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Validity and reliability of the Spanish fear-avoidance components scale in breast cancer survivors

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Abstract

Objective: The aim of this study was to carry out a psychometric analysis of the Fear-Avoidance Components Scale (FACS-Sp) in Spanish breast cancer survivors (BCS).

Methods: A validation study was carried out in 154 BCS. Participants were recruited from the service of Medical Oncology of the University Clinical Hospital Virgen de la Victoria, in Málaga (Spain). A psychometric analysis of internal consistency, internal structure and convergent validity of the FACS-Sp was performed. Cronbach's alpha was calculated for internal consistency. Exploratory Factor Analysis was used to determine the internal structure of the FACS-Sp. Convergent validity with the Tampa Scale of Kinesiophobia (TSK) and the Pain Catastrophizing Scale (PCS) was determined using the Pearson correlation coefficient.

Results: The internal consistency was high (McDonald's $\omega = 0.91$). The Exploratory Factor Analysis yielded one factor explaining the 40.80% of total variance. Convergent validity with the TSK and the PCS was demonstrated.

Conclusions: The FACS-Sp has demonstrated to be a valid and reliable measure for assessing pain-related fear avoidance in BCS based on internal consistency, structural validity and convergent validity. Further studies that analyse other measurement properties in different Spanish cancer populations are needed.

KEYWORDS
breast cancer, chronic pain, fear avoidance, fear avoidance components scale, psychometric properties, validation studies

1 | INTRODUCTION

Breast cancer is a frequent malignancy among women and the most common cause of cancer death for women worldwide (Azamjah et al., 2019). Breast cancer survivors (BCS) have high symptoms burden that impacts health-related quality of life (HRQoL; de Ligt et al., 2019; Mandelblatt et al., 2020). In this context, pain is a prevalent symptom in this population associated with the disease process and the side effect of treatment (Beyaz et al., 2016; Juhl et al., 2016).

Pain is a complex multidimensional experience that can be influenced by several factors, such as psychological, social, physical and spiritual (McGuire, 1992). In BCS, there is great interest in psychological factors influencing pain (Schreiber et al., 2014), such as pain-related fear avoidance (FA; Velthuis, Peeters, et al., 2012). FA involves different elements such as avoidance behaviours,

pain-related catastrophizing cognitions and hypervigilance, and it can lead to depression, decreased functioning and disability (Van der Gucht et al., 2020; Vlaeyen & Linton, 2012). Among BCS population, there is a myth that using the affected arm will exacerbate lymphedema or increase the risk of developing it (LeVasseur et al., 2018), while supervised strength exercise is required in the rehabilitation process, and it would even seem to prevent breast cancer-related lymphedema (Campbell et al., 2019). Therefore, it is essential to measure FA in this population.

Several Patient Reported Outcome Measures (PROMS) were developed for assessing FA in patients with painful medical conditions (Miller et al., 1991; Sullivan et al., 1995; Waddell et al., 1993), such as the Pain Catastrophizing Scale (PCS; Sullivan et al., 1995), the Tampa Scale for Kinesiophobia (TSK; Miller et al., 1991), Pain Anxiety Symptoms Scale (PASS; McCracken et al., 1992) or Fear-Avoidance Beliefs Questionnaire (FABQ; Waddell et al., 1993). However, these PROMS have been criticised for psychometric flaws (Lundberg et al., 2011; Neblett et al., 2016; Neblett et al., 2017), and they were introduced before the well-accepted FA model of chronic pain, so they do not evaluate cognitive, behavioural and emotional components of the FA model (Vlaeyen & Linton, 2000). Furthermore, while some previous PROMS are lack cutoff scores, Fear Avoidance Components Scale (FACS) has five severity ranges, from subclinical to extreme FA, to help with clinical interpretation (Neblett et al., 2016).

The FACS is an instrument that has been developed recently to assess FA comprehensively. It was designed including cognitive (pain catastrophizing), affective (pain-related fear/anxiety) and behavioural (avoidance) constructs based on previous mentioned PROMS. In addition, FACS evolves the reason of avoidance: pain without fear, fear of pain or fear of injury or reinjury (Neblett et al., 2016). Besides its original English version, FACS has been translated and validated in different languages, including Serbian, Gujarati and Spanish. All these versions have shown FACS to be valid and reliable PROMS consisting of a two-factor structure: general fear avoidance and types of avoided activities (Bid et al., 2020; Cuesta-Vargas et al., 2020; Knezevic et al., 2018; Neblett et al., 2016).

In the oncology field, PROMS such as TSK and PCS have been used in BCS to measure kinesiophobia and pain catastrophizing, respectively (Gencay-Can et al., 2018; Manfuku et al., 2021; Velthuis, Van den Bussche, et al., 2012). In fact, kinesiophobia seems to increase the risk of lymphedema, depression and anxiety while decreasing upper limb function in BCS (Gencay-Can et al., 2018). However, only the modified TSK-Fatigue has been validated in cancer survivors from different aetiology (Velthuis, Van den Bussche, et al., 2012). Therefore, there is a need to measure FA with PROMS evaluating all components of the current FA model, such as the recently developed FACS. Although it has been validated in Spanish patients with various chronic musculoskeletal pain disorders, no psychometric testing has been performed in BCS. This study aimed to assess the internal consistency, structural validity and convergent validity of the Spanish Fear Avoidance Components Scale (FACS-Sp) in Spanish BCS.

2 | METHODS

2.1 | Procedure

In this cross-sectional study, participants were recruited consecutively from the service of Medical Oncology of the University Clinical Hospital Virgen de la Victoria, in Málaga (Spain). Patients were included if they were Spanish-speaking adults (age ≥18 years) and had been surgically treated for their primary tumour with no evidence of recurrence or metastasis at the time of recruitment. Patients undergoing hormonal treatment radiotherapy, antiHER therapy or chemotherapy as part of their adjuvant treatment were included, regardless of time from diagnosis. Patients were excluded if they suffered any cognitive or mental illness that would impede reading comprehension and complete the questionnaire, had poor Spanish language comprehension, refused to participate in the study or were aged under 18 years old. All participants signed informed consent before participation. Those patients who met inclusion criteria were invited to participate in a revision with their oncologist, who had their entire medical history. Data were obtained between May 2017 and February 2020. All questionnaires were self-completed. The University Clinical Hospital gave ethical clearance for the study by The Portal de Ética de la Investigación Biomédica de Málaga Ethics Committee (2804/2016), adhere to accepted the Declaration of Helsinki.

2.2 | Measures

2.2.1 | Spanish Fear Avoidance Components Scale (FACS-Sp)

The original version of FACS is an instrument developed for assessing FA in patients with chronic musculoskeletal pain disorders (Neblett et al., 2016). This instrument consists of 20 items scored on a 6-point Likert scale, from 0 *completely disagree* to 5 *completely agree*. A total score, which ranges from 0 to 100, can be obtained by adding the ratings of each item. The total score indicates different levels of severity: *subclinical* (0–20); *mild* (21–40); *moderate* (41–60); *severe* (61–80) and *extreme* (81–100) (Neblett et al., 2016). The FACS has been adapted for different cultures, such as Serbian and Spanish (Cuesta-Vargas et al., 2020; Knezevic et al., 2018). In the present study, the Spanish version of FACS (FACS-Sp) was used, which has been cross-cultural adapted and validated in Spanish patients with chronic musculoskeletal pain disorders. It has demonstrated to be a valid and reliable instrument based on internal consistency ($\alpha = 0.872$), test–retest reliability ($r = 0.91$) and internal structure for factor 1 'general fear avoidance' ($\alpha = 0.902$) and factor 2 'types of activities that are avoided ($\alpha = 0.88$), which accounted for 48.75% of the total variance (Cuesta-Vargas et al., 2020).

2.2.2 | The Spanish version of the Tampa scale of Kinesiophobia

The Tampa Scale of Kinesiophobia (TSK) is one of the most widely used measures to assess FA in chronic pain patients (Miller et al., 1991; Tkachuk & Harris, 2012). The TSK has been adapted for different cultures, and the Spanish version of the TSK was used in this study (Aguiar et al., 2017; Gómez-Pérez et al., 2011; Haugen et al., 2008; Tkachuk & Harris, 2012). This assessment tool has been demonstrated to be a valid and reliable measure in terms of internal structure, internal consistency, test–retest reliability and convergent and predictive validity (Gómez-Pérez et al., 2011). The Spanish version of TSK consists of 11 items, which are scored on a 4-point Likert scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*; Gómez-Pérez et al., 2011). Thus, a total score ranging from 11 to 44 can be calculated, with higher scores indicating greater perceived levels of kinesiophobia.

2.2.3 | The Spanish version of the pain catastrophizing scale

The Pain Catastrophizing Scale (PCS) is a valid and reliable measure that has been designed to assess pain catastrophizing (Sullivan et al., 1995). The PCS has been adapted for different cultures, and the Spanish version of the PCS was used in this study (Fernandes et al., 2012; García Campayo et al., 2008; Sehn et al., 2012). This instrument has been demonstrated to be a valid and reliable measure based on internal consistency, test–retest reliability, internal structure, convergent validity and sensitivity to change (García Campayo et al., 2008). The Spanish version of the PCS consists of 13 items which are rated on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*all the time*; García Campayo et al., 2008). Thus, a total score, which ranges from 0 to 52, can be obtained by adding the ratings of each item, with higher scores indicating greater pain catastrophizing.

2.3 | Statistical analysis

A descriptive analysis of the anthropometric and clinical variables was carried out. McDonald's ω was calculated to obtain the internal consistency (McDonald, 1999). Kaiser–Meyer–Olkin (KMO) test was used to analyse the sample adequacy for factor analysis. Exploratory Factor Analysis (EFA) with Maximum Likelihood Extraction (MLE) was conducted to determine the internal structure of the questionnaire. The following priori extraction criteria were used: scree plot inflexion and variance >10% and eigenvalues ≥1 (Costello & Osborne, 2005). A minimum ratio of five participants per item was required, as detailed in the literature (Costello & Osborne, 2005). Convergent validity with the TSK and PCS was analysed using the Pearson's correlation coefficient. Data were entered into a data file and analysed using an SPSS statistical program (Version 24).

3 | RESULTS

3.1 | Participant characteristics

A total of 154 patients were included in the study, so the ratio of patient per item was obtained. All patients were females (51.34 ± 9.58) years old. Most of the women had undergone breast-conserving surgery (69.8%), had received chemotherapy (79.1%) and radiotherapy (84.9%) and were still under hormone therapy (57%). The mean FACS-Sp total score was 26.50 (±21.17). Additional descriptive and clinical variables are presented in Table 1.

3.2 | Internal consistency

The internal consistency of the FACS-Sp was excellent (ω = 0.91), with values ranging from 0.897 to 0.938. The descriptive statistics and internal consistency for the FACS-Sp items are shown in Table 2.

3.3 | Internal structure

The values for the KMO (0.856) and the Bartlett Test of Sphericity (Chi-square test = 1,317.827; degrees of freedom [df] = 190 and

TABLE 1 Anthropometric and clinical variables ($n = 154$)

Variable	Mean (SD) or percentage (%)	Min–max
Age (years)	51.34 (9.58)	32–70
Height (m)	1.61 (0.61)	1.42–1.72
Weight (kg)	73.75 (15.99)	47.20–124.20
BMI (kg/m^2)	28.45 (6.01)	17.60–43.50
Years from diagnosis	2.56 (2.26)	0–13
Surgical intervention		
Breast-conserving surgery	69.8% (107)	
Mastectomy	30.2% (46)	
Cancer treatment		
Chemotherapy	79.1% (121)	
Radiotherapy	84.9% (130)	
Hormone therapy	76.7% (118)	
Monoclonal antibody	24.4% (37)	
Current treatment		
None	23.3% (36)	
Chemotherapy	3.5% (5)	
Radiotherapy	2.3% (3)	
Monoclonal antibody	5.8% (9)	
Hormone therapy	57% (88)	

Abbreviations: BMI, body mass index; SD, standard deviation.

$p < 0.001$) indicated that the correlation matrix was adequate, providing support for the use of EFA for this data set. MLE yielded one factor that accounted for 40.80% of the variance with an eigenvalue higher than 1 (Table 3). The scree plot is shown in Figure 1. The factor loadings ranged between 0.47 and 0.75 (Table 4).

3.4 | Convergent validity

Convergent validity between the FACS-Sp and the TSK was demonstrated ($r = 0.39$, $p < 0.05$). Convergent validity between the FACS-Sp and the PCS was also demonstrated ($r = 0.49$, $p < 0.01$).

TABLE 2 Internal consistency for items from the FACS-Sp

FACS-Sp items	McDonald's ω if item deleted	Item-rest correlation
1	0.914	0.626
2	0.912	0.673
3	0.916	0.527
4	0.913	0.672
5	0.915	0.569
6	0.917	0.518
7	0.914	0.611
8	0.912	0.651
9	0.911	0.691
10	0.914	0.626
11	0.914	0.632
12	0.918	0.357
13	0.917	0.483
14	0.916	0.555
15	0.915	0.587
16	0.918	0.443
17	0.917	0.500
18	0.916	0.513
19	0.916	0.536
20	0.916	0.557

Abbreviation: FACS-Sp, Spanish version of Fear-Avoidance Components Scale.

4 | DISCUSSION

This study assessed for the first time the psychometric properties of the FACS-Sp in Spanish BCS, to the best of our knowledge. The results of this study indicate that the FACS-Sp is a valid and reliable measure for assessing FA in Spanish BCS based on internal consistency, internal structure and convergent validity (Costello & Osborne, 2005; McDonald, 1999; Terwee et al., 2007).

FA is a common problem in patients with painful medical conditions, and validated PROMS can be helpful for FA assessment and monitor their progress in BCS (Cuesta-Vargas et al., 2020; Miller et al., 1991; Van der Gucht et al., 2020). Despite previous findings, FACS is a new instrument that has been designed to assess FA comprehensively, including cognitive, emotional and behavioural components of the current FA model not considered in other PROMS (Neblett et al., 2016; Vlaeyen & Linton, 2012). Therefore, its use in BCS adds new information to the current literature. In light of the present results, clinicians can use this validated questionnaire to assess FA in BCS, obtaining information such as the reason for avoidance or what kind of activity the patient avoids (Neblett et al., 2016). Furthermore, clinicians can classify the level of FA to target interventions (Neblett et al., 2017).

The FACS-Sp showed high internal consistency ($\omega = 0.91$), which indicates that items from the questionnaire similarly contribute to the measurement of the construct. These results are in line with those found in the original version of FACS ($\alpha = 0.92$; Neblett et al., 2016) and higher than the Spanish ($\alpha = 0.872$) and Gujarati version ($\alpha = 0.827$) for the entire questionnaire (Bid et al., 2020; Cuesta-Vargas et al., 2020). When comparing by factors from other versions, results concur with factor 1 from the Spanish ($\alpha = 0.902$) and Serbian ($\alpha = 0.904$) versions (Cuesta-Vargas et al., 2020; Knezevic et al., 2018).

Concerning structural validity, the correlation matrix was adequate for EFA, and all the extraction criteria were met (Costello & Osborne, 2005). The one-factor solution that emerged in the EFA accounted for 40.80% of the total variance explained. However, other studies have revealed a 2-factor structure for the English, Spanish, Gujarati and Serbian version of FACS (Bid et al., 2020; Cuesta-Vargas et al., 2020; Knezevic et al., 2018; Neblett et al., 2016), namely 'general fear avoidance' (items 1–14) and 'types of activities that are avoided' (items 15–20) factors. While these versions were validated in patients with chronic musculoskeletal pain disorders, this is the first

TABLE 3 Total variance explained

	Initial eigenvalues			ESSL		
Factor	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	8.161	40.805	40.805	7.549	37.745	37.745
2	2.292	11.459	52.264			
3	1.872	9.361	61.625			
4	1.216	6.078	67.703			
5	1.005	5.023	72.726			

Abbreviation: ESSL, extraction sums of squared loadings.

FIGURE 1 ScreePlot

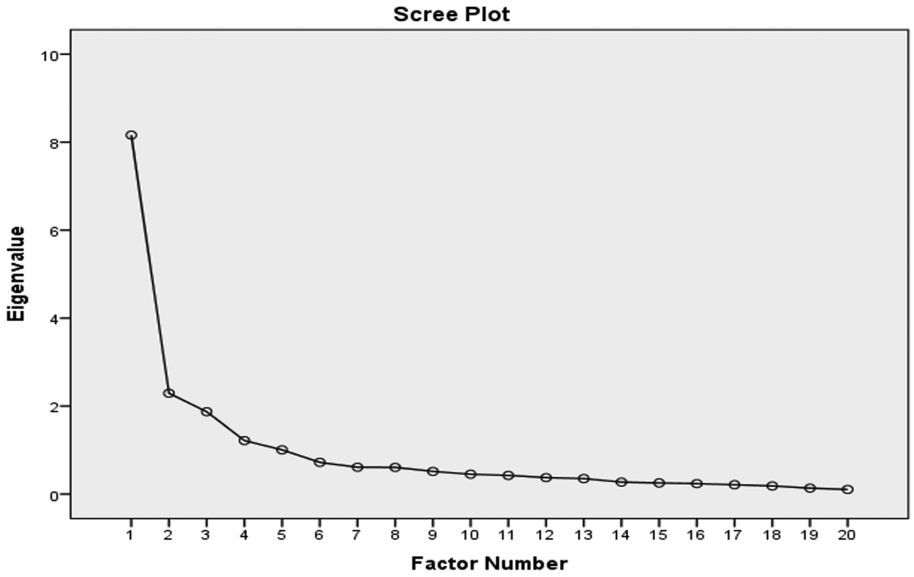

TABLE 4 Factor loading

FACS-Sp items	Factor loading
1	0.61
2	0.67
3	0.62
4	0.74
5	0.53
6	0.51
7	0.68
8	0.64
9	0.74
10	0.75
11	0.74
12	0.48
13	0.55
14	0.62
15	0.61
16	0.47
17	0.50
18	0.58
19	0.50
20	0.53

Abbreviation: FACS-Sp, Spanish version of Fear-Avoidance Components Scale.

version of FACS that has been validated in the oncology population, so no comparison in factors structure between oncology samples can be made. However, it is known that part of the BCS population believes that lifting heavy objects would increase the chance of lymphedema developing (LeVasseur et al., 2018). In light of the present results, all items from FACS, including those measuring types of avoided activities, account for a single general FA factor.

Convergent validity with the Spanish versions of TSK and PCS was also demonstrated with a Pearson correlation of $r = 0.39$ ($p < 0.05$) and $r = 0.49$ ($p < 0.01$), respectively. In this regard, there was a statistically significant correlation between the FACS-Sp and the measures assessing kinesiophobia and pain catastrophizing in chronic pain patients, providing support for construct validity. In this context, TSK was developed to measure FA, referred to as 'fear of movement/reinjury', as the original FA model was based on the concept of kinesiophobia. This term refers to the fear of movement and activity resulting from a feeling of vulnerability to reinjury (Vlaeyen et al., 1995). However, the current FA model comprises various constructs such as fear of pain, fear of movement and fear of work-related activities or fear of (re)injury (Meulders, 2020). Moreover, catastrophizing thoughts are part of the cognitive responses to pain and take part in the current FA model. However, the current model also contemplates affective (pain-related fear/anxiety) and behavioural (avoidance) constructs (Neblett et al., 2016). Therefore, these correlations were expected, as FACS was developed by reviewing FA-related PROMS items, including TSK and PCS (Neblett et al., 2016). PCS has also been used for convergent validity in the Serbian version of FACS, showing a moderate correlation ($r = 0.772$; Knezevic et al., 2018).

4.1 | Strengths and limitations

This study is the first validation of the FACS-Sp in Spanish patients with breast cancer to the best of our knowledge. Furthermore, it has been conducted following the international recommendations of the COnsensus-based Standards for the selection of health status Measurement INstruments methodology (COSMIN; Mokkink et al., 2016; Terwee et al., 2007). In this regard, the psychometric properties met the international criteria, and evidence for the validity and reliability of the FACS-Spin BCS has been provided for the first time.

Under musculoskeletal conditions, FA contributes to disuse, disability and pain chronification (Vlaeyen & Linton, 2012). In the present study, BCS showed a mean FACS-Sp total score of 26.50, corresponding to a mild FA level (Neblett et al., 2016). However, a high standard deviation (±21.17) suggests a wide variability in FA among BCS. The use of FACS in this population would allow clinicians to detect patients that would benefit the most from an educational intervention as part of rehabilitation. In addition, future research should study the effect of rehabilitation programs in FA (Velthuis, Peeters, et al., 2012).

The main limitation of this study is the lack of analysis of other psychometric properties of the FACS-Sp, such as responsiveness, test–retest reliability and minimal clinically important difference. Moreover, confirmatory factor analysis on a broader BCS sample should be carried out to select the most parsimonious model. Furthermore, these results may not generalise to other patient populations. Further studies that assess other psychometric properties of the FACS-Sp in different Spanish cancer populations are needed.

5 | CONCLUSION

The FACS-Sp has demonstrated to be a valid and reliable instrument for measuring FA in BCS based on internal consistency, structural validity and convergent validity. Unlike FACS versions validated in chronic musculoskeletal pain disorders, EFA yielded one factor in BCS population. Therefore, further studies that assess other measurement properties in different Spanish cancer populations are needed.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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AUTHOR'S CONTRIBUTIONS

Antonio I Cuesta-Vargas, Emilio Alba and Bella Pajares have made a contribution to the conception of this study. Daniel Gutiérrez-Sánchez and Cristina Roldán-Jiménez drafted the manuscript. Daniel Gutiérrez-Sánchez, Cristina Roldán-Jiménez and Antonio I Cuesta-Vargas participated in the analysis and interpretation of data and were involved in drafting the manuscript, as well as revising it critically for important intellectual content. All authors gave final approval of the version to be published.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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