unidimensional models. *Educ Psychol Meas*. 2019;79(2):249-71. doi: <https://doi.org/10.1177/2F0013164418773851>
26. Sellbom M, Tellegen A. Factor analysis in psychological assessment research: common pitfalls and recommendations. *Psychol Assess*. 2019;31(12):1428-41. doi: <https://doi.org/10.1037/pas0000623>
27. Lingens SP, Schulz F, Müller I, Schulz H, Bleich C. Associations between self-efficacy, distress and anxiety in cancer patient-relative dyads visiting psychosocial cancer support services: using actor-partner interdependence modelling. *PLoS One*. 2021;16(9):e0255318. doi: <https://doi.org/10.1371/journal.pone.0255318>
28. Magon A, Caruso R, Sironi A, Mirabella S, Dellafiore F, Arrigoni C et al. Trajectories of health-related quality of life, health literacy, and self-efficacy in curatively-treated patients with esophageal cancer: a longitudinal single-center study in Italy. *J Patient Exp*. 2021;8:23743735211060769. doi: <https://doi.org/10.1177/2F23743735211060769>
29. Chen M, Gong J, Cao Q, Li Q. The development and evaluation of a web-based complex intervention: the caring for couples coping with colorectal cancer "4Cs: CRC" program. *Asia Pac J Oncol Nurs*. 2022;9(5):100050. doi: <https://doi.org/10.1016/j.apjon.2022.03.002>
30. Manikis GC, Simos NJ, Kourou K, Kondylakis H, Poikonen-Saksela P, Mazzocco K, et al. Personalized risk analysis to improve the psychological resilience of women undergoing treatment for breast cancer: development of a machine learning-driven clinical decision support tool. *J Med Internet Res*. 2023;25:e43838. doi: <https://doi.org/10.2196/43838>

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■ **Authorship contribution:**

Project administration: Cláudia Jeane Lopes Pimenta.

Formal analysis: Cláudia Jeane Lopes Pimenta, Rômulo Lustosa Pimenteira de Melo.

Conceptualization: Cláudia Jeane Lopes Pimenta, Kátia Neyla de Freitas Macedo Costa.

Data curation: Cláudia Jeane Lopes Pimenta.

Writing-original draft: Cláudia Jeane Lopes Pimenta.

Writing-review & editing: Cláudia Jeane Lopes Pimenta, Thaíse Alves Bezerra, Cleane Rosa Ribeiro da Silva, Kaisy Martins de Albuquerque Madruga, Tatiana Ferreira da Costa, Rômulo Lustosa Pimenteira de Melo, Kátia Neyla de Freitas Macedo Costa.

Investigation: Cláudia Jeane Lopes Pimenta, Thaíse Alves Bezerra, Cleane Rosa Ribeiro da Silva.

Methodology: Cláudia Jeane Lopes Pimenta, Thaíse Alves Bezerra, Cleane Rosa Ribeiro da Silva, Kaisy Martins de Albuquerque Madruga, Tatiana Ferreira da Costa, Kátia Neyla de Freitas Macedo Costa.

Supervision: Kátia Neyla de Freitas Macedo Costa.

Validation: Cláudia Jeane Lopes Pimenta, Rômulo Lustosa Pimenteira de Melo, Kátia Neyla de Freitas Macedo Costa.

Visualization: Cláudia Jeane Lopes Pimenta, Thaíse Alves Bezerra, Cleane Rosa Ribeiro da Silva, Kátia Neyla de Freitas Macedo Costa.

The authors declare that there is no conflict of interest.

■ **Corresponding author:**

Cláudia Jeane Lopes Pimenta

E-mail: claudiajlpimenta@hotmail.com

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Luccas Melo de Souza

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