European Journal of Human Movement, 2017: **38**, 105-117

SPANISH VALIDATION OF BRUMS IN SPORTING AND NON-SPORTING POPULATIONS

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ABSTRACT

Introduction: The Brunel Mood Scale (BRUMS) is one of the most widely used tools for measuring mood states in sporting contexts. The BRUMS has also proven to be useful for evaluating the impact of exercise on emotions and moods. Specifically, positive mood appears to improve performance by helping athletes to maximally use their skills and promoting a more enjoyable practice. Although BRUMS has been translated to some languages, to our knowledge, a validated Spanish version does not yet exist. Materials and Method: The main purpose, therefore, of this study was to determine the factorial validity of the BRUMS for use with a Spanish sample. A total of 757 (aged between18-65 years) women and men completed the BRUMS. As secondary aims we evaluated overall mood state differences between (a) sporting and non-sporting populations and (b) male and female participants. Results and Discussion: The results showed that a Spanish version of BRUMS is a valuable measure of mood states in adult Spanish-speakers. However, results suggest that a shorter version better fits the six factors. Interestingly we found significant differences between both non-sporting/sporting groups and between women/men. Results are discussed in relation to previous works on sport performance and gender differences.
Key words: sport, mood, emotion, gender

VALIDACIÓN ESPAÑOLA DEL CUESTIONARIO DE ESTADOS DE ANIMO (BRUMS) EN DEPORTISTAS Y NO DEPORTISTAS

RESUMEN

Introducción: El cuestionario de estados de ánimo (BRUMS) es una de las herramientas más utilizadas para medir estados de ánimo en contextos deportivos. El BRUMS también ha demostrado ser útil para evaluar el impacto del ejercicio sobre las emociones y los estados de ánimo. Concretamente, el estado de ánimo positivo parece mejorar el rendimiento al ayudar a los atletas a utilizar al máximo sus habilidades y promover una práctica más agradable. Aunque el BRUMS ha sido traducido a algunos idiomas, aún no existe una versión validada en español. Materiales y Método: El principal objetivo de este estudio fue determinar la validez factorial del BRUMS para su uso en una muestra española. Un total de 757 participantes (entre 18-65 años) completaron el BRUMS. Como objetivos secundarios evaluamos las diferencias de estado de ánimo general entre (a) deportistas y no deportistas y (b) mujeres y hombres. Resultados y Discusión: Los resultados mostraron que una versión en español del BRUMS es una valiosa medida de estados de ánimo en adultos hispano hablantes. Sin embargo, los resultados sugieren que una versión más corta se ajusta mejor a los seis factores. Además, encontramos diferencias significativas entre los grupos de no deportistas y deportistas y en entre mujeres y hombres. Los resultados se discuten en relación a trabajos previos sobre rendimiento deportivo y diferencias de género.
Palabras clave: deporte, estado de ánimo, emoción, género

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Submitted: 15/04/2017 *Accepted:* 17/06/2017

INTRODUCTION

In the last decade, assessment of emotions and mood states has been a growing field of study (Laborde, Dosseville, & Allen, 2016). Emotion has been defined as a brief complex state of the organism caused by specific stimuli and characterized by an excitation or disturbance that predisposes to an organized response, while mood refers to an emotional state of longer duration and lower intensity (Lane et al., 2010). Mood has been reported to have an important influence in people's cognitive evaluation, feelings and action (Amado-Boccara, Donnet, & Olié, 1993).

Exercise or sport practice are strongly associated with mood changes (*e.g.* Brellenthin, Crombie, Hillard, & Koltyn, 2017; Lattari et al., 2014; Reichert et al., 2017). Monitoring those changes is of great interest for research purposes, medical prescription or physical interventions. In this regard, mood and emotion are usually assessed by self-report scales, being the Profile of Mood States (POMS) (McNair, Lorr, & Droppleman, 1971) one of the most extensively used scale to assess a range of emotional states (Berger & Motl, 2000; Leunes & Burger, 2000). Later, a derivative version focused on sport was developed by Terry et al. (Terry, Lane, & Fogarty, 2003; Terry, Lane, Lane, & Keohane, 1999), known as the Brunel Mood Scale (BRUMS). BRUMS assesses six mood states or emotions: anger, confusion, depression, fatigue, tension, and vigour. These six states are evaluated with 24 test items, and its factorial and concurrent validity for sport was validated with a sample of 2549 adolescent and adult athletes. Since its validation, BRUMS has been used widely in sports-related investigations to assess mood state or the impact of exercise on mood (e.g., Lastella, Roach, Halson, Martin, West, & Sargent, 2015). While BRUMS has been translated into some languages beyond English (*e.g.* French, Hungarian, Italian, Malaysian) (Hashim, Zulkifli, & Yusof Hanafi, 2010; Lane, Soos, & Leibinger, 2007; Rouveix, Duclos, Gouarne, Beauvieux, & Filaire, 2006), to our knowledge, a Spanish validated version has yet to be developed.

Validated questionnaires to assess mood (*e.g.* POMS and BRUMS) have also allowed researchers to examine differences in mood state between men and women. For instance, South African women have shown more negative mood states than men (Van Wijk, 2011), and gender differences in mood state (measured by POMS) after acute aerobic exercise have shown larger improvements in mood among women (McDowell, Campbell, & Herring, 2016; Rocheleau, Webster, Bryan, & Frazier, 2004). However, it is unclear whether these differences were due to the baseline mood states of men and women or their baseline differences in sporting practice. Additional findings regarding sex-related differences in mood states are rather mixed. Morgan and colleagues (e.g., Morgan, 1974; Morgan & Johnson, 1978) demonstrated that sporting people score higher score on vigour, and lower on anger, confusion, depression,

fatigue, and tension compared to non-sporting individuals. This study therefore aimed to validate the BRUMS in a Spanish sporting context and to further clarify whether sport and/or gender are related to different mood states.

METHOD

Participants

A total of 757 native Spanish speaking participants (275 men, aged *M* = 32.67, *SD* = 8.44; 482 women, aged *M* = 33.15, *SD* = 10.52) took part in this study[1]. Sporting participants (522 – 69.2% of the total sample; 242 men) were recruited through university advertisements (sports science students) at a Spanish university and from various sports clubs. Twenty-seven (3.6%; 9 men) reported doing sport 1 day/week; 95 (12.5%; 36 men) indicated doing sport 2 days/week; 141 (18.6%; 59 men), reported 3 days of sport practice per week; 95 (12.5%; 48 men) 4 days a week, 84 (11.1%; 45 men) 5 days per week, 41 (5.4%; 24 men) 6 days per week, and finally 39 participants (5.2%; 21 men) reported practising sport 7 days per week. They were actively involved in a variety of sports (including soccer, running, hiking/trekking, swimming, dance-sport, cycling, tennis, fitness, martial arts, handball, basketball, yoga, rugby, skiing, skating, hockey, sailing, horse riding, and climbing). The non-sporting participants (235 – 30.8% of the total sample; 33 men-202 women) were recruited through social media. They each reported sports practicing no days per week. All participants gave online informed consent before participating. The study was approved by the ethics committee of the University of Lausanne.

Measures

The 24-item Brunel Mood Scale (Terry et al., 1999; 2003) is grouped into six dimensions that indicate different moods: anger, confusion, depression, fatigue, tension and vigour. Examples follow: (a) anger items included "annoyed" and "bad-tempered," (b) confusion items included "uncertain" and "mixed-up," (c) depression items included "unhappy" and "downhearted," (d) fatigue items included "sleepy" and "tired, (e) "tension items included "Anxious" and "worried," and (f) vigour items included "active" and "alert". Participants indicated to what extent they were experiencing those feelings at that moment (mood state), on a scale from 1 (*not at all*) to 5 (*very much*).

[1] Thirty participants were eliminated from the final analysis due to having an age younger than 18 or older than 65. Two participants were eliminated because they did not sign the consent form.

Translation procedure

To translate the BRUMS from English to Spanish, we followed the technique of forward-backward translation in which two experts competent in both English and Spanish and with a psychology or a sports science background translated the English version of the BRUMS to Spanish after which two independent experts verified the accuracy of this process by translating the scale back to English. A proficient bi-lingual further compared the original document with the back-translation.

Procedure

Participants completed an informed consent process and then an online survey, including the BRUMS items (they were required to report how they were feeling at the moment of completing the survey) and some demographic questions including, age, gender, regular practice of sport, type of sport, average number of days per week on which they practised sport, and total hours of practice per week.

Data analysis

We conducted a confirmatory factor analysis (CFA) using the Structural Equation Module (SEM) in STATA version 13 by constraining the items to load on their respective factors (6 dimensions-moods: anger, confusion, depression, fatigue, tension and vigour). Consistent with theoretical predictions and following previous research, the six latent factors were free to inter-correlate and the variance of the factor was fixed at 1. The choice of cut-off criteria followed Hu & Bentler (1999), favouring the two-index strategy for assessing model fit, namely the Comparative Fit Index (CFI) and the Root Mean Square Error of Approximation (RMSEA, Steiger & Lind, 1980) as previously reported in Lan, Lane, Roy & Hanin's (2012) validation of the scale for a sample of Malaysian athletes. For the CFI, values should approach .95. RMSEA values of .05 and lower indicate a good fit, while values up to .08 indicate an acceptable fit (Browne & Cudeck, 1993). However, there have been many critics of the use of Good of Fitness indexes (including CFI), particularly when the model is complex (Hayduk, Cummings, Boadu, Pazderka-Robinson, & Boulianne, 2007). In this case, the use of Swain model fit correction was suggested (Swain, 1975; Antonakis & Bastardoz, 2013) together with modification indexes (Herzog, Boomsma, & Reinecke, 2007). These strategies select the indexes on the basis of sample size, model complexity, and the distributional properties of the data.

RESULTS

The target model with the 24 items (6 factors) did not show a good fit with the data. CFA results indicated a significant $X^2 = 1019.62$, $df = 237$, $p < .001$. The CFI was .91, which was below the .95 criterion for acceptability. The RMSEA value was .06 and therefore within the limits for acceptability. The X^2 lack of fit is not surprising because very small differences between expected and observed correlations in large samples can lead to a significant χ^2 (Cole, 1987). Similarly, CFI is not the best indicator, given that RMSEA is lower than .168, therefore resulting in lower CFI values (Kenny, Kaniskan, & McCoach, 2014). We performed the Swain correction, $X^2 = 1011$, $df = 237$, $p < .001$, and we estimated a trimmed model using only items that loaded highly on their respective factors. Modification indices reported that some factors were loading on the incorrect latent variables ("preocupado-worried", "nervioso-nervous", "destrozado-miserable", "animado-lively" and "alerta-alert"). We ran the model again, excluding those variables (Table 1). The CFA results still indicated a significant $X^2 = 340.92$, $df = 237$, $p < .001$.The CFI was .97, hence above the .95 criterion for acceptability. The RMSEA value was .04, therefore indicating a good fit.

TABLE 1
Descriptive statistics and factor loadings for items on the BRUMS.

	Mean	SD	Factor Loading	Loading excluding items*
Anger				
Annoyed7	.60	.85	.82	
Bitter11	.53	.80	.65	
Angry19	.44	.79	.89	
Bad tempered22	.47	.85	.87	
Confusion				
Confused3	.64	.92	.62	
Muddled9	.47	.78	.59	
Mixed'up17	.43	.87	.72	
Uncertain24	.80	1.05	.64	
Depression				
Depressed5	.44	.79	.78	.81
Downhearted6	.68	.89	.72	.77
Unhappy12	.41	.80	.72	.75
Miserable16*	.33	.72	.52	
Fatigue				
Exhausted4	.85	.95	.54	
Worn out8	1.18	1.04	.77	
Sleepy10	1.15	1.01	.48	
Tired21	1.23	1.01	.78	
Tension				
Panicky1	.31	.66	.43	.64
Anxious13	.87	1.00	.53	.64
Worried14*	1.10	.99	.61	
Nervous18*	.84	.95	.71	
Vigour				
Lively2*	2.24	.93	.58	
Energetic15	1.80	1.08	.78	.87
Active20	1.93	1.09	.79	.87
Alert23*	1.19	1.08	.16	

We then reported correlations between items included in the different factors (Table 2). All alphas ranged between .73 and .85. The highest correlation coefficients emerged between confusion, depression, anger and tension, and the only non-significant correlation was between vigour and tension.

TABLE 2
Alpha values, descriptive statistics and correlation matrix for BRUMS subscales.

	Alpha	Mean	SD	Anger	Confusion	Depression	Fatigue	Tension
Anger	0.82	.51	.67	1				
Confusion	0.81	.58	.72	0.64**	1			
Depression	0.85	.47	.66	0.68**	0.74**	1		
Fatigue	0.81	1.10	.80	0.40**	0.30**	0.42**	1	
Tension	0.74	.78	.68	0.63**	0.65**	0.61**	0.32**	1
Vigour	0.73	1.79	.78	-0.07*	-0.17*	-0.29**	-0.19*	0.00

*** p < .01; * p <. 05*

Finally, we were interested in evaluating the effect of sporting practice and gender on mood states in everyday life. We found that men in general reported practising sport more often than women, $F(1, 756) = 85.73$, $p < .001$, (X_{men} = 3.51 days/week, SD = 1.98; X_{women} = 2.07 days/week, SD = 2.20). Finally we conducted a one-way ANOVA to test whether the various factors of the BRUMS were affected by sporting practice. We found that all factors were affected by sporting performance, $Fs(1, 755) > 9.50$, $ps < .001$. In particular, sporting participants experienced less anger, confusion, depression, fatigue, and TMD as well as more vigour when compared with non-sporting participants. The tension scores showed a trend in the same direction, though this was only marginally significant, $Fs(1, 755) = 3.29$, $p = .07$ (See Table 3 for details).

TABLE 3
Descriptive statistics and statistical differences on BRUMS dimensions between sporting and non-sporting participants.

					95% Confidence Interval			
	Sport	**N**	**Mean**	**SD**	**Lower**	**Upper**	***F***	***p***
Anger	No	233	0.62	0.75	0.52	0.72		
	Yes	524	0.46	0.62	0.41	0.51	9.54	< .01
	No	233	0.76	0.82	0.65	0.86		
Confusion	Yes	524	0.51	0.66	0.45	0.57	19.15	< .01
	No	233	0.71	0.84	0.60	0.82		
Depression	Yes	524	0.42	0.65	0.37	0.48	25.23	< .01
	No	233	1.26	0.90	1.14	1.38		
Fatigue	Yes	524	1.03	0.75	0.97	1.10	13.11	< .01
	No	233	0.65	0.73	0.56	0.75		
Tension	Yes	524	0.56	0.64	0.50	0.61	3.29	.07
	No	233	1.45	0.99	1.32	1.58		
Vigour	Yes	524	2.04	0.96	1.96	2.13	60.85	< .01
Total Mood	No	233	2.79	3.53	2.33	3.24		
Disturbance	Yes	524	1.11	2.94	0.86	1.36	46.30	< .01

Interestingly, when including the sex of the participants as an independent variable we found that women reported experiencing significantly more anger, confusion, depression, fatigue, and Total Mood Disturbance (TMD) as well as less vigour when compared with men, *Fs*(1, 755) > 3.50, *ps* < .05. There were no significant differences in tension between women and men, *F*(1, 755) = 0.30, *p* = .59 (See Table 4 for details).

TABLE 4
Descriptive statistics and statistical differences in BRUMS dimensions between men and women participants.

					95% Confidence			
	Sex	**N**	**Mean**	**SD**	**Lower**	**Upper**	***F***	***p***
Anger	Men	275	0.45	0.57	0.38	0.52		
	Women	482	0.54	0.71	0.48	0.61	3.67	.06
Confusion	Men	275	0.48	0.60	0.41	0.55		
	Women	482	0.64	0.78	0.57	0.71	9.02	< .01
Depression	Men	275	0.44	0.63	0.36	0.51		
	Women	482	0.55	0.77	0.49	0.62	4.62	.03
Fatigue	Men	275	0.99	0.75	0.90	1.08		
	Women	482	1.17	0.83	1.09	1.24	8.67	< .01
Tension	Men	275	0.57	0.62	0.50	0.64		
	Women	482	0.60	0.69	0.54	0.66	0.30	.59
Vigour	Men	275	2.14	0.97	2.02	2.25		
	Woman	482	1.70	1.00	1.61	1.79	33.79	< .01
Total Mood Disturbance	Men	275	0.92	2.76	0.60	1.25		
	Women	482	2.03	3.40	1.72	2.33	20.98	< .01

DISCUSSION

The primary aim of this study was to assess the validity of a Spanish version of the BRUMS. Our validation revealed that this translated instrument is an acceptable psychometric tool once the item pool was reduced in comparison with the original scale. Therefore, the BRUMS appears to be a promising measure of mood for both sporting and non-sporting Spanish-speaking populations. The alpha coefficients (ranging between .7 and .85) are higher than those of the original scale, which may be due to the greater homogeneity of the sample (i.e., those who practise sports regularly) compared with a more general sample. The results from the validation phase highlight the need to re-validate translated versions of original validated scales and questionnaires, given that different words can have a different meaning for the end-users (Hashim et al., 2010). In this validation we demonstrated that a model including fewer indicators of the factors resulted in a better fit (cf., Hayduk & Littervay, 2012).

Our secondary aims, following the growing interest in mood, particularly in sporting contexts (Lane et al., 2010). We were interested to evaluate mood state differences between sporting and non-sporting participants and between males and females. Our results revealed a main difference between sporting and non-sporting participants such that sporting participants scored lower on anger, confusion, depression, fatigue, and TMD and higher on vigour than non-sporting participants. These results are in line with other studies, suggesting that sporting contexts require athletes to consistently cope with hard training stress and competitive pressure, and this includes understanding and regulating their emotions and those of other individuals (Laborde et al., 2016). In the same vein, Lane, Thelwell and Devonport, (2009) found that certain emotions such as vigour, happiness, and calmness are highly correlated with successful performance, whereas other emotions (e.g., confusion, depression and fatigue) are associated with poor performance.

Finally, our results regarding gender differences indicated that women reported higher levels of anger, confusion, depression, fatigue, and TMD and lower levels of vigour than men. These results replicate those of McDowell et al. (2016) and indicate that women generally have poorer baseline mood profiles. However, as reported by McDowell et al. (2016), women may also benefit more from practicing sports, which increases their motivation to continue exercising. Previous research has found that individuals with lower mood states benefit more from exercise (Reed & Ones, 2006).

Our results are important for both making available a valid tool to measure mood states in Spanish populations and understanding various populations better for developing and training such psychological skills as emotional control. Importantly, the prior sports practice experience and gender of the target person to whom training is directed may influence training outcome. Women may possess inherent skills that allow them to benefit more from acute exercise or they may have greater baseline mood disturbance from which to improve (McDowell et al., 2016). In the present study we found that the baseline mood state of men was already more controlled than that of women, and thus the reported mood levels were generally higher in the former. Consequently, it is important to take into consideration not only the level of sporting practice but also the gender of the athlete.

Limitations of this study are the gender distribution of participants, and any cultural differences that may be unique to Spanish speaking participants. In particular, only 33 men (14.04 percent) completed the questionnaire in the non-sporting group, requiring us to be cautious when interpreting apparent gender differences observed in the present study. Such differences might not have been observed if the same proportion of women and men were present in the sample.

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