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**Original Article**

# Cultural adaptation and validity of the memorial symptom assessment scale in adults with cancer in Colombia

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ABSTRACT

**Background & Aim:** The Memorial Symptom Assessment Scale measures the presence, frequency, severity, and distress of symptoms. The scale is available in Spanish, but it has not been validated in Colombia. This study aims to translate, validate, and culturally adapt the Memorial Symptom Assessment Scale for adults with cancer in Colombia.
**Methods & Materials:** Adults with cancer undergoing chemotherapy in an oncological outpatient center in Bogota, Colombia, were invited to participate in the study. Patients in end-of-life care or with cognitive deficits were excluded. Psychometric research was carried out and included: 1) Translation and cultural adaptation of the scale from English, 2) Construct validity and reliability with a convenience sample of 249 cancer patients. A factorial analysis of principal components was carried out with the Varimax rotation method in IBM SPSS v26.0. The reliability of the scale was estimated using Cronbach's Alpha; subsequently, factor analysis was carried out using structural equations in MPlus.
**Results:** The scale was adapted to the Colombian context. Two factors (physical and psychological) of the scale structure were produced by the factorial analysis that contributes 47.9% of the accumulated variance. The alpha coefficient of Cronbach ranged between 0.75 and 0.79. The final model goodness of fit was also adequate [X2 (128)=184.47, p = 0.008, CFI = 0.94, RMSEA: 0.04 [0.03, 0.06], SRMR: 0.06, TLI= 0.92].
**Conclusion:** The Memorial Symptom Assessment Scale has adequate validity and reliability to measure the prevalence, frequency, stress, and severity of symptoms in adults with cancer in Colombia.

## Introduction

During the course of the disease, people diagnosed with cancer report an average of 6 symptoms, with a range between 3 and 13 symptoms (1). Symptoms occur simultaneously, have a multiplicative effect, and lead to a high burden for the patient, the family, and the health system. Assessing symptoms is a priority when caring for adults with cancer (2). This approach guides the effective antineoplastic treatment (3), reduces readmissions and saturation of emergency services (3), and improves the quality of life of the patient (3,4).

Chemotherapy, considered one of the fundamental therapies for cancer, can generate side effects and multiple symptoms, which may cause delays in the treatment completion and disrupts the rehabilitation of cancer survivors (5). Understanding self-reported symptoms and their severity during chemotherapy are fundamental for providing high-quality care and effective support during treatment (6). Each chemotherapy regimen has a different toxicity profile, with side effects including neutropenia, nausea, trouble sleeping, cognitive decline, lack of energy, among

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others (7). Frequent evaluation of symptoms guides the course of treatment and identifies the symptoms fluctuation (8).

The Memorial Symptom Assessment Scale (MSAS) was originally developed in English and is a validated, reliable, and comprehensive scale for assessing symptoms in oncological populations (9). The scale measures the frequency, severity, and distress of physical and psychological symptoms in cancer patients; and has been translated and validated in different languages and contexts (10–14). Although the scale was validated in Spanish with an oncological population from Spain, the translation authors detected problems in the comprehension of some symptoms after completing a pilot study (10). On the other hand, Spain and Colombia are social and culturally different, and the level of education is lower in the latter (15). So, translating the scale again, considering the context in which it will be applied, may improve the comprehension of the items. Thus, we aim to translate, culturally adapt, and validate the Memorial Symptom Assessment Scale for adults diagnosed with cancer undergoing chemotherapy in Colombia.

According to Polit and Beck, validity refers to "the degree to which an instrument is measuring the construct it purports to measure" (16). This property has three major components: face, criterion, and construct validity. In this study, we focused on construct validity, that is, the extent to which the scores reflect an ideal measure of the construct. Face validity and content validity were not assessed because the first is not considered a critical measurement property, and the second cannot be assessed objectively (16). Since this is a translation of an instrument, cross-cultural validity is required to determine if the translated measure performs adequately (16).

## Methods

We conducted an instrumental psychometric research (17) design, which includes the adaptation and analysis of psychometric properties of the scale.

### *Participants*

From January to December 2019, the research team screened potential participants in the chemotherapy units, and recruitment was carried out in outpatient units—during follow-up appointments—or at the patient's home.

A convenience sample was obtained. People were invited to participate in the study if they were adults over 18 years of age with a cancer diagnosis and were receiving chemotherapy at the time of enrollment. Those who were in end-of-life care had some cognitive impairment, or psychiatric disorders were excluded. Participants were allocated into two groups, one for a pilot test and the other for the psychometric analysis. The pilot test group included the first 60 adults with cancer enrolled in the study; they completed a pretest of our translated Spanish version of the MSAS. The choice of 60 participants for the pilot phase was based on the convenience of maximizing the sample size, as no specific rules are determined by the literature given the qualitative nature of this activity.

For the second group, another 249 participants were enrolled for the psychometric tests of the scale. In order to assess the factorial structure of two factors as the original scale (22), simulation studies suggest that in factorial analyses under the frame of structural equation models, a sample size of at least 120 per factor with around six indicators or more is sufficient for standardized coefficients of at least 0.65 (20). Therefore at least 200 participants were aimed as a minimum acceptable sample size. In order to anticipate decreases in the participation rate, 25% more were recruited.

### *Instruments*

The Memorial Symptom Assessment Scale (8) is an instrument conformed by 32 items, organized in two sections, that assess psychological and physical symptoms. The person is asked if they have experienced a particular symptom in the last week (yes/no). If so, they are asked to report the frequency,

intensity, and distress caused by the symptom.

The frequency is measured for 24 items using a Likert-type scale, ranging from 1 to 4 (1: Rarely, 2: Occasionally, 3: Frequently, and 4: Almost constantly). The eight remaining items do not assess frequency because it is difficult to identify the periodicity of certain complaints—for example, hair or weight loss. To explore the intensity, a Likert-type scale ranging from 1 to 4 is also used (1: Slight, 2: Moderate, 3: Severe, and 4: Very severe). Finally, the distress caused by the symptom is measured with a 1-to-5 Likert-type scale (1: Not at all, 2: A little bit, 3: Somewhat, 4: Quit a bit, and 5: Very much).

The scores for each symptom were calculated according to Portenoy et al. (8): a) if the participant answered that they had experienced the symptom, the average scores of frequency, intensity, and distress were calculated; b) if the participant indicated that they had not experienced the symptom, the scores of frequency, intensity, and distress are coded as zero.

### *Procedures*

The study was conducted in two phases:

### *Cultural adaptation*

*Process of translation and adaptation of the scale*

The adaption process was based on the procedure proposed by Beaton et al. (21). A translation into Spanish and back-translation into English of the original scale was carried out. Two translators worked on the Spanish translation independently, subsequently analyzed each of their translations, and reached a consensus. The back-translation was carried out by a bilingual translator who is not related to the healthcare sciences nor knew the initial version of the instrument. Then, a group of experts reviewed, evaluated, and checked the versions, ensuring that they reflected the same meaning and content as the original scale.

*Pilot or pretest phase*

Participants of the pilot group completed the first translated version to determine if the scale was understandable. In case the participants considered that an item was unclear, they were asked to provide an alternative term. Then, the items reported as hard to understand were reviewed by a group of three experts constituted by a Ph.D. Nurse expert in oncology and two oncology nurse specialists. Based on the observations given by the participants, the experts were asked to discuss which term was more appropriate to represent the symptom.

### *Psychometric tests*

The construct validity and reliability of the scale were examined. A latent factor analysis was conducted using structural equation modeling in MPlus v.07. The factorial structure tested corresponded to the structure proposed in the original scale (22), which contains a psychological and a physical dimension. The latent psychological factor included the observed symptom scores of six items: difficulty concentrating, difficulty sleeping, worrying, feeling sad, feeling irritable, and feeling nervous. The latent physical factor included the observed symptom scores of twelve items: change in food taste, dry mouth, nausea, vomiting, feeling drowsy, lack of appetite, weight loss, constipation, feeling bloated, dizziness, pain, and lack of energy. Analyses were conducted using the Maximum Likelihood Robust estimator (MLR), which is robust to non-normality.

The model was evaluated by several goodnesses of fit indexes, both relative and absolute—first, a Chi-Square difference test. Second, relative indexes such as the comparative fit index (CFI), the root mean square error approximation (RMSEA), the standardized root mean squared residual (SRMR), and the Tuker-Lewis Index (TLI). Acceptable levels of fit indexes are between 0 and 0.08 for SRMR, lower than 0.08 for RMSEA, and larger than .90 and .95 for the CFI and TLI, respectively (23). Finally, item loadings were assessed by the magnitude (standardized coefficients) and statistical

significance tests. The internal consistency of each latent factor was calculated using McDonald's Omega coefficients (24).

According to the results from the factor analysis, mean scores and descriptive statistics of the psychological and physical dimensions were computed.

### *Ethical considerations*

The study was conducted at the Centro de Investigaciones Oncológicas Clínica San Diego (Center for Oncology Research San Diego's Clinic; CIOSAD in Spanish) in Bogota, Colombia, and was approved by the Review Board of the Nursing School of Universidad Nacional de Colombia and the CIOSAD's Scientific and Research Committee. Norms established in Resolution 008430 of the Colombian Ministry of Health (18) were followed, as well as the international ethics guidelines for research in health with human beings (19). The informed consent was obtained before enrollment.

## Results

### *Cultural adaptation*

Among the 60 participants in the pilot group, most were men (60%, standard deviation [SD]: 12.4). Breast cancer was the most frequent diagnosis, followed by colon cancer. On average, participants lasted 15 minutes completing the instrument. We identified difficulty understanding three items: feeling bloated, numbness/tingling in hands/feet. A semantic adjustment was made to these items to adapt the scale to the Colombian context, as shown in Table 1.

**Table 1.** Items adjusted semantically in the pilot phase

| Original item | Spanish translation | Semantic adjustment |
|---|---|---|
| **Feeling Bloated** | Sentirse hinchado | Sentirse hinchado o inflamado |
| **Numbness/tingling in hands/feet** | Entumecimiento/hormigueo en manos y pies | Calambre/hormigueo en manos y pies |
| **Dizziness** | Picor | Rasquiña/picazón |

*Note:* Items reported as difficult to understand were semantically adjusted to improve the understanding of the scale

### *Construct validity and reliability*

#### *Reliability*

As indicated early on, the reliability of the final version of the translated scale was conducted with 249 cancer patients. The information about their characteristics is displayed in Table 2. The two dimensions of the scale (physical and psychological) demonstrated optimal levels of reliability, measured by Cronbach's Alpha (Physical: 0.79 and Psychological: 0.75). The average reported on the physical scale was higher than the psychological scale (Mean physical: 1.28, [SD]: 0.82; Mean psychological: 0.93, SD: 0.84). According to the MANOVA test, there is no variation in the results by gender (Physical: F (1, 247): .025, p: 0.88; Psychological: F: (1.247), p: 0.08).

**Table 2.** Characteristics of the participants (N=249)

| Characteristic | N (%) |
|---|---|
| **Mean age in years (SD)** | 50.47 (12.70) |
| **Gender** | |
| **Male** | 180 (72.3%) |
| **Female** | 60 (27.7%) |
| **Place of origin** | |
| **Boyacá** | 108 (43.4%) |
| **Bogotá** | 75 (30.1%) |
| **Cundinamarca** | 66 (26.5%) |
| **Socioeconomic level** | |
| **Low** | 144 (57.9%) |
| **Middle** | 102 (40.9%) |
| **High** | 1 (0.4%) |
| **Not reported** | 2 (0.8%) |
| **Type of cancer** | |
| **Breast** | 98 (39.3%) |
| **Colon** | 23 (9.3%) |
| **Ovarian** | 18 (7.2%) |
| **Other** | 110 (44.2%) |

*Factor analysis*

The original two-factor structure was replicated in the present sample. The initial model showed poor goodness of fit, evidenced by only two of the five pre-determined fit criteria met [$X^2$ (134)=286.52, $p$< .000, CFI=.83, RMSEA: .07 [.06, .08], SRMR: .07, TLI=.80]. Therefore, the modification indexes provided by MPlus were used to improve the goodness of fit by allowing some items to covariate among them (e.g., vomiting and nausea). The addition of these covariances was always guided by theoretical reasoning. The final model showed an adequate goodness of fit, as evidenced by four of the five pre-determined fit criteria met [$X^2$ (128)=184.47, $p$ = 0.008, CFI = 0.94, RMSEA: 0.04 [0.03, 0.06], SRMR: 0.06, TLI = 0.92]. As displayed in Figure 1, the standardized item factor loads on each latent factor varied between 0.24 and 0.74 and were all statistically significant. The latent factors showed an excellent level of reliability as evidenced by the Omega coefficients of 0.73 and 0.80 for psychological and physical dimensions, respectively. A positive association was observed between the psychological and the physical factors (covariance=0.73).

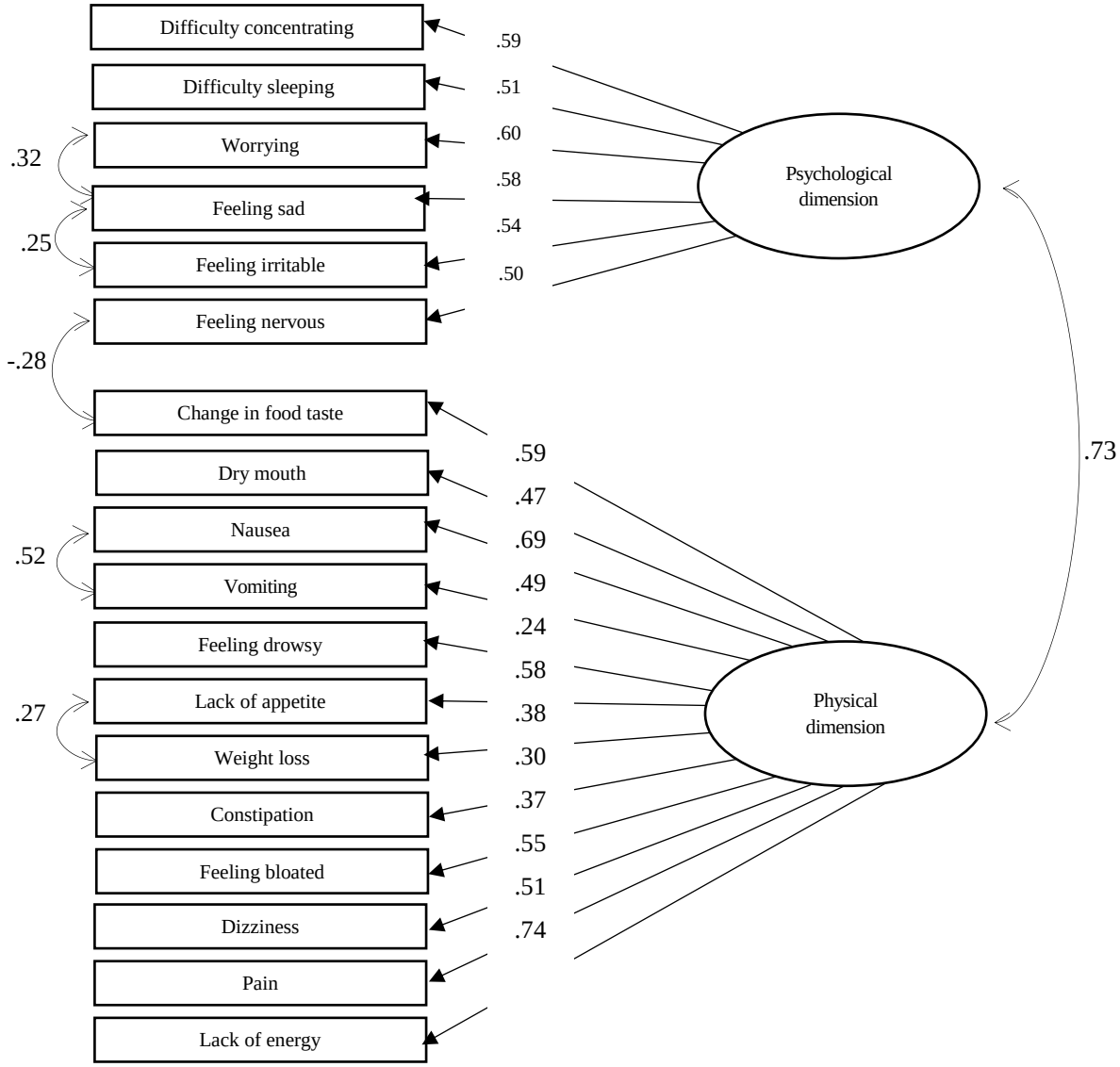


**Figure 1.** Latent factor model of two dimensions of the memorial symptom assessment scale

*Note:*The ovals represent the latent factors and the squares the observed symptom scores for each item. Covariances are represented by two double arrow connectors. Standardized coefficients are displayed. All the coefficients were statistically significant. [X2 (128) = 184.47, p=0.008, CFI = .94, RMSEA: .04 [ .03, .06], SRMR: .06, TLI = .92]

*Abbreviations:* $X^2$: Chi-square test, CFI: Comparative Fit Index, RMSEA: Root Mean Square Error of Approximation, SRMR: Standardized Root Mean Residual

*Descriptive statistics of the two dimensions*

On average, participants scored .99 (*SD*=0.83) and .90 (*SD*=0.67) on the psychological and physical dimensions, respectively. Women scored highly on the psychological dimension (*M*=1.06, *SD*=0.85) than men (*M*=0.85, *SD*=0.73), and that difference was small according to an effect size of Cohen's D=0.27. A *t*-test for independent samples suggested that this difference was not statistically significant (*t* (247)=-1.78, *p*>0.05). In contrast, men scored higher on the physical dimension (*M*=0.95, *[SD]*=0.69) than women (*M*=0.88, *[SD]*=0.67), but that difference was small as suggested by a Cohen's D effect size of .10. A *t*-test for independent samples suggested that the difference by gender on the physical dimension was not statistically significant (*t* (247)=0.78, *p* >0.05).

Additionally, it was observed that the middle socioeconomic status (SES) group scored higher on the psychological dimension (*M*=1.01, *[SD]*=0.83) than the low SES group (*M*=0.98, *SD*=0.79), while the opposite pattern was observed in the physical dimension ($M_{low}$=1.01, $SD_{low}$=0.71, $M_{medium}$=0.88, $SD_{medium}$=0.67). None of these differences were statistically significant (for psychological: *t* (244)=-.20, *p*>0.05; for physical *t* (244)=1.07, *p*>0.05) as demonstrated by Cohen's D effect sizes: 0.04 and 0.19, respectively.

## Discussion

This study is the first study adapting and validating the Memorial Symptom Assessment Scale scores in Colombia. Both the cultural adaptation and the psychometric validation of the instrument showed that the scale is adequate for the Colombian context.

The cultural adaptation evidenced the need to refine three items in their semantic content to ensure greater comprehensibility and clarity. This is probably due to the use of technical language in the first version of the scale, which may have caused confusion in the participants. However, the items were refined in the pilot testing phase. So, no major linguistic difficulties were detected in our last version of the translated scale compared to the English version, indicating an adequate performance relative to the original instrument. This is similar to other studies of cultural adaptation of the MSAS in Turkey (25), Sweden (26), and China (27).

The result of the construct validity is similar to that obtained in the original version (22) and to the validations carried out with other populations. On the other hand, the two factors that are identified in the application of the scale in the Colombian population coincide with what is reported in the construct validity of the MSAS in its short (28) and Chinese (29) versions, with a good fit between the data obtained and the hypothetical model.

The first factor corresponds to physical symptoms such as pain, dry mouth, lack of energy, nausea, changes in the way food tastes, changes in the skin, "I don't look like myself," numbness/tingling in hands/feet, and difficulty sleeping; similar to findings in the Spanish (10) and Swedish (26) versions, in which factor I contains most of the physical symptoms. The second factor consists of psychological symptoms that include feeling irritable, worried, sad, and nervous, like a previous study in Indonesia (14).

Additionally, we found that it is possible to use fewer items to adequately measure symptoms. This may be due to the lower prevalence of some symptoms in this study. So, there is uncertainty regarding how clusters of symptoms (including frequency, intensity, and distress) may affect the burden factor.

As reported in China (29), it is necessary to complement the traditional psychometric evaluation with a Rasch analysis that allows a detailed examination of the structure of the scale. However, it is important to obtain an abbreviated version of the scale to optimize the assessment time. This could increase the effectiveness of the scale in healthcare units and improve the treatment orientation.

The reliability of the instrument and the resulting subscales have good internal consistency and reliability. Compared with the original validation of the scale (22) and the Indonesian (14) and Swedish (26) versions, the alpha coefficients in our study were slightly lower. However, similar findings were obtained in the Chinese (29), Turkish (25), Arabic (12), Korean (11), and Spanish (10) versions.

According to our results, differences by gender and SES on the scores of the psychological and the physical dimensions were minimal. Future studies can explore in detail if the factor loadings or the scale structure itself vary according to these characteristics. For instance, in a previous study (30), the item "difficulty concentrating" was more likely to be endorsed by the woman than by men. To our knowledge, there are no studies addressing this potential differential item response analysis in the Colombian population.

Even though our study has several strengths is not without limitations. It was carried out in a single cancer center, and the sample could not be considered completely representative. The participants underwent chemotherapy, so the findings could not be generalized in people under radiotherapy or surgical regimens. The variety and stage of cancer among participants are homogenous, which does not allow us to identify differences by stages and types of cancer versus treatment. Future research should focus on the predictive and criterion validity of the scale in specific variables, such as quality of life and functionality status of people diagnosed with cancer.

## Conclusion

The MSAS version adapted for Colombia is a valid and reliable scale that allows measuring symptoms' frequency, severity, and distress in adults with cancer. It can provide benefits to health personnel in the evaluation of physical and psychological symptoms during chemotherapy and may guide the development of focused interventions for symptom management.

The findings support the feasibility of implementing the MSAS scale in the Colombian context when following-up cancer patients. Also, the importance of registering the symptoms reported by patients in their clinical history in order to serve as an indicator to provide comprehensive and timely care.

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## Conflict of interest

The authors declare no conflict of interest.

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