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RESEARCH ARTICLE

Validation of the Portuguese version of the supportive care needs survey short-form questionnaire (SCNS-SF34-Pt) and the breast cancer supplementary module (SCNS-BR8-Pt)

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ABSTRACT

Objective: This study aimed to test the psychometric properties of the Portuguese Supportive Care Needs Survey-Short Form-34 (SCNS-SF34-Pt) and its breast cancer-specific complementary module (SCNS-BR8-Pt). A further aim was to characterize Portuguese Breast Cancer Survivors' (BCS) unmet supportive care needs, using these measures.

Methods: A convenient sample of BCS was recruited from five hospitals in Portugal and invited to complete SCNS-SF34-Pt and SCNS-BR8-Pt, EORTCQLQC30 and QLQBR23, the Generalized Anxiety Disorder, and the Patient Health-Questionnaire. The validity (i.e. convergent, discriminant and convergent validity) and reliability of SCNS-SF34-Pt and SCNS-BR8-Pt were statistically evaluated. BCS' unmet supportive care needs were descriptively assessed.

Findings: 336 BCS participated in the study. A four-factor solution was produced for SCNS-SF34-Pt. This solution included the Physical and daily living needs, Psychological needs, Sexuality needs, and Health system, information, and patient support needs dimensions (73% of the total variance; Cronbach's alpha=.82 to .97). SCNS-SF34-Pt demonstrated good convergent validity. It could also discriminate between known-groups regarding age, disease staging, treatment performed, and ECOG performance status. SCNS-BR8-Pt revealed a single-factor structure (62% of the total variance; Cronbach's alpha=.91).

Portuguese BCS' most prevalent unmet supportive care needs were associated with the Psychological, and Physical and daily living domains. Fear of cancer spreading, the inability to do things as usual, and lack of energy/tiredness were perceived as issues requiring further supportive care.

Conclusions: SCNS-SF34-Pt and the SCNS-BR8-Pt are valid and reliable tools to assess Portuguese BCS' unmet supportive care

KEYWORDS

breast cancer; Portugal; psychometrics; reliability; SCNS-BR8; SCNS-SF34; supportive care; unmet needs; validity

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needs. Fear of cancer spreading and lack of energy/tiredness concerns should be a target of supportive care services.

1. Background

Breast cancer (BC) is the most frequently diagnosed cancer worldwide and the leading cause of cancer mortality in women.[1] In Portugal, 7,041 new cases were diagnosed in 2020, and 1,864 people died of the disease. However, early diagnosis and better treatments have steadily improved survival in the country, and in 2020 BC's 5-year prevalence was estimated at 27,051.[2]

Despite increasing survival rates, breast cancer survivors (BCS) often experience physical and psychosocial difficulties related to the sequelae of cancer and its treatments. Physical conditions such as fatigue, pain, and lymphedema are common among survivors. Psychosocial consequences such as fear of cancer recurrence, anxiety, depression, sleeping problems, body image issues, and sexual dysfunction are also frequently reported. Additionally, organizational and information-related difficulties are documented in the literature.[3,4] If not adequately addressed, these difficulties result in significant unmet supportive care needs which have been associated with impaired Health-related quality of life (HRQoL) in BCS.[5] Therefore, providing effective supportive care tailored to BCS' needs is paramount.[6,7]

Using comprehensive, culturally adapted, and psychometrically robust instruments to assess BCS' unmet supportive care needs is critical for designing patient-centered supportive care services and evaluating their impact.[8] In the past years, several generic and cancer-specific needs assessment tools have been developed.[9,10] Among these, the Supportive Care Needs Survey 34-Short form[11] is of particular interest due to its multidimensional and comprehensive nature,[12] generic and cancer-specific modular approach, psychometric robustness,[10,13] and focus on respondents' perceptions of the need for help and the magnitude of their desire for help, thereby enabling the provision of tailored supportive care.[6] Moreover, SCNS-SF34 is the most widely used instrument for needs assessment in cancer patients,[10] which is essential for comparative research. The questionnaire also applies to clinical and research settings and has been successfully adapted for online administration.[11]

SCNS-SF34 assesses cancer patients' perceived unmet care needs across five domains: psychological, health system and information, physical and daily living, patient care and support, and sexuality needs.[11] A complementary module developed for assessing BCS-specific needs - SCNS-BR8 – may be used with SCNS-SF34.[14] This unidimensional module evaluates needs

related to self-image, interpersonal relationships, lymphedema, prosthesis, and genetic aspects of BC.[11] In both scales, respondents self-report their need and extent of the need for support over the previous month, using a 5-point Likert scale (1 = No need/Not applicable; 2 = No need/Satisfied; 3 = Some need/Low need for help; 4 = Some need/Moderate need for help; 5 = Some need/High need for help). A Likert summated score can be calculated for each domain. The obtained score can be analyzed as the crude total of all items in the domain or be standardized into a score ranging from 0 to 100.[11]

SCNS-SF34 has been translated and validated to English,[11] French,[8] Dutch,[15] Brazillian,[7] German,[16] Italian,[17] Mexican,[18] Chinese,[19,20] Japanese,[12] Turkish,[21] Malaysian[22] and Ethiopian populations.[6] Conducted studies gathered strong evidence of SCNS-SF34's internal consistency, content and structural validity, and hypothesis testing. Moderate evidence has been reported concerning its reliability and cross-cultural validity.[10] Additionally, SCNS-BR8 has been validated among French-speaking BCS, revealing good psychometric properties.[8] Neither SCNS-SF34 nor SCNS-BR8 have been validated for the Portuguese population. This undermines the accurate assessment of BCS' unmet supportive care needs, the design of patient-centered supportive care services tailored to such needs, and comparative research.

This study aimed to translate and test the psychometric properties of SCNS-SF34 and SCNS-BR8 among Portuguese BCS. A further aim was to characterize Portuguese BCS' unmet supportive care needs, using these measures, to enable the development of new supportive care services tailored to their most pressing needs.

2. Methods

2.1. Study design

This survey study used a cross-sectional design. The ethical committees of IPO-Porto, Centro Hospitalar Universitário do Porto, Centro Hospitalar Universitário S. João, ULS-Matosinhos, Hospital CUF Porto, and Portuguese Data Protection Committee approved the study (approval:10727/2017). All participants provided written informed consent before the onset of study procedures.

2.2. Procedures

A convenience sample of BCS was recruited by the researchers or local clinical staff at the Day Hospitals and Breast Clinics of five hospitals in Porto (Portugal) in 2019. Eligibility criteria included being 18 years old or

over, having a confirmed history of BC, and being able to write and read in Portuguese. BCS providing informed consent were asked to complete either a paper-and-pencil or an online questionnaire available at iTerapi.[23]

2.3. Measures

2.3.1. Clinical and socio-demographic variables

A self-developed questionnaire was used to collect information about age, education, marital status, professional status, and area of residence. Clinical data, such as time since diagnosis, type of BC, type of treatment performed, disease staging, and ECOG performance status, were retrieved from participants' medical records using a standardized data abstraction form.

2.3.2. Unmet supportive care needs (SCNS-SF34-Pt and SCNS-BR8-Pt)

SCNS-SF34 and SCNS-BR8 were translated into Portuguese (Portugal) according to EORTC guidelines.[24] A preliminary forward translation from English to Portuguese (Portugal) was conducted by CMS (Cristina Mendes-Santos) and discussed with two of the authors (EW, RS). A back translation from Portuguese to English followed (CMS). The authors, who were fluent in English, identified, discussed, and solved discrepancies (EW, RS, GA). A second forward translation from English to Portuguese (Portugal) was conducted (CMS) and appraised by two external oncology experts and one psychology expert (LLS, AS, LC). Their comments were appraised and integrated into the semifinal versions of the questionnaires, which were afterward pre-tested by three BCS. After conducting a cognitive interview with pilot-test participants to assess facial and content validity, and adequacy and comprehension of the items the SCNS-SF34-Pt and SCNS-BR8-Pt final versions were considered ready for dissemination (c.f., Appendix 1).

2.3.3. Anxiety and depression

The Generalized Anxiety Disorder (GAD-7) and the Patient Health Questionnaire (PHQ-9) assessed anxiety and depression symptoms, respectively. Both scales are scored using a 4-point Likert scale (0="Not at all" to 3="Nearly every day"). Higher summated scores correlate with greater symptom severity. The questionnaires have been validated in Portuguese oncology settings, demonstrating good reliability (PHQ-9 Chronbach's α=.89; GAD-7 Chronbach's α=.88).[25,26]

2.3.4. HRQoL

EORTC QLQ-C30 (v.3.0) and QLQ-BR23 were used to assess HRQoL. QLQ-C30 includes nine multi-item scales, namely, six functional scales

(i.e. physical, role, cognitive, emotional, and social), three symptom scales (i.e. fatigue, pain, and nausea/vomiting), and a global health status/HRQoL scale. Additionally, the questionnaire incorporates five single-item symptom measures assessing dyspnea, loss of appetite, insomnia, constipation, and diarrhea and an extra single-item evaluating the perceived financial impact of the disease. QLQ-BR23 is an auxiliary questionnaire module developed to be administered with QLQ-C30. It includes five multi-item scales, specifically, two functional scales (i.e. body image and sexual functioning) and three symptom scales (i.e. arm symptoms, breast symptoms, and systemic therapy side effects). In addition, single-item measures evaluate sexual enjoyment, future perspective, and being upset due to hair loss. In both scales, items are scored using a 4-point Likert scale (1="Not at all"-4="Very much"), except for the two QLQ-C30 items assessing the global health status/HRQoL scale which follow a modified 7-point linear analog scale. A linear transformation should be implemented to obtain standardized scores ranging from 0 to 100, with higher scores translating into a "Better" level of functioning or "Worse" level of symptoms. Both questionnaires have been validated for the Portuguese population.[27,28]

2.4. Analysis

Statistical analyses were conducted in three stages using IBM SPSS (v.27). All hypothesis tests were conducted at a confidence level of 95% with a p-value of .05.

First, descriptive statistics, including median, interquartile range (IQR), frequency distributions, and percentages, were used to characterize the study sample concerning sociodemographic and clinical characteristics and assess the sample's facial validity. Non-parametric statistics were used because the data were non-normally distributed according to the Kolmogorov-Smirnoff test ($D(318)= 0.07$; $p<.05$).

Second, the psychometric properties of SCNS-SF34-Pt and the SCNS-BR8-Pt were assessed. We investigated the questionnaires' construct, convergent and discriminant validity, and reliability. SCNS-SF34-Pt and the SCNS-BR8-Pt construct validity was evaluated using an Exploratory Factor Analysis (EFA) based on Principal Components Analysis (PCA) with a varimax rotation. The Kaiser Meyer Olkin (KMO) index was calculated to assess sample adequacy. Appropriateness for factor analysis was evaluated using Bartlett's test of sphericity. To retain the factors, we followed Kaiser's criterion of eigenvalues > 1.[29] We expected SCNS-SF34-Pt to present a five-factor structure and SCNS-BR8-Pt to result in a single factor, like the original questionnaires. Items with factor loadings above .40 were considered acceptable.[30]

The scales' convergent validity was evaluated by correlating the SCNS-SF34-Pt and SCNS-BC8-Pt domains (62 hypotheses and nine hypotheses,

respectively, presented in Table 1) with PHQ-9, GAD-7, and QLQC30. These scales are widely used for symptom and functioning evaluation. All correlations were performed using Spearman correlation coefficients since data were non-normally distributed. The strength of the associations was examined according to Cohen's recommendations: low correlation with r_s ranging from .10 to .29, moderate correlation with r_s ranging from .30 to .49, and strong correlation with r_s ranging from .5 and 1.0.[31]

The discriminant validity of SCNS-SF34-Pt and SCNS-BR8-Pt was assessed *via* the known-groups comparison method. Differences between know-groups were analyzed using the Mann–Whitney U test or Kruskall–Wallis test regarding age, disease staging, time since diagnosis, type of surgery, treatment performed, and ECOG performance status. We hypothesized that younger participants would report higher unmet needs in the sexuality domain,[6,8,12,16,19,20] and lower unmet needs in the physical and daily living domain;[18] participants with higher ECOG performance levels

Table 1. Correlation matrix for convergent and divergent validity.

		SCNS-SF34-Pt				
		Psychological needs	Health system, information, and patient support	Physical and daily living needs	Sexuality needs	SCNS-BC8-Pt
PHQ-9		.63[a] **	.47[a] **	.59[a] **	.28[a] **	.38 [a] **
GAD-7		.68 a**	.47 a**	.53 a**	.27 a**	.37 a**
QLQC30						
	Global Health status	−0.37 b**	−0.31 b**	−0.44 b**	−0.12 b*	
	Physical Functioning	−0.49 b**	−0.36 b**	−0.59 b**	−.07[b]	
	Role Functioning	−0.56 b**	−0.46 b**	−0.68 b**	−0.17 b*	
	Emotional Functioning	−0.68 b**	−0.5 b**	−0.59 b**	−0.25 b**	
	Cognitive Functioning	−0.53 b**	−0.38 b**	−0.55 b**	−0.23 b**	
	Social Functioning	−0.49 b**	−0.38 b**	−0.54 b**	−0.21 b**	
	Fatigue	.55 a**	.45 a**	.68 a**	.15 a*	
	Nausea and vomiting	.2 a**	.27 a**	.31 a**	.15 a*	
	Pain	.43 a**	.34 a**	.6 a**	.13 a*	
	Dyspnea	.31 a**	.27 a**	.32 a**		
	Insomnia	.47 a**	.34 a**	.5 a**	.23 a**	
	Appetite Loss	.34 a**	.25 a**	.38 a**		
	Constipation	.19 a**	.24 a**	.25 a**		
	Diarrhea	.24 a**	.23 a**	.22 a**	.19 a*	
	Financial difficulties	.39 a**	.37 a**	.47 a**	.19 a**	
QLQBR23						
	Body Image					−0.40 b**
	Sexual Functioning					−0.05[b]
	Sexual Enjoyment					−0.02[b]
	Future Perspective					−0.37b**
	Systemic Therapy side effects					.32 a**
	Breast Symptoms					.32 a**
	Upset by hair loss					.22 a**

PHQ-9: Patient Health Questionnaire; GAD-7: Generalized Anxiety Disorder Screener.
[a] Hypothesis: A positive association was expected (r_s >0).
[b] Hypothesis: A negative association was expected (r_s <0).
* p<.05.
** p<.001.

were expected to present higher unmet physical and daily living needs; participants with more extended periods of post-diagnostic would present lower unmet needs in all domains;[15,18,32] participants treated with chemotherapy and with advanced stage disease were expected to have higher unmet needs on the physical and daily living[6,18,32] and psychological domains;[32] and participants that had performed a mastectomy would score higher in SCNS-BC8-Pt.[33] Additionally, patients with higher psychological distress, more symptoms, and lower HRQoL were expected to have higher unmet needs.[3,4]

Internal consistency was evaluated by computing Cronbach's alpha coefficient and item-to-total correlation (acceptable values above .70 and .50, respectively).

Finally, descriptive statistics such as the median, IQR, frequency distributions, and percentages were used to characterize BCS' unmet supportive care needs as assessed per the SCNS-SF34-Pt and the SCNS-BR8-Pt.

3. Findings

3.1. Participants' characteristics

A total of 505 BCS fulfilled the eligibility criteria and were invited to participate in the study. Of these, 336 participants answered the survey (67% response rate). The participant's median age was 53 (Range: 26–82). Most participants were married/in de facto relationships (67%; $n = 225$), and 32% were active ($n = 107$). The majority had been diagnosed with an invasive ductal carcinoma NST (73%; $n = 231$), Luminal B Her2- (33%; $n = 88$), or Luminal B Her2+ (31%; $n = 82$) two years before the study (Range: 0–24). Concerning treatments performed, most performed lumpectomy (49%; $n = 156$) with sentinel lymph node biopsy (73%; $n = 230$), and adjuvant treatment (67%; $n = 215$) with chemotherapy and radiotherapy (38%; $n = 120$), and hormone therapy (54%; $n = 172$). Close to 32% ($n = 100$) had been diagnosed with Stage II BC.

3.2. Validation of SCNS-SF34-Pt and SCNS-BR8-Pt

3.2.1. Construct validity

Considering SCNS-SF34-Pt, Bartlett's test statistic was $\chi^2(561)=11213.91$ ($p<.001$) for the correlation matrix's significance, revealing adequacy for factor analysis. A KMO = 0.95 confirmed sampling adequacy.

The EFA resulted in a four-factor model (with eigenvalues > 1) that accounted for 73.02% of the variance explained (unrotated solution: factor one 52.16%, factor two 11.59%, factor three 5.42%, and factor four 3.85%; or rotated solution: factor one 32.46%, factor two 17.82%, factor three

14.67%, and factor four 8.07%), suggesting the questionnaire measures four dimensions. As opposed to identified by Boyes and colleagues,[11] the loading pattern did not differentiate between the items belonging to the "Patient care and support domain" and those belonging to the "Health System and information domain".

Factor 1, labeled "Health system, information, and patient support needs", included 16 items assessing needs related to the treatment center and healthcare providers and information-related needs concerning the course of the disease. It accounted for 52.16% of the variance explained. Factor 2 accounted for 11.59% of the variance and was composed of ten items, consistent with the original version.[11] This factor addressed emotions and coping related to the disease and was labeled "Psychological needs". Items 6, "Anxiety", 7, "Feeling down or depressed", 8, "Feelings of sadness", and 17, "Concerns about the worries of those close to you", had a secondary loading on the "Physical and daily living needs" domain. However, they were retained in the "Psychological needs" domain due to convergency with theory. Factor 3 (5.42% of the variance) was labeled "Physical and daily living needs" and comprised five items coherent with the original questionnaire. It reflected needs related to managing physical symptoms, treatment side effects, and the performance of routine chores and activities. Finally, factor 4 (3.85% of variance) included three items that assessed needs related to sexual relationships and was labeled "Sexuality" (c.f. Table 2).

Regarding SCNS-BR8-Pt, adequacy for factor analysis was confirmed by Bartlett's test statistic, $\chi^2(28)=1536.24$ ($p<.001$) for the correlation matrix's significance. A KMO = 0.91 confirmed sample adequacy. The EFA confirmed a single-factor model consistent with previous validation studies.[8] The factor accounted for 61.77% of the variance, comprising eight items reflecting BC-specific needs, such as self-image, interpersonal relationships, lymphoedema, prosthesis, and genetic aspects of the disease, consistent with the original version (c.f., Table 2).

3.2.2. Convergent and discriminant validity

As hypothesized, all domains of the SCNS-SF34-Pt and the SCNS-BC8-Pt demonstrated a positive and significant correlation with PHQ-9 (rs ranging from .28 to .63, $p<.05$) and GAD-7 (rs ranging from .27 to.68, $p<.05$), suggesting that more unmet needs are associated with greater depression and anxiety symptoms severity, respectively.

Regarding QLQC30, the global health status correlated negatively and significantly with all the SCNS-SF34-Pt domains (rs ranging from −0.12 to −0.44, $p<.05$), suggesting that higher unmet needs are associated with lower HRQoL. The functional scales (Physical, role, emotional, cognitive,

Table 2. Principal components factor analysis of the SCNS-SF34-Pt and the SCNS-BR8-Pt (varimax rotation) and item-total correlation ($N = 336$).

Item number and the item		SCNS-SF34-Pt				SCNS-BR8-Pt		
		Health system, information, and patient support	Psychological	Physical and daily living	Sexuality	Breast Cancer	Item-to-total correlation	Proportion with unmet need (%)[a]
27	Being informed about your test results as soon as feasible	0.85					75	39.7
25	Being given explanations of those tests for which you would like explanations	0.85					77	35.7
23	Being given written information about the important aspects of your care	0.83					73	34
26	Being adequately informed about the benefits and side-effects of treatments before you choose to have them	0.83					75	35.9
28	Being informed about cancer which is under control or diminishing (that is, in remission)	0.81					71	37.9
29	Being informed about things you can do to help yourself to get well	0.81					78	39.3
22	Hospital staff acknowledging, and showing sensitivity to, your feelings and emotional needs	0.81					70	30.1
24	Being given information (written, diagrams, drawings) about aspects of managing your illness and side-effects at home	0.80					73	32
21	Hospital staff attending promptly to your physical needs	0.80					71	33.5

(*Continued*)

Table 2. Continued.

Item number and the item		SCNS-SF34-Pt				SCNS-BR8-Pt		
		Health system, information, and patient support	Psychological	Physical and daily living	Sexuality	Breast Cancer	Item-to-total correlation	Proportion with unmet need (%)[a]
34	Having one member of hospital staff with whom you can talk to about all aspects of your condition, treatment, and follow-up	0.79					77	38.5
32	Being treated like a person not just another case	0.79					75	35
20	Reassurance by medical staff that the way you feel is normal	0.77					78	38.6
33	Being treated in a hospital or clinic that is as physically pleasant as possible	0.73					71	35.3
19	More choice about which hospital you attend	0.70					71	40.3
18	More choice about which cancer specialists you see	0.68					71	39.5
30	Having access to professional counseling (e.g. psychologist, social worker, counselor, nurse specialist) if you, family, or friends need it	0.64					76	37.8
11	Uncertainty about the future		0.83				76	59
9	Fears about cancer spreading		0.82				73	59
10	Worry that the results of treatment are beyond your control		0.78				72	52
12	Learning to feel in control of your situation		0.75				77	52
14	Feelings about death and dying		0.72				68	40.8
13	Keeping a positive outlook		0.67				76	48.9
6	Anxiety		0.60	0.50			72	52
8	Feelings of sadness		0.59	0.51			75	52
7	Feeling down or depressed		0.58	0.54			74	50.2

(*Continued*)

Table 2. Continued.

Item number and the item		SCNS-SF34-Pt				SCNS-BR8-Pt		
		Health system, information, and patient support	Psychological	Physical and daily living	Sexuality	Breast Cancer	Item-to-total correlation	Proportion with unmet need (%)[a]
5	Not being able to do the things you used to do			0.80			64	54
4	Work around the home			0.78			59	53
2	Lack of energy/ tiredness			0.75			67	53
3	Feeling unwell a lot of the time			0.73			64	41.9
1	Pain			0.69			61	43.8
17	Concerns about the worries of those close to you		0.41	0.43			68	55
16	Changes in your sexual relationships				0.84		38	29.4
15	Changes in sexual feelings				0.84		44	31.9
31	To be given information about sexual relationships				0.63		52	26.5
40	Wanting help in coping with the shock of the amount of breast that was removed					0.88	82	24.9
39	Coping with changes in your self-image as a result of breast surgery					0.87	80	33.4
41	Dealing with your partner's reaction to your breasts					0.83	76	19.2
37	Wanting more information about finding a good breast prosthesis					0.81	74	17.5
36	Coping with problems with your breast prosthesis (e.g. when gardening, swimming, or playing sports)					0.81	73	19.1
38	Coping with lymphoedema					0.76	67	21
42	Coping with fears about the reactions of future partners to your breasts					0.73	64	18.9

(*Continued*)

Table 2. Continued.

Item number and the item	SCNS-SF34-Pt				SCNS-BR8-Pt		
	Health system, information, and patient support	Psychological	Physical and daily living	Sexuality	Breast Cancer	Item-to-total correlation	Proportion with unmet need (%)[a]
35 Coping with what having breast cancer might mean for your daughters or sisters					0.57	49	39.6
Variance	52.16	11.59	5.42	3.85	61.77		

[a]The proportion of patients that reported unmet needs was calculated according to those who rated 3 or more on the 5-point Likert scale.

and social functioning) demonstrated significant and negative correlations with all domains (rs ranging from −0.17 to −68, $p<.05$), except for the non-significant correlation between physical functioning and the sexuality needs domains. These results suggest that higher unmet needs are associated with lower functioning, as expected. A positive and significant correlation between the symptom scales of QLQC30 (fatigue, pain, and nausea/vomiting) and the SCNS-SF34-Pt domains (rs ranging from .13 to .68, $p<.05$) was found. The items dyspnea, appetite loss, and constipation correlated positively and significantly with all domains (rs ranging from .19 and .38, $p<.05$), except for the sexuality needs domain. Financial difficulties, insomnia, and diarrhea correlated positively and significantly with all domains (rs ranging from .19 to .50, $p<.05$). These results suggest that more symptoms are associated with higher perceived unmet care needs.

Regarding the QLQBR23, body image, and future perspective correlated significantly and negatively with the SCNS-BC8-Pt (rs=-0.40 and rs=-0.37, $p<.05$, respectively), suggesting that a positive body image and future perspective relate to lower BC-specific unmet needs. Systemic therapy side-effects, breast symptoms, and upset by hair loss items presented significant and positive correlations with the SCNS-BC8-Pt (rs ranging from .22 to .32, $p<.05$, see all results in Table 1), suggesting that these are associated with higher BC-specific unmet needs. No significant correlations were found between SCNS-BC8-Pt and sexual enjoyment and sexual functioning domains.

SCNS-SF34-Pt could distinguish needs across different subgroups as calculated per Mann-Whitney U tests. Younger patients (under <53 years old) revealed higher unmet needs (Mdn = 16.67) in the sexuality domain than older patients (Mdn= 4.17; $U=9952.5$, Z=-3.1, $p<.05$), but no differences were found in the physical and daily living domain ($U=12310.5$, Z=-0.38, $p=.70$). Regarding disease staging, patients with stage IV disease

(Mdn= 45) and patients that had undergone chemotherapy (Mdn = 45) revealed more unmet needs in the physical and daily living domain than their counterparts (Mdn = 35 and Mdn = 35, respectively), $U = 12310.5$, Z=-2.34 $p<.05$, and $U = 8719.5$, Z= −1.94 $p<.05$ respectively. BCS submitted to mastectomy (Mdn = 25) revealed higher scores on the SCNS-BC8-Pt than patients that performed a tumorectomy (Mdn = 9.38) $U = 4556$, Z= −3.87, $p<.01$. The Kruskal Wallis test showed that a higher ECOG performance status is associated with higher unmet needs in the psychological and physical and daily living domains ($\chi^2(3)= 9.01$, $p<.05$, χ^2 (3)= 12.08, $p<.05$, respectively). Further posthoc tests did not reveal group differences. Finally, the Kruskal-Wallis test did not show differences between the post-diagnostic period (0 to 2 years, 3 to 5 years, and 6 and more years) and the different dimensions of SCNS-SF34 ($\chi^2(2)= .631$, $p=.73$ for the psychological domain, χ^2 (2)= 1.58, $p=.45$ for the physical and daily living domain, $\chi^2(2)=1.455$, $p=.48$ for the sexuality domain, and χ^2 (2)= 4.42, $p=.11$ for the health system, information and patient support domain). No other significant results were found (c.f., Table 1). All the findings mentioned above suggest that SCNS-SF34-Pt and SCNS-BC8-Pt present good convergent and discriminant validities.

3.2.3. Reliability

SCNS-SF34-Pt revealed excellent internal consistency, with Cronbach's alpha of 0.97 for the total scale. Regarding SCNS-BR8-Pt, Cronbach's alpha was 0.91, revealing excellent internal consistency. Item-to-total score correlation coefficients exceeded 0.5, except for items 15 and 16 of the SCNS-SF34 and item 35 of the SCNS-BR8, ranging from .38 to .49 (c.f. Table 2).

3.3. BCS' unmet supportive care needs

The ten most frequently reported unmet care needs were related to the Psychological, and Physical and daily living domains (c.f., Table 3). The most reported psychological unmet care needs were "Fear of cancer spreading", "Uncertainty about the future", and "Concerns about the ability of those close to you to cope with caring for you". The most perceived physical and daily living unmet needs concerned "Not being able to do things as used to", "Lack of energy/tiredness", and doing "Work around the home" (c.f., Table 4).

4. Discussion

This study aimed to translate and test the psychometric properties of SCNS-SF34-Pt and SCNS-BR8-Pt among Portuguese BCS and characterize

their unmet supportive care needs, using these measures. Its findings provide robust evidence of the validity and reliability of SCNS-SF34-Pt and SCNS-BR8-Pt and document a high level of psychological, and physical and daily living unmet supportive care needs among Portuguese BCS.

Regarding psychometric properties, we assessed construct, convergent and discriminant validity, factor structure, internal consistency, and reliability. We applied a varimax rotation for the SCNS-SF34-Pt factor structure since it revealed a more straightforward and similar structure to the original version of the questionnaire.[11] Opposingly to the predicted five-factor structure,[11] the factor analysis produced a four-factor structure corresponding to four domains: psychological needs, physical and daily living needs, patient care and health system information needs, and sexuality needs. The loading patterns failed to differentiate between the patient care and support needs and the health system and information needs domains and were, therefore, combined in a single domain. No item was deleted in SCNS-SF34-Pt.

Other studies have proposed a similar four-factor structure for this questionnaire.[7,15,19] In Jansen and colleagues[15] and Au and colleagues[19] studies, item 19 was also deleted. Even though the proposed five-factor structure was found in other validation studies, minor adjustments were made to the original structure of Boyes and colleagues.[11] This suggests that it is unlikely to uphold one universal factor structure for the SCNS-SF34, as it may vary depending on age, gender, cancer diagnosis,[15,20] and cultural idiosyncrasies.[19] For example, authors found some items to have higher loadings in different dimensions (e.g.[12,16]) some items that did not load (e.g.[6,34]) and others that had high cross-loadings and had to be excluded (e.g.[18]) Moreover, some studies found correlated residuals that indicate redundancy among items in their confirmatory factor analysis.[8,20] Despite this, SCNS-SF34-Pt presented a structure coherent with theory, with few double-loading items, presenting good internal consistency (Cronbach's alpha of .97).

Table 3. Descriptive statistics and Cronbach's alpha for each SCNS-SF34-Pt domains and SCNS-Br8-Pt.

Domain	Number of items	Mdn (0–100)	IQR	Alpha Coefficient
SCNS-SF34-Pt	34			.97
Health system, information, and patient support needs	16	28.13	41	.97
Psychological needs	10	40.0	55	.95
Physical and daily living needs	5	40.0	50	.90
Sexuality needs	3	16.67	42	.82
SCNS-BR8-Pt	8	12.5	28	.91

Mdn: Median; IQR: Inter-quartile range.

Table 4. Participants' characteristics ($N = 336$).

Variables		
Education, n (%)		
	No education	2 (1)
	4–6 school years	109 (32)
	9 school years	66 (20)
	12 school years	78 (23)
	University degree	81 (24)
Marital status, n (%)		
	Single	38 (11)
	Married/de facto relationship	225 (67)
	Divorced/Separated	43 (13)
	Widowed	30 (9)
Employment status, n (%)		
	Unemployed	52 (16)
	Active	107 (32)
	Sick leave	94 (28)
	Retired	83 (25)
Surgery, n (%)		
	Not performed	68 (21)
	Lumpectomy	156 (49)
	Mastectomy	95 (29)
	Missing	17
Chemo/Radiotherapy, n (%)		
	Not performed	74 (23)
	Chemo and radiotherapy	120 (38)
	Only chemotherapy	87 (27)
	Only radiotherapy	38 (12)
	Missing	17
Hormone therapy, n (%)		
	Yes	172 (54)
	No	147 (46)
	Missing	17
Immunotherapy, n (%)		
	Yes	82 (25)
	No	237 (74)
	Missing	17
Disease staging, n (%)		
	0	12 (4)
	I	100 (32)
	II	79 (25)
	III	72 (23)
	IV	34 (11)
	Under determination	17 (5)
	Missing	22
ECOG performance status[a], n (%)		
	0	198 (80)
	1	42 (17)
	2	8 (3)
	3	1 (0)
	Missing	87

[a]Eastern Cooperative Oncology Group.

As expected, SCNS-BC8-Pt presented a single-factor structure with excellent internal consistency (Cronbach's alpha of .91). These findings align with the only validation study conducted for SCNS-BC8.[8] Both SCNS-BC8-Pt and SCNS-SF34-Pt correlated with other widely used instruments assessing HRQoL and psychological distress and could distinguish across different subgroups of patients presenting good discriminant and convergent validity. Overall, our findings reveal that the SCNS-SF34-Pt

and the SCNS-BC8-Pt pose reliable tools for assessing unmet needs in BCS for both clinical and research purposes and may play an essential role in identifying priorities for designing patient-centered supportive care services and interventions. Further research should evaluate whether assessing BCS' unmet supportive care needs using SCNS-SF34-Pt and the SCNS-BR8-Pt contribute to better patient outcomes.

Considering Portuguese BCS' unmet needs, the psychological, and the physical and daily living domains had the highest scores, followed by the health system and information domain and the sexuality domain. BC-specific unmet care needs, as assessed by SCNS-BC8-Pt, were also prevalent. Previous research reports similar results among BCS, revealing higher unmet needs in the psychological,[32,35] and in the physical and daily living domain.[33,36] Meanwhile, other studies show higher unmet needs in the health system and information domain,[32,35,36] suggesting that unmet care needs may vary between countries, cultures, and healthcare systems.

The most frequent psychological unmet care needs reported by Portuguese BCS were "Fear of cancer spreading", "Uncertainty about the future", and "Concerns about the ability of those close to you to cope with caring for you". Concerning physical and daily living needs, the most often reported were "not being able to do things you used to do", "lack of energy/tiredness", and doing "work around the home". These findings echo previous research conducted in Portugal[37] and other geographies,[12,18] and underline the importance of developing psychosocial interventions targeting psychological and physical and daily living concerns in BCS, particularly fear of cancer recurrence and fatigue. Previous systematic reviews have demonstrated significant effects of psychological interventions in reducing these concerns among BCS.[38,39] Still, further research adopting robust randomized-controlled designs and using validated unmet care needs measures, such as the SCNS-SF34-Pt and SCNS-BR8-Pt, are necessary.

4.1. Implications

The findings suggest that SCNS-SF34-Pt and SCNS-BR8-Pt are valid and reliable tools for assessing BCS' unmet care needs in clinical and research settings. Future studies should further test responsiveness of participants and test-retest reliability in order to apply these measures for designing and evaluating the impact of supportive care services and interventions targeting BCS. Findings on the characterization of BCS' unmet supportive care needs underline the need of developing tailored interventions to BCS. Priority should be given to interventions targeting fear of cancer recurrence and fatigue since these are highly prevalent among BCS.

4.2. Strengths and limitations

Despite the study's multicentric design, which allowed for recruiting a large sample of participants from different hospitals in Portugal, the sample's representativeness can be argued due to potential selection bias. Participants were recruited in clinical settings in northern Portugal and may not represent BCS living in other regions or long-term survivors who have been released from cancer centers. Still, the sample's demographic and background characteristics were similar to those published in previous national reports,[40] suggesting our findings present good odds of being generalizable to the Portuguese BCS population. Future studies should recruit a broader community sample. Furthermore, the cross-sectional design precluded test-retest reliability evaluation and responsiveness analysis. Future longitudinal studies could be useful in overcoming these limitations.

5. Conclusions

SCNS-SF34-Pt and SCNS-BR8-Pt are valid and reliable tools to assess the unmet care needs of Portuguese BCS, support the design of patient-centered supportive care services and interventions, and conduct comparative research. Nevertheless, further longitudinal research is necessary to test the measures responsiveness and test-retest reliability.

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Data availability statement

The data that support the findings of this study are available upon request.

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Appendix

SCNS-SF34-Pt and SCNS-BR8-Pt.