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Psychometric Properties of the Negative and Positive Affect Scales (NAPAS) in Patients with Breast Cancer

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ABSTRACT

Background: Breast cancer (BC) has a substantial impact on women's emotional well-being. This study examined the psychometric properties of the Negative and Positive Affect Scales (NAPAS) to provide validity evidence for their use in women with BC. **Method:** We evaluated validity evidence based on internal structure and on relationships with other variables (general health, life satisfaction, self-esteem and resilience), as well as item analysis, reliability of scale scores and measurement invariance across age groups ($N = 202$). **Results:** Confirmatory factor analysis supported a two-correlated factor structure, negative affect (NA) and positive affect (PA), $\chi^2(53) = 137.807$, CFI = .994, NNFI = .993, RMSEA = 0.089, SRMR = .067. This structure was invariant between age groups (≤ 50 vs. > 50 years). The homogeneity indices and the reliability of the scores were adequate. PA was positively associated with life satisfaction, self-esteem and resilience, and negatively associated with general health and its dimensions. NA showed the opposite pattern of associations. **Conclusions:** The findings support the use of the NAPAS as a measure of affective well-being in women with BC. Given its strong associations with mental health indicators, the scale may be useful in clinical settings for assessment and intervention planning.

Propiedades Psicométricas de las Escalas de Afecto Negativo y Positivo (NAPAS) en Pacientes con Cáncer de Mama

RESUMEN

Palabras clave:

Bienestar subjetivo

Afecto positivo

Afecto negativo

Estudio instrumental

Antecedentes: El cáncer de mama (CM) impacta sustancialmente en el bienestar emocional de las pacientes. Este estudio examinó las propiedades psicométricas de las Escalas de Afecto Negativo y Positivo (NAPAS) con el fin de aportar evidencia de validez para su uso en mujeres con CM. **Método:** Se presentan evidencias de validez basadas en la estructura interna y en las relaciones con otras variables (salud general, satisfacción vital, autoestima y resiliencia), análisis de ítems, fiabilidad de las puntuaciones e invariancia de medida entre grupos de edad ($N = 202$). **Resultados:** El análisis factorial confirmatorio respaldó una estructura de dos factores correlacionados, afecto negativo (AN) y afecto positivo (AP), $\chi^2(53) = 137.807$, CFI = .994, NNFI = .993, RMSEA = 0.089, SRMR = 0.067, que fue invariante entre los grupos de edad (≤ 50 y > 50 años). Los índices de homogeneidad y la fiabilidad de las puntuaciones fueron adecuados. El AP se asoció positivamente con satisfacción vital, autoestima y resiliencia, y negativamente con salud general; el AN mostró el patrón contrario. **Conclusiones:** Los hallazgos respaldan el uso de NAPAS como medida de bienestar afectivo en mujeres con CM, pudiendo ser útil en contextos clínicos para la evaluación y planificación de intervenciones.

Psychological research has shown that subjective well-being may be affected by a variety of adverse health conditions, including cancer (Alarcón et al., 2020; Cerezo et al., 2020; Cerezo, Soria-Reyes et al., 2022). Cancer is one of the main causes of morbidity and mortality worldwide, with the International Agency for Research on Cancer predicting that the number of cases will surpass 44 million globally by 2040. Although survival rates have improved, breast cancer still accounts for 15.5% of all cancer deaths among women (International Agency for Research on Cancer, 2023). As expected, a diagnosis of breast cancer can have a significant negative impact on a woman's psychological adjustment (Cardenal et al., 2012; Cerezo et al., 2020), including her subjective well-being (Alarcón et al., 2020; Cerezo, Soria-Reyes et al., 2022, 2024).

According to Diener et al. (1999), subjective well-being refers to a person's evaluation of their own life, and it encompasses two closely related aspects: cognitive and affective. The cognitive component corresponds to life satisfaction, to how the person views their life as a whole, and thus it reflects the gap between prior expectations and current life circumstances. The affective component refers to the emotions experienced in response to life events and it includes states of pleasure, referred to as *positive affect*, and displeasure, referred to as *negative affect* (Diener et al., 1999; Pavot & Diener, 2008). This affective component plays a central role in the emotional and physical evolution of breast cancer patients, and its assessment provides important information that is not captured by measures focused solely on anxiety or depression. Research has highlighted that both types of affects significantly influence prognosis and quality of life after treatment, as high negative affect is associated with greater psychological distress, more pain and fatigue, and poorer recovery, while positive affect acts as a protective factor linked to better adaptation and daily functioning (Rosenblom et al., 2025; Zhao et al., 2024). Given that positive and negative affect can be experienced simultaneously, achieving a balance in the management of both affective states is more important for subjective well-being than simply increasing positive affect or decreasing negative affect. In line with this perspective, having an adequate instrument to assess affect in patients with breast cancer is essential. Such tools can provide valuable information about patients' emotional experiences throughout the course of the disease and help guide interventions aimed at promoting emotional balance, thereby enhancing their capacity to cope with illness.

When assessing subjective well-being, the cognitive and affective components are generally considered separately, typically using Likert-type scales to capture respondents' intensity and frequency of experiences (Ferrando et al., 2025). With regard to the measurement of life satisfaction, a variety of tools are available, including the Harmony in Life Scale (HILS; Kjell et al., 2016), the Cantril Ladder (Cantril, 1965), the Riverside Life Satisfaction Scale (RLSS; Margolis et al., 2019), and the Satisfaction with Life Scale (SWLS; Diener et al., 1985). Of these, the SWLS is the most widely used and it has recently been validated in the breast cancer population (Cerezo, Soria-Reyes et al., 2022).

A number of different instruments may likewise be used to assess affective well-being, for example, the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), the 10-item International PANAS Short Form (I-PANAS-SF; Kercher, 1992; Thompson, 2007), the Scale of Positive and Negative Experience (SPANE; Diener et al., 2010) and the Negative and Positive Affect Scales

(NAPAS; Mroczek & Kolarz, 1998), for which a short form is also available (Joshani, 2017). The PANAS is one of the most widely used tools for assessing the affective well-being, and its psychometric properties have been analysed in several different populations worldwide (e.g., Davis et al., 2022; Joshani, 2016; López-Gómez et al., 2015; Medvedev et al., 2023). Despite its popularity, however, it has certain limitations. For instance, and as noted by Diener et al. (2010), some of its items use the words "active" and "strong", which do not necessarily refer to feelings or emotions. Similar ambiguities have been highlighted by López-Gómez et al. (2015) with respect to Spanish translations of the PANAS. Assessments across languages highlight that items developed in one language may not always function equivalently when translated or adapted to other languages (Badham et al., 2025), which is particularly relevant for instruments such as the PANAS, where some items may be interpreted differently across linguistic or cultural contexts. In this regard, the NAPAS appears to overcome these limitations, insofar as its items employ adjectives that refer unambiguously to emotional states. Cerezo, Soria-Reyes et al. (2022) found that the correlation between life satisfaction (measured using the SWLS) and affect (both positive and negative) was stronger when affect was assessed using the NAPAS rather than the PANAS, leading them to suggest that the descriptive language used in the former reflects more clearly the emotional state of women with breast cancer.

The NAPAS has also been widely used in both the general population (Gao et al., 2023; Haas et al., 2021; Hadžić & Kantar, 2021; Joshani, 2019; Sirgy et al., 2020) and specific groups, including older adults (González-Herero & Extremera, 2010), cancer survivors (Gallagher et al., 2019) and women with breast cancer (Alarcón et al., 2020; Cerezo, Álvarez-Olmo et al., 2022; Cerezo et al., 2014; Cerezo, Soria-Reyes et al., 2022, 2024). However, its psychometric properties have not been fully analysed, and only a few instrumental studies have been conducted with this instrument (Chan et al., 2020; Joshani, 2016, 2017; Joshani & Bakhshi, 2016).

The 12 items that comprise the NAPAS were first reported in a study conducted in the USA by Mroczek and Kolarz (1998), who followed Watson and Tellegen (1985) in conceptualising positive and negative affect separately. The items are distributed equally across the two dimensions (positive and negative affect), with each item being responded to using a 5-point Likert-type scale. The items consist of adjectives (or adjectival phrases) and the respondent is asked to indicate how often they have experienced each of these affective states during the past month. The results of subsequent studies involving confirmatory factor analysis support a structure of two related factors for the NAPAS (Chan et al., 2020; Joshani, 2017; Joshani & Bakhshi, 2016), and this structure has shown measurement invariance across gender (Joshani & Bakhshi, 2016) and age (Chan et al., 2020).

Regarding the reliability of scale scores, Mroczek and Kolarz (1998) reported Cronbach's alpha coefficients of .87 and .91 for the negative and positive affect scales, respectively. Similar results were obtained in later studies, with reliability coefficients above .80 for both scales (Chan et al., 2020; Joshani, 2016, 2017). In terms of validity evidence based on relationships with other variables, Mroczek and Kolarz (1998) analysed sociodemographic, personality and contextual variables using regression models. The results showed a different pattern of relationships for men and women. Among men, older age, being married and lower education were

associated with higher scores on positive affect. In the sample of women, being married was likewise associated with a higher level of positive affect, while the relationship with age followed a quadratic function. For both men and women, scores on positive affect were positively associated with extraversion, and negatively associated with neuroticism, occupational stress and relative stress. The opposite pattern of associations was observed for scores on negative affect. Very few studies have subsequently explored these relationships further. Joshanloo (2017) confirmed the association between scores on positive and negative affect and those on extraversion and neuroticism, and also reported direct relationships between positive affect and self-esteem and life satisfaction, and inverse relationships between negative affect and these two variables.

In addition to the fact that only a few studies have examined the properties of the NAPAS, those which have done present important limitations. For example, most studies only provide validity evidence based on internal structure, without exploring validity based on relationships with other variables (Chan et al., 2020; Joshanloo & Bakhshi, 2016). Furthermore, relationships are only established with life satisfaction (Joshanloo, 2016, 2017) or with neuroticism, extraversion and self-esteem (Joshanloo, 2017). Finally, there are no studies examining the psychometric properties of the NAPAS in the Spanish-speaking population, whether in general or specifically among cancer patients. The aim of the present study was therefore to conduct an in-depth analysis of the psychometric properties of the Spanish version of the NAPAS. More specifically, we sought to provide evidence supporting the use of NAPAS scores as a measure of the affective component of subjective well-being in a sample of Spanish women with breast cancer. This is important as the inferences that can be drawn from test scores are specific to a population and a context (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014). The information obtained through application of the instrument could contribute to the design of more tailored psychological interventions. To this end, and based on previous findings (Chan et al., 2020; Joshanloo, 2017; Joshanloo & Bakhshi, 2016), we first test the model of two related factors to obtain validity evidence based on internal structure. Next, we examine measurement invariance across age groups, the reliability of scale scores and item homogeneity indices. To provide validity evidence based on relationships with other variables, we calculate Pearson correlation coefficients between scores on the NAPAS and scores on measures of general health (somatic symptoms, anxiety and insomnia, social dysfunction and severe depression), life satisfaction, self-esteem and resilience. It is expected to find that scores on positive affect correlate positively with scores on life satisfaction, self-esteem and resilience, and negatively with scores on general health and its dimensions. Scores on negative affect are expected to show the opposite pattern of associations with these variables.

Method

Participants

The sample comprised 202 Spanish women diagnosed with breast cancer, aged between 31 and 74 years ($M = 51.56$, $SD = 9.66$). Of these, 72.3% resided in the autonomous community of Andalusia, while the remainder lived in other regions of Spain. They were

most commonly married or living with their partner (43.6%), had a university education (40.1%), and were currently employed outside the home (36.1%). Their age at the time of diagnosis ranged between 21 and 73 years ($M = 46.94$, $SD = 9.18$). In terms of their clinical status, approximately half of the sample (51.5%) was at stage II of the TNM (Tumour, Nodes, Metastasis) classification system.

The sample was recruited through various health clinics providing breast cancer care in Spain associated with the Spanish Federation of Breast Cancer Patients (FECMA). The inclusion criteria were: signing informed consent, having a confirmed diagnosis of breast cancer, and no diagnosis of any other cancer or of a mental health disorder. Table 1 shows the sample characteristics.

Table 1
Sample Characteristics

Variables	N	%
Age (years)		
≤ 50	97	48.0
> 50	105	52.0
Civil status		
Married/living with partner	88	43.6
Single	86	42.6
Divorced	20	9.9
Widowed	8	4.0
Educational level		
Primary	49	24.3
Secondary	72	35.6
University	81	40.1
Employment status		
Working at home	44	21.8
Working outside the home	73	36.1
Medical leave	34	16.8
Unemployed	17	8.4
Retired	34	16.8
Time since diagnosis (years)		
< 2	66	32.7
≥ 2	136	67.3
Cancer stage		
0	7	3.5
I	26	12.9
II	104	51.5
III	62	30.7
IV	3	1.5

Instruments

1) Sociodemographic questionnaire, created ad hoc for the present study and used to gather data on age, civil status, level of education, employment status and disease-related variables (time since diagnosis and cancer stage).

2) Negative and Positive Affect Scales (NAPAS; Mroczek & Kolarz, 1998), translated into Spanish by González-Herero and Extremera (2010). The NAPAS measures the affective component of subjective well-being by asking the respondent about emotions and feelings experienced during the past 30 days. It comprises 12 items, each rated using a 5-point Likert-type scale (1 = *none of the time*, 5 = *all of the time*) and distributed equally across the negative and positive affect scales. Higher scores indicate higher levels of the type of affect being measured.

3) General Health Questionnaire (GHQ-28; Goldberg & Hillier, 1979), in its Spanish version (Lobo et al., 1986). The GHQ-28 comprises 28 items that explore somatic symptoms, anxiety and insomnia, social dysfunction and severe depression (four subscales of 7 items each). All items are rated using a 4-point Likert-type scale (0 = *not at all*, 3 = *much more than usual*), and both a total score and subscale scores are calculated. Higher scores indicate poorer health status on the corresponding indicator. In the present sample, McDonald's ω were .87 for scores on the somatic symptoms subscale, .93 for anxiety and insomnia, .86 for social dysfunction, .92 for severe depression and .94 for the total score.

4) Satisfaction With Life Scale (SWLS; Diener et al., 1985), in its Spanish version (Vázquez et al., 2013), which has been validated in breast cancer patients (Cerezo, Soria-Reyes et al., 2022). The SWLS evaluates the cognitive component of subjective well-being (i.e. satisfaction with life as a whole) and comprises 5 items, each rated using a 7-point Likert-type scale (1 = *strongly disagree*, 7 = *strongly agree*). Higher scores reflect a higher level of life satisfaction. McDonald's ω of scale scores in the present sample was .84.

5) Self-Esteem Scale (SES; Rosenberg, 1965), in its Spanish version (Atienza et al., 2000). The SES comprises 10 items, each rated on a 4-point Likert-type scale (1 = *strongly disagree*, 4 = *strongly agree*). Higher scores indicate higher levels of self-esteem. McDonald's ω of scale scores in the present sample was .89.

6) 10-item version of the Connor-Davidson Resilience Scale (CD-RISC 10; Campbell-Sills & Stein, 2007), in its Spanish version (Notario-Pacheco et al., 2011), which has been validated in breast cancer patients (Alarcón et al., 2020). Each item of the CD-RISC-10 is rated using a 5-point Likert-type scale (0 = *not true at all*, 4 = *true nearly all the time*), and higher scores indicate higher levels of resilience. McDonald's ω of scale scores in the present sample was .85.

Procedure

The study was conducted in accordance with the ethical standards of the Declaration of Helsinki and it was approved by the Experimental Ethics Committee of the University of Malaga, Spain. Participants were recruited by convenience sampling through various health clinics providing care to women with breast cancer. Staff of these clinics contacted potential participants and invited them to take part in the research. Those who expressed an interest were then contacted via e-mail in order to inform them about the study objectives and procedures. It was made clear at this point that participation was entirely voluntary and that all data collected would remain anonymous and confidential and be used solely for research purposes. No incentives were offered for taking part. Subsequent to signing (electronically) an informed consent form, and with the aim of avoiding fatigue among respondents, the sample was divided into two groups, randomly split using the random function of the Excel program. Each group was then sent an e-mail with a link to the questionnaires they were required to complete. Both groups completed the sociodemographic questionnaire, and the following set of instruments: subsample 1 ($n = 102$) completed the NAPAS and the GHQ-28 (total of 40 items), while subsample 2 ($n = 100$) completed the NAPAS, SWLS, SES and CD-RISC 10 (total of 37 items). There were no missing data as the questionnaires could not be submitted unless all items had been responded to.

Data Analysis

We first calculated descriptive statistics (mean, standard deviation, skewness and kurtosis) for scores (both item and total) on the NAPAS and the other instruments administered. Then, in order to obtain validity evidence based on the internal structure of the NAPAS, we conducted a confirmatory factor analysis (CFA) using the *R* package *lavaan* (Rosseel, 2012), testing the structure with two related factors. The method used was diagonally weighted least squares (DWLS) estimation with the polychoric correlation matrix, which has been shown to provide accurate parameter estimates when dealing with categorical items (Li, 2016) and tends to perform better than unweighted least squares (ULS) when the sample size is small (Forero et al., 2009). Model fit was assessed by calculating the chi-square statistic (χ^2) and the following fit indices: comparative fit index (CFI), Bentler-Bonett non-normed fit index (NNFI), root mean square error of approximation (RMSEA) and the standardized root mean square residual (SRMR). The criteria used in interpreting these indices were as follows: CFI and NNFI values of .95 or higher indicated a good fit (Hu & Bentler, 1999); RMSEA values below .08 indicated a reasonable fit (Browne & Cudeck, 1992) and those below .06 a satisfactory fit (Hu & Bentler, 1999); SRMR values close to .08 indicated adequate fit (Hu & Bentler, 1999). Next, we analysed configural, metric and scalar invariance across two age groups (≤ 50 and > 50 years) after first determining the baseline model for both groups. This cut-off point was chosen because 50 years of age is the age at which women in Spain undergo population screening for early detection of breast cancer. Measurement invariance implies that an instrument measures the same construct in the same way across different groups, at various time points or under different conditions (Cieciuch & Davidov, 2015). Configural invariance requires that each construct is measured by the same items. Metric invariance is tested by constraining the factor loadings between the observed items and the latent variable to be equal across the compared groups. Finally, scalar invariance is tested by constraining both the factor loadings and the thresholds to be equal across groups (Chen, 2007; Cieciuch & Davidov, 2015). Here, we assessed invariance by comparing the CFI, RMSEA, and SRMR values of the more constrained models with those obtained in the less constrained model. Equality constraints are tenable when the decrease in the CFI is no more than .010, and when the increase in the RMSEA is not greater than .015; the increase in the SRMR should be no greater than .030 for metric invariance and no more than .010 for scalar invariance (Chen, 2007; Cheung & Rensvold, 2002).

Next, reliability of scale scores was assessed by calculating McDonald's ω coefficient, considering values of .70 or higher as satisfactory, in line with commonly used rule for acceptable reliability (Howitt & Cramer, 2020). Corrected item-total correlation coefficients (homogeneity index) for each of the NAPAS scales (negative and positive affect) were calculated, interpreting values above .30 as satisfactory (De Vaus, 2002). Finally, validity evidence based on relationships with other variables was obtained by calculating Pearson correlation coefficients between scores on the NAPAS and scores on the measures of general health, life satisfaction, self-esteem and resilience. In accordance with Cohen's (1988) criteria, coefficients were interpreted as follows: $|.10|$, low; $|.30|$, moderate; $|.50|$ or higher, strong correlation.

Results

Descriptive Analysis

Table 2 shows descriptive statistics for NAPAS items and its two scales, as well as for the other variables assessed.

Table 2
Descriptive Statistics for NAPAS Items, its two Scales and the Other Variables Assessed in the Study

Variables	<i>M</i>	<i>SD</i>	Skewness	Kurtosis
Negative Affect ^a	14.06	5.22	0.35	-0.37
1. So sad nothing could cheer you up	2.45	1.01	0.08	-0.83
2. Nervous	2.70	1.09	0.15	-0.73
3. Restless or fidgety	2.38	1.12	0.35	-0.80
4. Hopeless	2.13	1.07	0.50	-0.65
5. That everything was an effort	2.45	1.14	0.33	-0.68
6. Worthless	1.98	1.15	0.88	-0.31
Positive Affect ^a	19.05	4.91	-0.12	-0.48
1. Cheerful	3.45	0.84	-0.33	-0.17
2. In good spirits	3.48	0.96	-0.43	-0.39
3. Extremely happy	2.97	1.06	-0.07	-0.59
4. Calm and peaceful	2.94	0.97	-0.11	-0.54
5. Satisfied	3.23	0.99	-0.27	-0.24
6. Full of life	2.99	1.09	-0.17	-0.55
General Health (GHQ-28) ^b	27.91	14.86	0.60	-0.17
Somatic Symptoms ^b	8.18	4.85	0.39	-0.79
Anxiety and insomnia ^b	8.45	5.44	0.28	-0.72
Social dysfunction ^b	8.20	3.83	0.54	0.36
Severe Depression ^b	3.09	4.62	1.88	2.95
Life Satisfaction (SWLS) ^c	21.78	5.72	-0.44	-0.36
Self-esteem (SES) ^c	29.95	5.83	-0.25	-0.20
Resilience (CD-RISC 10) ^c	25.06	7.03	-0.61	0.46

Note. ^a *N* = 202; ^b *n*₁ = 102; ^c *n*₂ = 100.

Validity Evidence Based on Internal Structure

The results of the CFA (see Table 3) indicated that all fit indices were adequate according to the aforementioned cut-off criteria. This was the case for both the total sample and the two age-based subsamples, thus supporting the model with two related factors. The analysis also provided evidence of measurement invariance, insofar as comparison of the less constrained with the more constrained model showed a decrease of less than .010 in the CFI and increases of less than .015 in the RMSEA and less than .030 in the SRMR. Figure 1 shows the standardised parameter estimates for the total sample. All values are statistically significant.

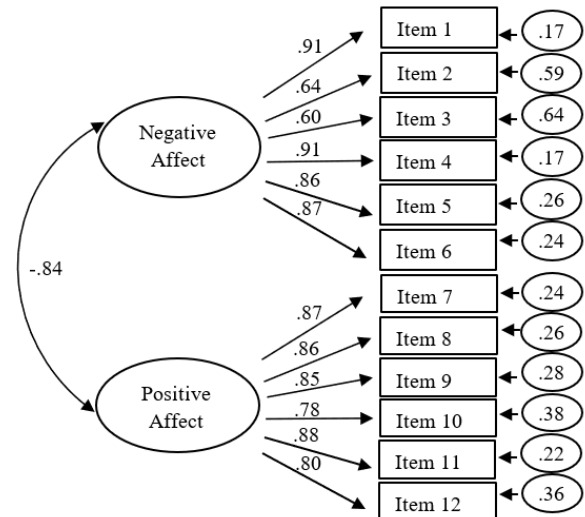
Table 3
Fit Indices for Confirmatory Factor Analysis and for Measurement Invariance

Model	χ^2	<i>df</i>	CFI	NNFI	SRMR	RMSEA	Δ CFI	Δ RMSEA	Δ SRMR
Total sample	137.807	53	.994	.993	.067	.089 [.071, .108]			
≤ 50 years	80.816	53	.996	.995	.076	.074 [.038, .105]			
> 50 years	77.571	53	.997	.996	.066	.067 [.030, .097]			
Configural invariance	158.387	106	.997	.996	.071	.070 [.046, .092]			
Metric invariance	195.109	116	.995	.994	.079	.083 [.062, .102]	<.010	<.015	<.030
Scalar invariance	202.563	150	.997	.997	.071	.059 [.036, .079]	<.010	<.015	<.010

Note. *N* = 202; ≤ 50 years, *n* = 97; > 50 years, *n* = 105; χ^2 = Chi-Square Statistic; *df* = Degrees of Freedom; CFI = Comparative Fit Index; NNFI = Non-Normed Fit Index; RMSEA = Root Mean Square Error of Approximation with 90% Confidence Interval; Δ CFI = CFI Less Constrained Model – CFI More Constrained Model; Δ RMSEA = RMSEA Less Constrained Model – RMSEA More Constrained Model; Δ SRMR = SRMR Less Constrained Model – SRMR More Constrained Model.

Figure 1

Factorial Loadings for the NAPAS Two-Factor Related Model With Standardized Factor Loadings for the Total Sample



Reliability of Scores and Item Analysis

Reliability of NAPAS scores was satisfactory, with ω values of .88 and .91 for the negative and positive affect scales, respectively. Table 4 shows corrected item-total correlations for each item of the NAPAS with respect to its corresponding scale. All correlations were above the established threshold of .30.

Table 4
Corrected Item-Total Correlations for Items of the NAPAS

Items	Item-Total Correlation
Factor 1: Negative Affect	
1. So sad nothing could cheer you up	.81
2. Nervous	.60
3. Restless or fidgety	.54
4. Hopeless	.79
5. That everything was an effort	.71
6. Worthless	.69
Factor 2: Positive Affect	
1. Cheerful	.79
2. In good spirits	.78
3. Extremely happy	.78
4. Calm and peaceful	.64
5. Satisfied	.80
6. Full of life	.70

Validity Evidence Based on Relationships With Other Variables

Table 5 shows correlations between scores on the NAPAS and scores on the criterion scales. Scores on the negative affect scale were strongly and negatively correlated with scores on life satisfaction, self-esteem and resilience, and strongly and positively correlated with scores on general health, anxiety and insomnia, social dysfunction and severe depression. A moderate positive correlation was observed between scores on the negative affect scale and the somatic symptoms dimension of general health.

For scores on the positive affect scale there was a strong positive correlation with scores on life satisfaction, self-esteem and resilience, and a strong negative correlation with scores on general health, anxiety and insomnia, social dysfunction and severe depression. A moderate negative correlation was observed between scores on positive affect and the somatic symptoms dimension of general health.

Table 5
Pearson Correlations Between NAPAS Scores and Scores on the Other Study Variables

Variables	Negative Affect	Positive Affect
General Health (GHQ-28) ^{1a}	.71***	-.62***
Somatic Symptoms	.35***	-.35**
Anxiety and Insomnia	.67***	-.52***
Social Dysfunction	.58***	-.55***
Severe Depression	.66***	-.55***
Life Satisfaction (SWLS) ²	-.57***	.66***
Self-Esteem (SES) ²	-.63***	.57***
Resilience (CD-RISC 10) ²	-.58***	.60***

Note. $n_1 = 102$; $n_2 = 100$; ** $p \leq .01$, *** $p \leq .001$

Discussion

The purpose of this study was to analyse the psychometric properties of the NAPAS and to provide evidence supporting its use as a tool for assessing the affective component of subjective well-being among women with breast cancer. To this end, we examined its internal structure, tested measurement invariance across two age groups, analysed the reliability of scale scores, conducted an item analysis and obtained validity evidence based on relationships with other variables (general health, life satisfaction, self-esteem and resilience).

Our findings supported the correlated two-factor model, consistent with prior research (Chan et al., 2020; Joshanloo, 2017; Joshanloo & Bakhshi, 2016), indicating that positive affect and negative affect are related but distinct dimensions of affective experience. The results align with the view that positive and negative affect represent distinct psychological constructs rather than opposite poles of a single bipolar continuum. This conceptualization is explicitly supported by Mroczek and Kolarz (1998), who noted that these dimensions must be treated separately and emphasized that the NAPAS was originally developed under this assumption, designed to measure positive and negative affect as separate, non-bipolar constructs. The correlated two-factor model allows for the derivation of separate positive and negative affect scores, facilitating their independent interpretation while accounting for their correlation. This structure yielded adequate fit indices for the two age groups considered (≤ 50 and > 50 years), and also showed measurement invariance across these groups. This means that the NAPAS items measure positive and negative affect in the same way in both these groups.

Item homogeneity indices were satisfactory for all items, indicating consistency among items when measuring the same construct. Reliability of scale scores was also satisfactory, with ω values of .88 and .91 for scores on the negative and positive affect scales, respectively, both above the established threshold of .70 and in line with coefficients reported previously (Chan et al., 2020; Joshanloo, 2016, 2017; Mroczek & Kolarz, 1998).

As for the relationship with other variables, the results obtained are again as expected. Scores on positive affect were strongly and positively correlated with scores on life satisfaction, self-esteem and resilience, and strongly and negatively correlated with scores on three of the four dimensions of general health; the negative correlation with the other general health factor (somatic symptoms) was of moderate magnitude. The opposite pattern of correlations was observed for scores on negative affect. Overall, these findings indicate that those women who experience more positive affective states (such as feeling cheerful, calm and full of life) also tend to be more satisfied with their life as a whole, to have a more positive view of themselves, are better able to deal with adversity and show better psychological adjustment in general; in turn, they are less likely to experience somatic symptoms, anxiety and insomnia, social dysfunction and severe depression. By contrast, those women who experience stronger negative emotions (such as feeling sad, anxious, restless, hopeless and worthless, or that everything is an effort) tend to show poorer psychological adjustment and general health.

The results obtained are consistent with those reported in the general population and add to existing validity evidence for the NAPAS. These studies likewise found that scores on positive affect were positively correlated with positive psychological variables such as life satisfaction, extraversion and self-esteem, while scores on negative affect were positively associated with indicators of emotional distress and instability, such as neuroticism, occupational stress and relative stress (Joshanloo, 2016, 2017; Mroczek & Kolarz, 1998). The relationship between positive and negative affect and the variables general health (including its different dimensions) and resilience has not previously been studied for the NAPAS, although the results obtained for these variables with the PANAS (Cerezo, Soria-Reyes et al., 2022; López-Gómez et al., 2015) are similar to those obtained here.

A noteworthy finding from the correlational analysis is that although all correlations were strong, scores on positive affect were more strongly correlated with life satisfaction than with the other variables measured. This suggests that it is these two constructs which make the most significant contribution to subjective well-being in the current sample. In a recent study that assessed affect using the SPANE, Jovanović and Joshanloo (2022) similarly found that positive affect had a strong effect on life satisfaction, leading them to conclude that people rely more on positive emotional experiences (rather than negative ones) when evaluating how satisfied they are with life. Here, we also found that the strongest correlation for scores on negative affect was with general health, which suggests that negative emotions are more closely linked to physical and psychological problems (Hu & Gruber, 2008). Future studies should aim to analyse in depth the relationship between life satisfaction and positive affect, as well as the possible causal relationship between negative affect and indicators of health problems.

Overall, our results suggest that the NAPAS has adequate psychometric properties for use in the breast cancer population.

Although this study does not provide evidence regarding its specific use in the clinical context, it is expected to be useful for the assessment of affective state, identifying states that should be improved with psychological intervention. Given its brevity, and insofar as scores on its two scales are associated with a set of variables that are indicative of general health and psychological adjustment, the NAPAS could be used as a tool to detect possible mental health problems, thus helping to identify those women for whom a more detailed assessment is indicated. One of the goals of intervention might be to help patients to achieve a balance between both emotional states, as achieving subjective well-being relies more on this emotional equilibrium than on simply increasing positive affect or reducing negative affect. Thus, interventions should aim to regulate emotions rather than eliminate negative ones, thereby enhancing patients' subjective well-being and strengthening their capacity to cope with the disease. In a meta-analysis, [van Agteren et al. \(2021\)](#) concluded that mindfulness-based and multi-component positive psychological interventions were the most effective in improving various indicators of subjective well-being in both clinical and non-clinical populations. They also found that singular positive psychological interventions, as well as interventions based on cognitive and behavioural therapy, acceptance and commitment therapy, and reminiscence were useful in this respect.

This study has a number of limitations that should be acknowledged. First, our use of a convenience sample may limit the generalizability of results. Second, the sample size does not allow the analysis of other more complex factor structures such as the bifactor model, which require large samples ([Kretzschmar & Gignac, 2019](#); [Zhang et al., 2021](#)). Future studies with larger sample sizes could evaluate whether the fit of the bifactor model is superior to that based on two related factors, and also use other criteria for the interpretation of fit indices, such as dynamic fit index cutoffs ([McNeish, 2023](#); [McNeish & Manapat, 2023](#)). Third, all the study variables were measured using self-report tools, and hence response bias might be an issue. Fourth, the cross-sectional nature of the study means that no causal relationships can be established between the different variables. Finally, although we report validity evidence based on relationships with several different variables, further research is needed to explore the potentially important role of other aspects of well-being (e.g., flourishing) and personality traits (e.g., introversion, neuroticism, etc.) in breast cancer.

Despite these limitations, the present study has two important strengths. First, it reports useful information about the use and interpretation of NAPAS scores among women with breast cancer, adding to existing validity and reliability evidence. In addition, it provides evidence regarding the relationship between the affective component of subjective well-being and a series of positive psychological variables, namely life satisfaction, self-esteem and resilience, an association that has barely been analysed in instrumental studies. Evidence is also provided about the relationship with variables inherent to psychological maladjustment and general health, namely somatic symptoms, anxiety and insomnia, social dysfunction and severe depression. The NAPAS can help professionals identify aspects of subjective well-being that need improvement to promote better adjustment and coping with the disease.

Author Contributions

M. Victoria Cerezo: Conceptualization, Methodology, Data Curation, Writing - Original Draft. **Lucía Sánchez-Espíldora:** Writing - Original Draft. **Rafael Alarcón:** Methodology, Writing - Original Draft, and Review. **Lorena M. Soria-Reyes:** Conceptualization, Data Curation, Writing - Original Draft and Review. **María J. Blanca:** Conceptualization, Methodology, Software, Data Curation, Writing - Original Draft, Supervision, Validation, Funding, Review and Editing.

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Declaration of Interests

The authors declare that there is no conflict of interest.

Data Availability Statement

The data is available at <https://doi.org/10.24310/riuma.38142>

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