Empirical Articles

The Psychometric Properties of the Scale of Body Connection (SBC) in a Portuguese Sample

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Abstract

Aim: The Scale of Body Connection (SBC) is a measure aimed at examining body awareness (BA), specifically awareness of inner body sensations, and bodily dissociation (BD), or the sense of separation from the body. The aim of this study was to develop a Portuguese version of the SBC.

Method: An online survey was completed by 445 women, with an average age of 30.47 (SD = 9.87), and 464 men, with an average age of 37.54 (SD = 12.34). Ages ranged from 18 to 72 years old.

Results: Results showed Cronbach's alpha coefficients of .86 for BA and .73 for BD. Confirmatory factor analysis revealed reasonable goodness-of-fit indices (χ2/df = 9.0; GFI = .84; NFI = .72; CFI = .74; PGFI = .68; PCFI = .66; RMSEA = .09).

Conclusion: Positive correlations between the SBC factor scores and the scores of the General Body Dissatisfaction Scale and the Cognitive Distraction Scale confirmed convergent validity. These findings support the reliability and validity of the SBC in a Portuguese sample.

Keywords: interoceptive awareness, scale validation, sexual activity

The Scale of Body Connection (SBC) was developed to address the need for a self-report measure to examine psychophysical awareness in mind-body research, specifically awareness of inner body sensations (i.e., interoceptive awareness), and to examine bodily dissociation, or the sense of separation from the body (Price & Thompson, 2007). The scale includes two distinct subscales: Body Awareness (BA) and Bodily Dissociation (BD). BA is a multidimensional construct that includes the awareness of inner body sensations – or interoceptive awareness (Mehling et al., 2009). Interoceptive awareness involves the sensory processes of receiving, accessing and appraising internal bodily signals (Cameron, 2001; Craig, 2002, 2009). In contrast, BD is the sense of separation from the body, may involve avoidance of physical and emotional sensations, and is the antithesis of awareness of and presence in the body. The SBC assesses interoceptive awareness and

bodily dissociation, two critical sensory awareness processes underlying the mind-body connection, and are thus integral to mind-body therapies.

Because many body sensations are inherently valenced to motivate behaviour, such as pleasure from a slow caress or aversion to a sudden pain, these ingrained, affective components to interoceptive signals may serve to guide decision making (van Rijsbergen et al., 2013), and may have originally evolved to help organisms maintain homeostasis (Berntson, Bechara, Damasio, Tranel, & Cacioppo, 2007; Bhagwagar, Cowen, Goodwin, & Harmer, 2004; Di Simplicio, Norbury, & Harmer, 2012; Paulus, 2007). Thus, understanding how interoceptive processes influence representations of the self in the world and self-regulation may lead to improved therapeutic or treatment models (Pollatos, Kirsch, & Schandry, 2005). Likewise, theoretical models in experimental and body psychotherapy purport that body awareness and association are thought to be integral to overall well-being (Aposhyan, 1999, 2004; Hanna, 1993) and important for an integrated sense-of-self (Greenberg & Van Balen, 1998; Seth, 2013).

Improving interoception has been suggested as the mechanism involved in mind-body and mindfulness-based treatment approaches for multiple conditions, e.g., chronic pain, depression, PTSD, substance use (Farb et al., 2015). Interoception may also underlie sexual dysfunction (Carvalheira & Vilarinho, 2013), as research has shown a relationship between sexual dysfunction and cognitive distraction (Barlow, 1986; Cuntim & Nobre, 2011; Dove & Wiederman, 2000; Masters & Johnson, 1970; Nobre & Pinto-Gouveia, 2008; Wiederman, 2001; Wiegel, Scepkowski, & Barlow, 2007). An interdisciplinary model of interoception highlights the potential role of body awareness and embodiment in health and well-being, and the importance of multiple strategies for measurement of interoception including self-report measures (Farb et al., 2015).

The Current Study

The primary aim of this study was to assess the reliability and construct validity of the Portuguese version of the Scale of Body Connection in a community sample. In addition, gender differences and discriminant validity through trauma exposure were explored. Scales of body dissatisfaction and cognitive distraction were also explored for convergent validity because these constructs are clinically linked to body awareness and bodily dissociation but have not been researched in the study of sexuality (Brotto, Basson, Carlson, & Zhu, 2013; Brotto, Chivers, Millman, & Albert, 2016; Brotto & Heiman, 2007; Carvalheira, Godinho, & Costa, 2017; Carvalheira & Vilarinho, 2013; Maltz, 2012).

Method

Participants

The sample consisted of 909 individuals, 464 men (51.0%) and 445 women (49.0%). Ages ranged from 18 to 72 years old ($M = 34.08$, $SD = 11.74$), with men ($M = 37.54$, $SD = 12.34$) being significantly older than women ($M = 30.47$, $SD = 9.87$), $t(879) = 9.56$, $p < .05$. The majority were heterosexual (88.4%), had a college degree or higher (70.4%), and were in a committed relationship (80.8%). For those who were in a relationship, the mean duration of relationships was 7.84 years ($SD = 8.87$), significantly longer for men ($M = 9.44$, $SD = 9.94$) when compared to women ($M = 6.07$, $SD = 7.12$), $t(733) = 5.48$, $p < .05$.

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Procedure

An anonymous web survey was used to collect responses. The questionnaire was hosted on a commercial website dedicated to online surveying (SurveyMonkey). Participants were recruited through passive advertisement on a news portal, involving a banner inviting subjects to participate in a study focused on sexual health. The survey was open for recruitment from September to December 2014. After accessing the first page that briefly described the study, participants viewed a consent form. Upon agreeing to participate, participants could access the questionnaire. No compensation was provided. All procedures were approved by the Ethics Committee of ISPA - University Institute in Lisbon, Portugal.

Measures

Socio-Demographic Variables

Socio-demographic variables included age, residential area by district, educational level, relationship status, and length of the relationship.

Body Connection

Scale of Body Connection (SBC) is a 20-item scale involving two distinct dimensions: Body Awareness (BA), i.e., conscious attention to sensory cues indicating bodily state, such as tension, nervousness, peacefulness; and Bodily Dissociation (BD), i.e., separation from the body, including emotional disconnection such as the difficulty to attend to emotions (Price & Thompson, 2007). Rated on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*all the time*), 12 items measure body awareness and 8 items measure bodily dissociation. The original scale demonstrated a Cronbach's alpha coefficient of .83 for body awareness and .78 for bodily dissociation. The SBC was translated to Portuguese by two independent translators. These versions were separately back-translated by a native English speaker. The final version was pilot-tested with a sample of 15 college students, and it was found comprehensible and equivalent to the English version. There was no disagreement between versions.

General Body Dissatisfaction

General Body Dissatisfaction (GBD) is a four-item subscale of the Body Attitudes Test (Probst, Vandereycken, Van Coppenolle, & Vanderlinden, 1995). The GBD is a general measure of body dissatisfaction based on the frequency of negative perceptions, behaviours, and feelings about one's own body. The four items of GBD are: "When I compare myself with my peers' bodies, I'm dissatisfied with my own", "I'm inclined to hide my body (for example by loose clothing)", "When I look at myself in the mirror, I'm dissatisfied with my own body" and "I envy others for their physical appearance". Participants rate their answers on a 6-point Likert scale, ranging from 1 (*never*) to 6 (*always*). Total scores range from 4 to 24 points, with higher scores indicating higher levels of body dissatisfaction. This instrument has had good reliability and validity in another Portuguese study, with a Cronbach's alpha coefficient of .82 (Pascoal, Narciso, & Pereira, 2012). The measure also revealed good psychometric properties in the current study, with a Cronbach's alpha coefficient of .86 in the male sample and .91 in the female sample.

Cognitive Distraction

Cognitive Distraction Scale (CDS) is a 20-item scale with two subscales: Appearance-based Cognitive Distraction and Performance-based Cognitive Distraction (Dove & Wiederman, 2000). Participants rate their

answers on a 6-point Likert scale, ranging from 1 (*never*) to 6 (*always*), with higher scores indicating higher cognitive distraction. In the current study, the measure showed good psychometric properties. The Cronbach's alpha for Appearance-based Cognitive Distraction was .93 in the female sample and .87 in the male sample. The Cronbach's alpha for Performance-based Cognitive Distraction was .90 in the female sample and .84 in the male sample.

Trauma History

A single item question was used to assess trauma history. The item was: "Since the age of 13, has someone forced you to have sex against your will, using force, threat or any kind of pressure?" Three response options were presented: 0 (*never*), 1 (*it happened once*), and 2 (*it happened more than once*).

Data Analysis

The psychometric sensitivity was evaluated with measures of central tendency, dispersion and shape. According to Marôco (2011), an adequate level of psychometric sensitivity occurs when the absolute value of skewness is smaller than three and the absolute value of kurtosis is smaller than seven, indicating a near normal distribution of the responses. Furthermore, internal consistency was analysed using the Cronbach's alpha coefficient based on standardised items. A result above .70 and around .80 is considered by Field (2009) a good value.

Confirmatory factor analysis was conducted with AMOS, using the maximum likelihood estimation method. Following recommendations by Marôco (2010), standardised factor loadings are considered adequate if they exceed .50. Model fit was also assessed by examining the following fit indices: Chi-Square by degrees of freedom ratio (χ^2/df), Goodness-of-Fit Index (GFI), Parsimony Goodness-of-Fit Index (PGFI), Normed Fit Index (NFI), Comparative Fit Index (CFI), Parsimony Comparative Fit Index (PCFI) and Root Mean Square Error of Approximation (RMSEA). The model is considered a good fit if a consensus of measures meets or exceeds acceptance levels. According to Marôco (2010), these acceptance levels are: $\chi^2/df \leq 2.0$; GFI, NFI, CFI $\geq$ .90; PGFI, PCFI $\geq$ .60; RMSEA $\leq$ .05.

Convergent validity was assessed by examining Pearson's correlations between the SBC factor scores and the scores on other measures, given a reference *p*-value of .01. Correlations were interpreted following Field (2009), who considers an absolute value of .10 as representing a small effect, .30 a medium effect and .50 a large effect.

Finally, when comparing groups, *t*-tests were used to determine if the average scores were significantly different, given a *p*-value of .05. Effect sizes were calculated using Cohen's *d*. According to Cohen (1988), effect sizes are considered small if they reach a minimum absolute value of .20, medium if they reach an absolute value of .50 and large if their absolute value exceeds .80.

Results

Descriptive Statistics and Internal Consistency

Descriptive statistics and internal consistency data for each subscale are presented in Table 1. There was no missing data in the sample. Adequate values of skewness and kurtosis were found in all items, indicating a near normal distribution of the responses.

Table 1

Descriptive Statistics and Internal Consistency

Sub-scales and Items		*M*	*SD*	*Sk*	*Ku*	$r_{\text{i-t}}$	α
Body Awareness		3.29	.75	-.24	-.22	–	.86
it1	Aware of tension	3.68	1.08	-.58	-.59	.51	
it3	Breathing becomes shallow when nervous	3.09	1.26	-.09	-1.17	.45	
it4	Notice emotional response to caring touch	3.96	1.01	-.94	.34	.47	
it6	Notice how body changes when angry	3.18	1.38	-.16	-1.29	.53	
it8	Aware internal sensations during sexual activity	3.80	1.09	-.86	.13	.46	
it9	Can feel breath travel	2.88	1.33	.05	-1.24	.50	
it12	Take cues from body	2.51	1.24	.42	-.88	.57	
it13	Think about what might cause discomfort	3.29	1.19	-.31	-.81	.51	
it14	Listen from body about emotional state	2.63	1.26	.27	-1.04	.63	
it15	Notice stress in body	3.63	1.14	-.64	-.45	.60	
it17	Note where tension is in body	3.04	1.17	-.04	-.92	.56	
it18	Notice feeling different after peaceful experience	3.73	1.21	-.84	-.22	.57	
Bodily Dissociation		1.95	.59	1.01	1.79	–	.73
it2	Difficult to identify emotions	2.12	.93	.92	.63	.43	
it5	Body feels frozen, numb	2.16	1.18	.86	-.26	.26	
it7	Looking at body from outside	1.68	.96	1.51	1.80	.47	
it10	Feel separated from body	1.46	.85	2.10	4.26	.55	
it11	Hard to express emotions	2.56	1.10	.29	-.77	.46	
it16	Distract self from feelings of discomfort	1.98	1.05	.98	.24	.19	
it19	Feel separated from body during sexual activity	1.63	1.03	1.73	2.26	.46	
it20	Difficult to pay attention to emotions	2.00	1.01	.99	.53	.49	

Note. M = Mean; *SD* = Standard deviation; *Sk* = Skewness; *Ku* = Kurtosis; $r_{\text{i-t}}$ = Corrected item-total correlation; α = Cronbach's alpha.

Internal consistency analysis revealed a Cronbach's alpha coefficient of .86 for the Body Awareness (BA) subscale and .73 for the Bodily Dissociation (BD) subscale, which were considered very good and good, respectively. Item-total correlations in the first subscale were equal to .45 or above. The lowest values occurred in the second subscale, with Item 16 presenting the lowest correlation ($r_{\text{i-t}}$ = .19). However, deleting this item, or any other item, would not significantly improve the Cronbach's alpha coefficient. Similarly, deleting items in the BA subscale would not improve reliability.

Construct Validity

Results from the confirmatory factor analysis first involved the analysis of the two-factor model according to its original structure. The standardised regression weights are indicated in Table 2. Factor loadings ranged

from .15 (Item 16) to .84 (Item 10), with an average standardised regression weight of .53. Item 16 had the lowest factor loading and other items (2, 3, 4, 5, 8, 11, 20) were also below the recommended value of .50. However, having lower factor loadings is not unusual when analysing many items in a construct (Hoyle, 2000).

Table 2

Confirmatory Factor Analysis: Factor Loadings for the Original 2-Factor Model

Factor, Item	Standardized Regression Weights
Body Awareness	
it1	.53
it3	.47
it4	.49
it6	.57
it8	.48
it9	.53
it12	.66
it13	.57
it14	.72
it15	.65
it17	.62
it18	.62
Bodily Dissociation	
it2	.33
it5	.31
it7	.69
it10	.84
it11	.36
it16	.15
it19	.68
it20	.39

A positive, yet small, correlation was found between the two subscales (r = .24). The strength and direction of the result was confirmed by the Pearson's correlation coefficient and the correlation turned out to be also significant ($p < .01$).

In terms of model fit, results of the general fit indices are indicated in Table 3. The original model resulted in a reasonable fit. After taking in consideration the modification indices and the low factor loading of Item 16, the CFA was ran without Item 16. However, the model was not significantly improved with the removal of Item 16 and the Cronbach's alpha coefficient of the BD subscale remained .73.

Table 3

General Fit Indices and Reliability Values for the CFA Models

Indexes	CFA Models		
	Global	Men	Women
CMIN/DF	9.00	5.02	4.97
GFI	.84	.83	.83
PGFI	.68	.67	.67
NFI	.72	.69	.69
CFI	.74	.73	.73
PNFI	.64	.61	.61
PCFI	.66	.65	.65
RMSEA	.09[a]	.09[b]	.10[c]
α BA	.86	.85	.84
α BD	.73	.70	.75

[a]90% CI [.090,.098]. [b]90% CI [.087,.099]. [c]90% CI [.088,.101].

Gender Differences

The performance of the SBC model and its scoring by gender was also examined. Among men, a significant and positive correlation between the subscales still existed (r = .15), whereas the female subsample showed no significant correlation (r = .02). In terms of model fit, only slight disparities were found between these two subsamples (see Table 3). However, in terms of the BA subscale scoring, differences between men (M = 3.09, SD = .74) and women (M = 3.49, SD = .70) were statistically significant, $t(907)$ = -8.27, p < .05. Women (M = 2.01, SD = .63) also scored higher than men (M = 1.89, SD = .55) in the BD subscale and these differences were also significant, $t(907)$ = -3.00, p < .05. The effect size was medium in BA (d = -.56) and small in BD (d = -.20).

Convergent Validity

To evaluate the SBC in relationship to other related measures, Pearson's correlations between the SBC factor scores and the scores of the General Body Dissatisfaction Scale and the Cognitive Distraction Scale were examined. This is the first time that the relationship between these scales has been examined. The BA subscale was significantly correlated with the Appearance-based Distraction subscale of CDS (r = .12, p < .01). The BD subscale was significantly correlated with GBD (r = .38, p < .01) and with the Appearance-based subscale (r = .45, p < .01) and the Performance-based Distraction subscales of CDS, (r = .31, p < .01) and r = .31, respectively, all p (two-tailed) < .01.

Discriminant Validity

As further testing of scale validity, body awareness and bodily dissociation scores were also examined by grouping participants on the basis of the reported trauma exposure. A total of 76 participants (8.4%), 62 women and 14 men, reported some kind of sexual abuse after the age of 13. Differences in the BA scores between individuals who reported sexual trauma (M = 3.59, SD = .60) and individuals who did not (M = 3.26, SD = .75) were significant, $t(98)$ = -4.53, p < .05, and a near medium effect size (d = -.49) was present. Differences in the

BD scores between the first (*M* = 2.26, *SD* = .74) and the second group (*M* = 1.92, *SD* = .56) were also significant, $t(83)$ = -3.85, $p < .05$ and medium in size (d = -.52).

Discussion

The confirmatory factor analysis results indicated reasonable goodness-of-fit indices, evidencing construct validity of the Portuguese version of the Scale of Body Connection. Adequate internal consistency values were in accordance with the results found by Price and Thompson (2007). Item-total correlations were also generally consistent, except for Item 16. A similar problem with Item 16 was identified in a prior validation study of a Spanish translation with a community sample (cf. Quezada-Berumen, González-Ramírez, Cebolla, Soler, & Garcia-Campayo, 2014). However, we would not recommend, for now, the elimination of this item. Further research is needed to determine whether its inclusion in future versions of the scale may depend on the sample (e.g., clinical *vs.* community). As in the Spanish validation study by Quezada-Berumen et al. (2014), we also found that the body awareness (BA) and bodily dissociation (BD) subscales were correlated, although this correlation was small and only in the male sample. The original version and test of the SBC showed no correlation between the BA and BD subscales. However, while the constructs of BA and BD are distinct, both scales include items specific to emotional awareness, and thus a small correction between the subscales is not surprising.

The results indicated differences in the SBC factor scores by gender, with women scoring higher in body awareness and bodily dissociation when compared to men. This is the first time that a validation study has found significant differences in SBC scores by gender. Only with more published SBC research will be possible to know if this finding is consistent across studies or specific to this particular sample.

This study also provided an opportunity to examine the SBC in relationship to constructs of body dissatisfaction and cognitive distraction during sexual interaction. There was a weak relationship between body dissatisfaction and body awareness although, as expected, the correlation with bodily dissociation was moderate and significant. Likewise, cognitive distraction during sexual activity was not strongly associated with body awareness, although it was moderately and significantly correlated with bodily dissociation on both the appearance and performance-based subscales. The results revealed that individuals who presented higher levels of bodily dissociation (i.e., emotional disconnection and separation from the body) reported higher levels of cognitive distraction during sexual activity. These findings suggest that bodily dissociation may be critical to explain cognitive distraction during sexual activity, and consequently an important factor to consider for the aetiology and treatment of male and female sexual problems. This is a question for future research.

Finally, SBC was able to discriminate between those with and those without a history of sexual trauma. This result was similar to the initial SBC study by Price and Thompson (2007), which examined BA and BD responses in relationship to a wide variety of possible trauma indicators, and found higher BD to be associated with sexual trauma. The present findings showed higher BA and BD to be associated with trauma. As this study included only one trauma indicator (i.e., sexual trauma as an adult), it is impossible to examine SBC responses in relationship to a more nuanced understanding of possible trauma exposures or mental health indicators. Additional trauma markers might have facilitated the interpretation of the above finding.

There are some study limitations to consider. Participants were recruited over the internet and presented a significant disparity in age, even considering the fairly homogeneity in terms of education and marital status. Additionally, data on ethnicity were not collected. Thus, results may differ if a more diverse and representative community sample is considered.

Conclusion

The present study demonstrated acceptable psychometric properties of the Portuguese version of the Scale of Body Connection. In addition, results revealed positive correlations between body connection, body dissatisfaction and cognitive distraction during sexual activity. These findings suggest possible future research directions, particularly towards the role of body awareness and bodily dissociation in sexual response and dysfunction, trauma, and eating disorders. We therefore consider SBC a relevant tool to expand the study of body awareness and bodily dissociation, contributing to improved theoretical and therapeutic models in the fields of clinical psychology and sexology.

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