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# Body awareness and mindfulness: Validation of the Spanish version of the Scale of Body Connection

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**Background:** To assess the psychometric properties and the factor structure of the Spanish version of the Scale of Body Connection (SBC) in a community population of meditators and non-meditators and to investigate the relationships among mindfulness, body awareness and body dissociation.

**Methods:** *Design.* Validation study. *Sampling.* An internet-based commercial system was used to recruit the sample. *Instruments.* In addition to the SBC, the Five Facet Mindfulness Questionnaire (FFMQ) and the Depression, Anxiety, and Stress Scale (DASS-21) were administered.

**Results:** A sample of 578 subjects responded to all of the items in the protocol. A total of 55.2% of respondents had some previous experience with meditation. A Scree plot showed a two-factor solution involving the Body Awareness (BA) and Body Dissociation (BD) subscales. This study differed from the original validation study in the lack of independence of the subscales; they were correlated in the present study ( $r = -.11$ ). Internal consistency for BA was  $\alpha = .86$ , and for BD, the  $\alpha$  was  $.62$ . Test-retest reliability was assessed in a subsample ( $N = 67$ ) and was  $r = .679$  for BA and  $r = .765$  for BD. Hierarchical multiple regression analyses showed that mindfulness practice and the FFMQ factors of Observing and Describing were positive predictors of BA. Describing, Acting with awareness and Non-judging negatively predicted BD, and Observing positively predicted BD.

**Conclusion:** The study confirms the adequacy of the psychometric properties of the Spanish version of the SBC for use in community samples. The relationship between SBC and mindfulness is discussed in light of previous research.

**Key words:** Body Connection Scale, Body awareness, Body dissociation, Validation, Spanish, Mindfulness

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## Conciencia corporal y mindfulness: Validación de la versión española de la escala de conexión corporal (SBC)

**Objetivos:** Evaluar las propiedades psicométricas y la estructura factorial de la versión española de la escala de conexión corporal (*Scale of Body Connection* (SBC)) en una población comunitaria de meditadores y no meditadores e investigar las relaciones entre atención, conciencia corporal y disociación corporal.

**Método:** *Diseño.* Estudio de validación. *Muestra.* Para reclutar a la muestra se utilizó un sistema comercial basado en Internet. *Instrumentos.* Además de la SBC, se administraron el Cuestionario de las Cinco Facetas del Mindfulness (*Five Facet Mindfulness Questionnaire* (FFMQ)) y la Escala de estrés, depresión y ansiedad (*Depression, Anxiety, and Stress Scale* (DASS-21)).

**Resultados:** Una muestra de 578 sujetos respondió a todos los ítems del protocolo. Un total de un 55,2% de los encuestados tenía alguna experiencia previa con la meditación. Un gráfico de sedimentación mostró una solución de dos factores que implicaban subescalas de conciencia corporal (CC) y disociación corporal (DC). Este estudio difiere del estudio de validación original en la falta de independencia de

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las subescalas, que se correlacionaban en el presente estudio ( $r=-0,11$ ). La consistencia interna para CC fue de  $\alpha: 0,86$  y para DC, el  $\alpha$  fue 0,62. La fiabilidad test-retest fue medida en una submuestra ( $N=67$ ) y fue  $r=0,679$  para CC y  $r=0,765$  para DC. Un análisis de regresión múltiple jerárquica mostró que la práctica de la atención plena y los factores FFMQ de Observar y Describir fueron predictores positivos de CC. Describir, Actuar con conciencia y no juzgar predijo negativamente DC, y Observar predijo positivamente DC.

**Conclusión:** El estudio confirma la adecuación de las propiedades psicométricas de la versión española de la SBC para su uso en muestras de población general. La relación entre SBC y la atención se analiza a la luz de la investigación anterior.

**Palabras clave:** Escala de conexión corporal, Conciencia corporal, Disociación corporal, Validación, Español, Mindfulness

## INTRODUCTION

Body awareness (BA) has been described as an emergent, interactive and dynamic process in which there is a perception of body states, processes and actions that originates in proprioceptive and interoceptive afferences and that can be observed by the individual<sup>1</sup>. This concept includes the perception of both physical sensations (e.g., body position, heart rate) and more complex sensations (e.g., pain, relaxation).

According to Price & Thompson<sup>2</sup>, BA refers to a conscious phenomenon of mind-body connection, and others have linked BA to inner conscious processes of self-knowledge and self-regulation<sup>3-7</sup>. An adequate BA implies an ability to perceive deep body stimuli and to be aware of inner body experience. It is also associated with the presence and acceptance of body experience rather than the avoidance of and dissociation from body experience<sup>8-10</sup>.

This construct has recently been studied in different health disciplines<sup>1</sup>. BA has traditionally been considered to be a trait associated with psychological disorders. For example, BA has been used with anxiety and panic disorders to describe a cognitive attitude focused on such physical symptoms as somatosensory magnification and rumination as well as on a belief in catastrophic consequences<sup>11</sup>. The number of perceived anxiogenic body sensations has accordingly been widely utilised as a marker for hypochondriasis, anxiety and somatisation<sup>11</sup> and has been associated with negative outcomes such as pain chronification<sup>12</sup>.

There is preliminary evidence that BA, defined as the ability to perceive subtle body signals<sup>13</sup>, can be useful in the

management of such chronic disorders as chronic lumbar pain<sup>1,14</sup>; heart failure<sup>13</sup>; chronic renal failure<sup>15</sup>; irritable bowel syndrome<sup>16</sup>; and chronic pain<sup>17</sup>.

The frequent use of Mindfulness-Based Therapies (MBT) has recently renewed interest in BA because BA is considered to be a mechanism that is relevant for the development of mindfulness<sup>18</sup>. In mindfulness practice, the focus of attention is placed on the inner experience of such physical sensations as respiration and of body sensations. Mindfulness interventions such as MBSR (mindfulness-based stress reduction) has been shown to produce an increase in the ability to perceive bodily sensations as assessed by self-reports<sup>18</sup> and by experimental methods<sup>19,20</sup>. However, the BA promoted by mindfulness is slightly different from traditional BA because it is based on a non-judgmental and accepting attitude. Watkins and Teasdale (2004) called this type of BA adaptive self-focus to differentiate it from psychopathological maladaptive self-focus<sup>21</sup>.

BA also includes the concept of body dissociation (BD), which is the opposite of mindfulness and is characterised by the avoidance of inner experience. BD includes normal daily experiences such as distraction and the separation of bodily experience and emotion. Examples include difficulty in identifying, describing and experiencing emotions. BD is considered a strategy to protect oneself from painful memories, thoughts and feelings. It is frequently used to cope with physical pain<sup>22</sup> and trauma<sup>23,24</sup>.

People with a history of trauma frequently exhibit phenomena associated with somatoform dissociation and depersonalisation. Somatoform dissociation has been described as the activation of somatic symptoms during a dissociative reaction or state. Research studies have confirmed that somatic dissociation symptoms define dissociative disorders<sup>25</sup> and are associated with trauma<sup>26,27</sup>.

Adequate and reliable self-reported instruments are required to test this psychological construct. Several questionnaires have been developed to evaluate BA, although most measure its negative aspects that are frequently associated with anxiety disorders. Other instruments that assess more complex aspects of BA have also been developed<sup>28</sup>. One of the most relevant questionnaires for assessing BA is the Scale of Body Connection (SBC)<sup>2</sup>, which was designed for research and intervention assessment with body therapies. Despite some preliminary reports that suggest this scale does not seem to have broad clinical or research use<sup>2</sup>, our main focus is its use as a variable associated with mindfulness practice<sup>29</sup>. The aims of the present study were to assess the psychometric properties and the factor structure of the Spanish version of the SBC in a community population of meditators and non-meditators and to investigate the relationship between mindfulness and BA/BD.

## METHOD

### Design. Validation study

#### *Translation of the SBC*

Permission to validate the SBC was obtained from the original authors<sup>2</sup>. The Spanish version of the scale had previously been developed by the original authors for research proposals and was provided to us for our research. However, we followed the usual adaptation protocol for validation studies. A new translation from the original instrument was performed by two native Spanish speakers who were aware of the objective of the scale. Two native English speakers who were not familiar with the SBC then performed a back-translation from Spanish to English. Discrepancies between the Spanish and English translators were resolved by agreement. The original and back-translated English versions were considered equivalent by a third native English speaker, and the Spanish version was judged to be an accurate translation of the original English version. The final Spanish version was determined to be equivalent to the Spanish version that had been provided by the original authors (see Appendix after References).

#### *Procedure*

An internet-based commercial system specifically designed to recruit survey samples was used to recruit our sample (www.surveymonkey.com; Portland, OR, USA). A link containing the assessment protocol was sent to a general population and to different Spanish associations that were organised around mindfulness and meditation. Prospective participants were invited to participate voluntarily in the study and were told that there would be no monetary compensation. The protocol was available from April 2012 to January 2013. A total of 917 people activated the link, 850 (92.6%) agreed to participate in the study, and 578 (63.03%) answered the complete protocol. This sample size was adequate for a validation study, based on a recommended ratio of 10 subjects to each test item<sup>30</sup>. The Ethical Committee of the regional health authority approved the study questionnaires and protocol. Participants signed a consent form indicating their willingness to participate.

#### *Instruments*

*Demographic and pain-related variables.* Each participant was asked to provide information about a number of demographic variables (gender, age, marital status, living arrangement, educational level) and meditation-related variables (including type of meditation, daily practice and years of meditation).

*Scale of Body Connection (SBC)*<sup>2</sup>. This was the scale whose outcomes would be used as the main variables in this study. The scale comprises 20 items scored with a Likert scale that ranges from 0 ("not at all") to 4 ("all the time"). It includes two independent factors ( $r=-.08$ ). The first factor is BA, which assesses conscious attention to sensory signals that indicate the state of the body (e.g., tension, nervousness, relaxation). The second factor, body dissociation (BD), measures the bodily connection to or separation from emotional experiences. Internal consistency for both factors was judged to be adequate based on a Cronbach's  $\alpha$  of .83 for BA (12 items) and .78 for BD (8 items). The SBC was developed using Confirmatory Factor Analysis (CFA) with structural equations in a sample of students (N=291). The  $\chi^2$  was significant ( $\chi^2=283.34$ , 166df.  $p<.001$ ), and the specific fit indices suggested an adequate fit between the model and the data (CFI=.96, GFI=.89, NFI=.90, SRMR=.07,  $\gamma$  RMSEA=.05 [confidence interval=.043-.065])<sup>2</sup>.

*Five Facet Mindfulness Questionnaire (FFMQ)*<sup>31</sup>: This questionnaire comprises 39 items that assess five facets or factors of mindfulness: observing (8 items), describing (8 items), acting with awareness (8 items), not judging inner experience (8 items) and not reacting to inner experience (7 items). Items are rated using a Likert scale that ranges from 1 ("never or very rarely true") to 5 ("very often or always true"). The Spanish version of this scale has been validated<sup>32</sup> and has been shown to have good internal consistency and reliability.

*Depression Anxiety Stress Scales (DASS-21)*<sup>33</sup>: This questionnaire purports to clearly differentiate anxiety from depression. Patients assess the frequency and severity of 21 negative emotional symptoms that they had experienced during the previous week, using a scale that ranges from 0 to 3. The questionnaire comprises three scales (depression, anxiety and stress) that each contain 7 items. The scales are moderately intercorrelated. The alpha reliability coefficients for the DASS-21 subscales have been examined in clinical and nonclinical samples and reported as .94 for DASS-D, .87 for DASS-A, and .91 for DASS-S<sup>33</sup>. We have used this questionnaire because it allows a brief assessment, and in only one questionnaire, three of the most important aspects of minor psychiatric disorders: depression, anxiety and stress. The validated Spanish version of this scale has been used in previous research<sup>34</sup>.

#### *Statistical analysis*

Confirmatory Factor Analysis (CFA)<sup>35</sup> was used to estimate the construct validity of the SBC. The initial model was based on the two-factor model taken from a previous exploratory factor analysis<sup>2</sup>. Each of the 20 observed variables was initially assumed to be associated with the factor variable that had the largest factor loading emerging

**Table 1** Means and standard deviations of the responses to the questionnaires used in the study

	Median	Mean	Standard deviation
BodyAwareness	43.0	42.6	6.9
BodyDissociation	16.0	16.1	4.1
BodyAwareness (post-test)	45.0	43.9	7.3
BodyDissociation (post-test)	15.0	15.6	3.6
DASS: Depression	18.0	20.9	8.2
DASS: Anxiety	18.0	19.6	6.8
DASS: Stress	24.0	25.5	7.7
Mindfulness: Observing	29.0	28.3	5.5
Mindfulness: Describing	31.0	30.1	5.6
Mindfulness: Act with awareness	27.0	26.8	5.5
Mindfulness: Non-judging the inner experience	30.0	29.4	6.7
Mindfulness: Non-reactivity to inner experience	24.0	23.3	4.6

from the varimax rotation of the exploratory factor analysis. A CFA using the maximum likelihood method was carried out as a first step. The structural model fit was improved after the results were evaluated, which allowed covariance estimation among the errors. Based on previous recommendations<sup>35</sup>, we evaluated the model fit by using  $\chi^2$ /degrees of freedom (df), a goodness-of-fit index (GFI) that should be  $\geq .80$ , an adjusted goodness of fit index (AGFI) that should be  $\geq .80$ , and a root-mean-square error of approximation (RMSEA) that should be  $< .09$ .

We assessed internal consistency with Cronbach's  $\alpha$  coefficient. Test-retest reliability was assessed, with a test-retest interval of one month using Pearson's  $r$  correlation coefficients. We examined the criterion validity of the SBC by calculating the correlations of its subscales with DASS and FFMQ subscales using Pearson's  $r$  correlation coefficient. Finally, a hierarchical multiple regression analysis was conducted to assess the contribution of mindfulness variables to BA and BD. All statistical analyses were performed with SPSS software, version 19 (SPSS Inc., Chicago, Illinois, USA), with the exception of analysis of the CFA, which was conducted with IBM SPSS Amos 20.0. (IBM, New York, USA).

## RESULTS

### Characteristics of the sample

Of the final sample of 578 participants, 61.9% were women, with a mean age of 41.3 years ( $SD=11.2$ ); 90.5% were Spanish, 7.1% were from South America, and 2.4% were from other European countries. A total of 50.2% of respondents had a university degree, 28.4% were university

postgraduates, and 21.4% had no more than a high school education. A total of 55.2% of respondents had previous experience with meditation, 47.5% had focused on mindfulness, 35% had practised Zen meditation, and 17.5% had practised Yoga, Tibetan meditation or other types of meditation. Within the meditation subsample, 20.6% meditated on a daily basis, 16.1% practiced 3 or 4 times a week, 6.4% practiced once a week, 2.9% practiced approximately 2 or 3 times a month, and 9.2% practiced occasionally. There were no differences in the main sociodemographic variables (gender, age and education) between meditation and nonmeditation subsamples. Table 1 summarises the means and standard deviations of the responses to our questionnaires.

### Face validity

A sample ( $N=10$ ) of psychologists and psychiatrists with expertise in mindfulness and body awareness and a randomly recruited sample of healthy people from the community ( $N=20$ ) were asked whether they thought the SBC could adequately measure their BA. All of the experts and 18 of the 20 of the community sample participants agreed that the questionnaire seemed to accurately measure the main aspects of BA (perception of deep body stimuli and awareness of inner body experiences) and BD (the avoidance of inner experiences) concepts.

### Factor analysis

A Scree plot (Figure 1) was used to assess the factors of the scale. The slope became stable at the third factor, with eigenvalues of 5.7 for the first factor, 2.5 for the second

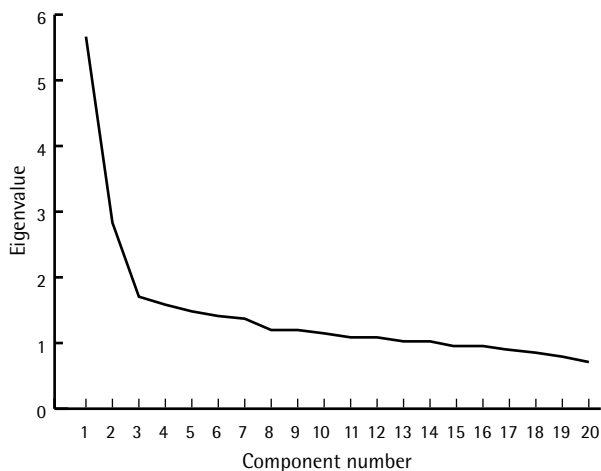


Figure 1 | Scree Plot

factor and 1.3 for the third factor, allowing us to conclude that a two-factor solution is adequate and consistent with the results of the original English validation. Figure 2 shows the results of the CFA with consideration of the correlations among the errors. Factorial loads of items 3 and 16 were low, despite significant fit indices. The elimination of these items does not improve the fit index, so it seems sensible to include them and decide in future analyses whether they should be eliminated. In the analysis of the constructs of many items, some of them having low factorial loads is not unusual<sup>26</sup>. Additionally, the overall fit indexes are satisfactory.

Regarding item 7, when factorial loads are negative, it usually indicates that it is necessary to revert the scoring of that item. However, the inter-item correlation is positive although not intense ( $r=.16$ ). In these cases, it is recommended that the correlation be confirmed in other samples, and if the correlation is still positive, that the item be modified.

Our Spanish version differed from the original English version by having a significant correlation between the BA and BD subscales ( $r=-.11$ ). When our sample was analysed separately by gender, women ( $r=-.172$ ) but not men ( $r=-.042$ ) showed a significant correlation between the subscales, as can be seen in Table 2. The percentages of male and female participants were not specified for the original English version.

### Internal consistency

The internal consistency of the SCB was calculated for both subscales. The BA subscale showed an  $\alpha$  coefficient of .86. The item-scale correlation for item 3 was low ( $r=.171$ ). Internal consistency increased to .87 when item 3 was

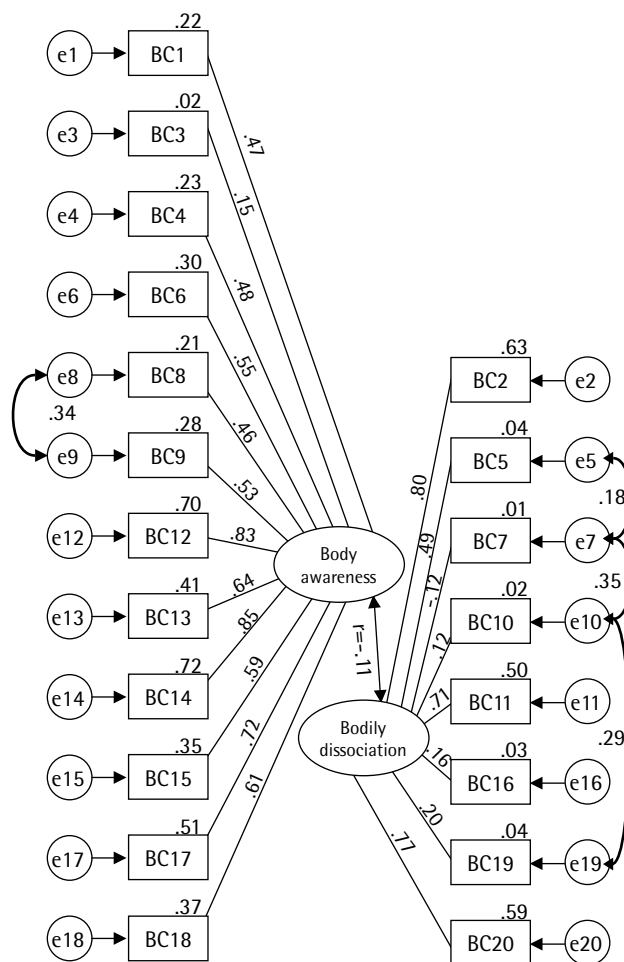


Figure 2 | Loadings of the pattern matrix of the CFA

omitted, but this did not significantly improve the psychometric properties of the scale. The BD subscale showed an  $\alpha$  coefficient of .62. The item-scale correlation for item 16 was low ( $r=.093$ ), but  $\alpha$  increased to only .65 when item 16 was eliminated.

### Test-retest reliability

Subsamples are habitually used for test-retest reliability since smaller sample sizes are needed. Consequently, we randomly selected a subsample of 67 patients from the total sample studied. Test-retest reliability was assessed using Pearson's  $r$  correlation. The coefficient for the BA subscale was .679 ( $p=.001$ ), and the coefficient for the BD subscale was .765; ( $p=.001$ ). A coefficient equal to or greater than .70 is considered to indicate adequate to excellent test-retest reliability.

**Table 2** Means and standard deviations in FFMQ by gender

	Men		Women		Student's T
	Mean	Standard deviation	Mean	Standard deviation	
Mindfulness: Observe	28.6	5.7	28.2	5.4	t= 0.883; p= 0.377
Mindfulness: Describe	30.0	5.1	30.1	5.9	t= -0.277; p= 0.782
Mindfulness: Awareness	27.3	5.4	26.5	5.5	t= 1.841; p= 0.066
Mindfulness: Nonjudge	30.5	6.4	28.6	6.8	t= 3.375; p= 0.001
Mindfulness: Nonreact	24.5	4.3	22.6	4.6	t= 5.008; p= 0.001

**Table 3** Convergent validity in the whole sample

	Body Awareness	Body Dissociation
DASS: Depression	-0.222**	0.424**
DASS: Anxiety	-0.070	0.444**
DASS: Stress	-0.166**	0.421**
Mindfulness: Observing	0.659**	-0.079
Mindfulness: Describing	0.333**	-0.542**
Mindfulness: Act with awareness	0.239**	-0.350**
Mindfulness: Non-judging the inner experience	0.228**	-0.382**
Mindfulness: Non-reactivity to inner experience	0.423**	-0.255**

\*\*p=0.001

**Table 4** Convergent validity in meditator and non-meditator subsamples

	Meditators		Non-meditators	
	Body Awareness	Body Dissociation	Body Awareness	Body Dissociation
DASS: Depression	-0.298**	0.388**	-0.079	0.477**
DASS: Anxiety	-0.149**	0.408**	0.086	0.498**
DASS: Stress	-0.257**	0.444**	0.028	0.420**
Mindfulness: Observing	0.579**	-0.138*	0.602**	-0.047
Mindfulness: Describing	0.367**	-0.526**	0.270**	-0.573**
Mindfulness: Act with awareness	0.367**	-0.298**	0.051	-0.421**
Mindfulness: Non-judging the inner experience	0.283**	-0.370**	0.037	-0.424**
Mindfulness: Non-reactivity to inner experience	0.446**	-0.274**	0.200*	-0.294**

\*p=0.01; \*\*p=0.001

Table 5		Predictors of Body Awareness					
		Body Awareness			Body Dissociation		
	Predictors	Change in R <sup>2</sup>	R2 Total	Beta	Change in R <sup>2</sup>	R2 Total	Beta
Step 1	Frequency of mindfulness practice (weekly)	0.168	0.16	-0.410**	0.000	0.000	-0.012ns
Step 2	FFMQ	0.277	0.44		0.363	0.363	
	Observe			0.530**			0.117**
	Describe			0.141**			-0.464**
	Act aware			-0.008 ns			-0.142**
	Non judge			0.056 ns			-0.191**
	Non reactivity			-0.018 ns			0.007 ns

\*\* $p < 0.01$ . Ns: Nonsignificant. .

### Correlations between the SBC scale and other measures

Table 3 summarises the correlations for the entire sample between the SBC subscale and the DASS subscales (depression, anxiety and stress) on the one hand and the FFMQ subscale on the other. Table 4 summarises the same correlations for the meditator and non-meditator subsamples. All of these correlations were significant except that between the BA subscale and DASS (depression) and that between Body Dissociation and Mindfulness ("observing"). The many other significant correlations suggest the high convergent validity of the SBC. There were differences between the meditator and non-meditator subsamples. The BA subscale correlated with all 5 factors of FFMQ and with depression, anxiety and stress in meditators, but BA did not correlate with depression, anxiety and stress or with the factors of awareness and non-judging of the FFMQ in non-meditators.

### Hierarchical multiple regression analysis

Hierarchical regression is used to evaluate the relationship between a set of independent variables and the dependent variable, controlling for or taking into account the impact of a different set of independent variables on the dependent variable. In our sample, there are different patterns of practice, from non-practice to daily meditation practice. It has been reported that mindfulness practice modifies levels of mindfulness traits<sup>37</sup>, and furthermore, that mindfulness practice modifies body awareness<sup>38</sup>. We decided to put mindfulness practice in the first step of the hierarchical regression analysis because it was expected to have an effect on the mindfulness trait and not on BA and

BD. Table 5 shows that both mindfulness practice and two FFMQ factors (observing and describing) were predictors of BA. Mindfulness practice did not predict this factor for BD, but the FFMQ factors of Describing, Acting with awareness and Non-judging the inner experience were negative predictors of BD, and Observing was a positive predictor.

### DISCUSSION

The present study was performed to assess the psychometric properties of the SBC scale in an internet-recruited sample from the community and to investigate the relationship between mindfulness and body awareness. The SBC dissociation scale is thought to be useful for monitoring the effectiveness of psychological treatment in chronic pain disorders, trauma and anxiety disorders. The awareness scale could also be useful for assessing the efficacy of mindfulness-based therapies on the development of mindfulness because BA seems to be a relevant variable for this construct. The importance of this study is that the SBC, which is the most utilized questionnaire for assessing BA and BD, was used in Spanish-speaking countries for the first time. The relevance of this instrument to the medical field would surely be different for both subscales: BD could be used in trauma (sexual and physical abuse, physical assault) [2], while BA could be used as a tool to monitor the effectiveness of mind-body therapies, including mindfulness practice.

Factor analysis yielded a two-factor solution, which is the same factor structure that emerged in the validation of the original English version of the questionnaire. However, the BA and BD factors were not independent in our sample. We found an overall correlation between these subscales, but the correlation was significant only for women when

gender samples were analysed separately, perhaps because our female participants' had significantly higher mindfulness levels. In summary, except for the correlation between the BD and BA subscales, the remaining psychometric properties are quite similar between the original English version and the validated Spanish version.

Hierarchical multiple regression analyses showed that, as predicted, mindfulness practice predicts BA and shows no relationship with BD. Most of the FFMQ factors also showed the predicted relationships with SBC. Describing is a predictor of BA. Describing, Acting with awareness and Non-judging of inner experience are negative predictors of BD, and Observing is a positive predictor of both BA and BD. A previous analysis of the FFMQ showed that the Observing factor is different in meditators and non-meditators<sup>31</sup>. Observing is the factor most likely to increase with mindfulness practice and is most responsive to training<sup>31</sup>. The predictive value of Observing for BD might have been due to our sample having had a large subsample of meditators. The same sampling bias might explain the correlation in our study between the SBC BA and BD scales, which was not found with the original English version. However, this is only a speculative hypothesis that should be examined in future studies. The predictive effect of Observing on both BA and BD might explain why long-term meditators experience increased BA as a factor of mindfulness and sometimes suffer from dissociative experiences as an unexpected effect of their practice<sup>39</sup>.

Other psychometric properties of the SBC were shown to be adequate. It showed high internal consistency and high test-retest reliability. The construct validity of the SBC was supported by significant correlations of both the BA and BD subscales with most DASS and FFMQ subscales. The predicted relationship between mindfulness and awareness of the body was found. Significant positive correlations were found between all 5 FFMQ factors and BA in the meditator sample, but significant correlations were found between only 3 FFMQ factors and BA in the non-meditator sample. Awareness of the body (BA) was negatively related to anxiety, depression and stress symptoms only in the meditator sample. This relationship between BA and mood and emotional symptoms is similar to the reported relationship between mindfulness and anxiety, depression and stress measurements<sup>31,37</sup>. BA was related to the construct of mindfulness among subjects with meditation experience and was associated with less anxiety, depression and stress in only the meditator sample. This relation is most likely due to the focus on the awareness of the body (i.e., body scan, mindful movements) in several common meditation practices. Although high BA was beneficial in terms of mood and emotion for those with meditation experience and was neither beneficial nor detrimental for non-meditators, it would be interesting to test how BA relates to mood and emotion in samples with clinical anxiety. Subjects diagnosed

to have panic emotions or hypochondriasis are characterised by being focused on bodily sensations and might present a relationship that is opposite to that in our meditator sample. BD was negatively related to mindfulness in both meditators and non-meditators and was positively related to anxiety, depression and stress. The relationship between dissociation and such clinical symptoms as anxiety and depression has frequently been reported<sup>40,41</sup>. Our research has made it possible for the SBC to be used to assess BA and BD reliably in Spanish-speaking populations.

Our study has some limitations. For instance, we recruited the sample from the internet. Although the sample was large (more than 500 participants) and other studies have confirmed the reliability of data obtained from the internet<sup>42</sup>, these samples are most likely more heterogeneous and biased than those obtained by truly random sampling; internet sampling also has a high non-response rate and involves self-selection. Another source of bias is that the responses to the questionnaires were self-reported and may have conformed to socially desirable expectations. Subjects used personal recall to report their frequency of meditation, and we used only the present frequency of practice, which does not reflect the possible cumulative effects of many years of practice. We also did not analyse the effects of the type of meditation, and different types of meditation are focused variously on the body, breath, imagery or mantras. Further research is needed to study the effects of different meditation techniques on BA and BD. Finally, as this is a cross-sectional study, causality cannot be analysed. So we do not know whether meditation improves BA or, alternatively, high BA influences the practice of meditation.

## CONCLUSION

Our study confirms the adequacy of the psychometric properties of the Spanish version of the SBC in community samples. Longitudinal studies with different clinical and nonclinical samples, with and without mindfulness experience, are needed to elucidate this psychological construct.

## ABBREVIATIONS

SBC: Scale of Body Connection. FFMQ: Five Facet Mindfulness Questionnaire. DASS-21: Depression, Anxiety, and Stress Scale. BA: Body Awareness. BD: Body dissociation. MBT: Mindfulness-Based Therapies. CFA: Confirmatory Factor Analysis. CFI: Comparative fit index (CFI). SRMR: Standardised root-mean-square residual. RMSEA: Root-mean-square error of approximation.

## CONFLICT OF INTEREST

The authors declare that they have no competing interests.



## AUTHORS' CONTRIBUTION

AC, JR and JG-C conceptualised the study. LCQB and MTGR carried out the statistical analysis and all authors participated in critically revising for important intellectual. All authors read and approved the final manuscript.

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APENDIX		Spanish version of the Body Connection Scale				
		En absoluto o nunca 0	Un poco 1	Algunas veces 2	La mayoría del tiempo 3	Todo el tiempo 4
1.	Si hay una tensión en mi cuerpo, estoy consciente de esa tensión					
2.	Me cuesta identificar mis emociones					
3.	Noto que no respiro profundamente cuando estoy nervioso(a)					
4.	Me doy cuenta de mi respuesta emocional a las caricias					
5.	Siento que mi cuerpo se congela, como si estuviera adormecido durante situaciones incómodas					
6.	Me doy cuenta cómo mi cuerpo cambia cuando estoy enojado(a)					
7.	Siento como si observara mi cuerpo desde afuera					
8.	Estoy consciente de la sensación interna durante la actividad sexual					
9.	Puedo sentir mi respiración pasar a través de mi cuerpo cuando exhalo profundamente					
10.	Me siento separado(a) de mi cuerpo					
11.	Me cuesta expresar ciertas emociones					
12.	Tomo en cuenta las señales de mi cuerpo para entender cómo me siento					
13.	Cuando me siento físicamente incómodo(a), pienso qué puede haber causado esa incomodidad					
14.	Escucho la información de mi cuerpo acerca de mi estado emocional					
15.	Cuando estoy estresado(a), noto el estrés en mi cuerpo					
16.	Me distraigo de los sentimientos de incomodidad física					
17.	Cuando estoy tenso(a), presto atención a dónde se concentra la tensión en mi cuerpo					
18.	Noto que mi cuerpo se siente diferente después de una experiencia apacible					
19.	Me siento separado(a) de mi cuerpo durante la actividad sexual					
20.	Me cuesta prestar atención a mis emociones					