Development and Initial Validation of the Brazil Mood Scale

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Abstract

The present study developed and evaluated the Brazil Mood Scale, a 24-item measure based on the Brunel Mood Scale. Mood descriptors were converted into Portuguese using the translation-back translation method. The revised scale was administered on two occasions to 298 participants in Brazil (173 males and 125 females; age: M = 18.3, SD = 5.1 yr.). Exploratory factor analysis recovered the hypothesized, 6-factor solution (anger, confusion, depression, fatigue, tension, vigour) at Time 1 and Time 2, explaining 68% and 72% of variance, respectively. Subscales for depression, fatigue, and vigour were recovered cleanly in both solutions; whereas the anger, confusion, and tension scales showed some complexity. Cronbach alpha coefficients were acceptable for all subscales at T1 (range = .76 - .85) and T2 (range = .79 - .90). Confirmatory factor analysis showed support for the measurement model, although some values were marginal (χ^2 /df: T1 = 2.42, T2 = 2.28; CFI: T1 = .91, T2 = .93; TLI: T1 = .88, T2 = .91; RMSEA: T1 = .06, T2 = .06). Overall, the measure showed encouraging psychometric characteristics.

Introduction

Psychological research relies inherently upon validated measures. The majority of published measures in psychology are produced in the English language, which provides a significant challenge for researchers who work in other languages. Duda and Allison (1990), in their review of cross-cultural research in sport and exercise psychology, noted a general "void in the field" (p.114). Other researchers have since echoed the need for investigation of the cross-cultural generalisability of measures (e.g., Li, Harmer, Chi, & Vongjaturapat, 1996; Terry, Potgieter, & Fogarty, 2003).

Mood responses in sport and exercise have received extensive interest from researchers in the English-speaking world over the past thirty years (see LeUnes, 2000). Such investigations have typically used the Profile of Mood States (POMS: McNair, Lorr, & Droppleman, 1971) or one of its derivatives to assess mood responses. With a simple format of single- or dual-word mood descriptors, the POMS lends itself very well to translation from one language to another. Indeed, in its various forms, the POMS has already been translated into many languages, including Arabic, Chinese, Dutch, French, German, Korean, Malay, and Spanish. A derivative of the POMS, the Brunel Mood Scale (Terry, Lane, Lane, & Keohane, 1999; Terry, Lane, & Fogarty, 2003), which was developed specifically to assess mood parsimoniously in sport and exercise contexts, has become a popular research tool.

To date, there is no validated version of the Brunel Mood Scale suitable for use in a Brazilian context. The present study addressed this gap in the literature, and

represents an important pre-cursor for further investigations in Brazil of, for example, the potential mood enhancements that accrue from exercise (see Berger & Motl, 2000) or links between mood and athletic performance (see Beedie, Terry & Lane, 2000).

Method

Participants

A sample of 298 participants took part, comprising 173 males and 125 females (Age: *M* = 18.3, *SD* = 5.1 yr.). Of these, 62 were students from Santa Catarina State University in Florianopolis, Brazil; 170 were athletes from a cross-section of sports at adult and adolescent levels in Florianopolis and Belo Horizonte; and 66 were elementary and high school students in Florianopolis.

Measures

The Brazil Mood Scale was generated by translating the Brunel Mood Scale, which is a 24-item, self-report measure of six, 4-item subscales (anger, confusion, depression, fatigue, tension, vigour), into Portuguese by two bilingual university researchers using the translation-back translation method. Participants reported mood responses using a "*How are you feeling right now*?" response timeframe (see Terry, Stevens, & Lane, 2005) on a 5-point scale from 0 = *not at all* (nada) to 4 = *extremely* (extremamente). A full version of the Brazil Mood Scale is shown in Appendix A but all results are presented in English.

Procedure

Participants reported mood responses on two occasions each (Time 1 and Time 2). To obtain a range of mood responses from participants, student data were collected before and/or after examinations (15%) and/or during regular classes (28%). Athlete data were collected before and/or after training (46%) and/or competition (11%). The percentage of participants assessed in these different arousal states remained consistent at Time 1 and Time 2.

Results and Discussion

Data were checked for missing values, distributional properties, and the presence of outliers. Assumptions underlying the statistical procedures used were confirmed. The measurement model for the Brazil Mood Scale was assessed using reliability analysis, exploratory factor analysis and confirmatory procedures.

Table 1 reports the reliability coefficients (Cronbach α) for the six, 4-item subscales at Time 1 and Time 2. All coefficients exceeded the criterion value indicating acceptable internal consistency (Nunnally, 1994).

Table 1: Reliability coefficients for the Brazil Mood Scale at Time 1 and Time 2.

Factor	Time 1 α	Time 2 α
Anger	.76	.86
Confusion	.84	.86
Depression	.82	.90
Fatigue	.85	.85
Tension	.81	.81
Vigour	.83	.79

Results of an exploratory factor analysis using principal components analysis and varimax rotation for Time 1 and Time 2 data are shown in Table 2 and Table 3, respectively. These analyses were constrained to identify six latent factors.

Table 2: Factor loadings for the Brazil Mood Scale at Time 1.

Factors	Ten	Fat	Dep	Vig	Con	Ang
Items	1	2	3	4	5	6
Anxious	.83					
Worried	.76					
Nervous	.70					
Panicky	.53				.44	
Exhausted		.80				
Sleepy		.77				
Worn out		.75				
Tired		.73				
Depressed			.81			
Unhappy			.76			
Miserable			.60			
Downhearted			.56			
Energetic				.82		
Active				.80		
Lively				.76		
Alert				.75		
Uncertain					.71	
Muddled					.65	
Confused					.60	
Mixed up	.60		.41		.39	
Angry						.76
Bad tempered						.68
Annoyed						.67
Bitter			.51			.50
Eigenvalues	8.4	3.0	1.9	1.3	1.0	0.8

Note. Ten = tension; Fat = fatigue; Dep = depression; Vig = vigour; Con = confusion; Ang = anger. Cross-loadings < .40 are omitted.

The solution for Time 1 data, which explained 68% of variance, showed close correspondence to the hypothesized measurement model. The depression (depressão), fatigue (fadiga) and vigour (vigor) subscales were recovered cleanly, whereas the anger

(raiva), confusion (confusão) and tension (tensão) subscales showed some complexity, cross-loading on one item each.

The solution for Time 2 data, which explained 72% of variance, also showed close correspondence to the hypothesized measurement model. The anger, depression, fatigue and vigour subscales were recovered cleanly, while confusion and tension showed cross-loading on one item each. The item *panicky* (*apavorado*), theoretically part of the tension scale, cross-loaded onto the confusion scale in both solutions, suggesting a potential cross-cultural difference in its meaning. The item *mixed up* (*inseguro*) loaded cleanly onto the confusion scale at Time 2, whereas it had cross-loaded onto the tension and depression scales at Time 1. There is no obvious explanation for this difference.

Table 3: Factor loadings for the Brazil Mood Scale at Time 2.

Factors	Dep	Ten	Fat	Ang	Vig	Con
Items	1	2	3	4	5	6
Unhappy	.85					
Miserable	.82					
Depressed	.75					
Downhearted	.70					
Anxious		.83				
Worried		.78				
Nervous		.72				
Panicky		.11				.80
Exhausted			.86			
Worn out			.82			
Tired			.79			
Sleepy			.63			
Angry				.82		
Annoyed				.74		
Bad tempered				.74		
Bitter				.63		
Energetic					.83	
Active					.79	
Lively					.76	
Alert					.67	
Confused						.71
Muddled						.59
Mixed up						.58
Uncertain		.61				.49
Eigenvalues	9.0	2.6	2.0	1.6	1.1	0.9

Note. Dep = depression; Ten = tension; Fat = fatigue; Ang = anger; Vig = vigour; Con = confusion. Cross-loadings < .40 are omitted.

Given the support for the hypothesized measurement model in both datasets, confirmatory factor analysis using EQS version 5.5 was used to further quantify the fit of the measurement model to the data. Results are shown in Table 4. Values for the fit indices met or exceeded criterion values of acceptability in both datasets (see Browne & Cudeck, 1993; Byrne, 2000; Kline, 1998), with the exception of the Tucker-Lewis index for Time 1, which was marginal. Overall, initial psychometric evaluation of the Brazil Mood Scale showed support for the measurement model.

Table 4: Fit indices for the Brazil Mood Scale at Time 1 and Time 2.

Fit index	Time 1	Time 2
χ^2/df	2.42	2.28
CFI	.91	.93
TLI	.88	.91
RMSEA	.06	.06

Having confirmed the stability of the measurement model of the mood scale in Portuguese and its congruence with the English version, it is therefore proposed that the Brazil Mood Scale has appropriate psychometric characteristics to be used for research purposes and in applied settings among Portuguese-speaking participants. To assist with the interpretability of scores derived from the Brazil Mood Scale, a table of normative values was established, based on 646 administrations of the scale. The normative scores, which are shown in Table 5, are in standard score form, with a mean of 50 and a standard deviation of 10. The equivalent normative score for the range of raw scores (0-16) is provided for the six mood subscales.

Table 5: Normative values for the Brazil Mood Scale (*N* = 646), represented as T-scores.

Raw score	Ang	Con	Dep	Fat	Ten	Vig
0	43	42	43	38	40	28
1	47	45	47	41	43	30
2	50	49	50	43	46	33
3	54	52	54	46	48	36
4	57	55	57	48	51	38
5	61	58	60	51	54	41
6	64	61	64	53	57	44
7	68	65	67	56	60	47
8	71	68	71	59	62	49
9	75	71	74	61	65	52
10	78	74	77	64	68	55
11	82	78	81	66	71	57
12	86	81	84	69	74	60
13	89	84	88	72	76	63
14	93	87	91	74	79	66
15	96	90	95	77	82	68
16	100	94	98	79	85	71

Note. Ang = anger; Con = confusion; Dep = depression; Fat = fatigue; Ten = tension; Vig = vigour.

Since its development, the Brazil Mood Scale has been introduced in Brazil to monitor mood responses among members of the national basketball, gymnastics, judo, sailing, soccer, swimming, tennis, and volleyball teams. It has been promoted in a Brazilian context as having particular relevance in guarding against overtraining syndrome amongst athletes (see Armstrong & Vanheest, 2002; Rohlfs et al, 2004, 2005) and for monitoring emotional responses during cardiac rehabilitation (de Carvalho, 2005).

The present results clearly have primary relevance for researchers or practitioners who wish to investigate mood responses among Portuguese-speaking individuals. There are, however, at least three reasons why the findings are also of relevance to those who use the English-language version of the Brunel Mood Scale. Firstly, the results further demonstrate the robustness of the measurement model across different cultural settings, adding somewhat to general confidence in the measure. Secondly, given that the majority of the research in sport and exercise psychology has been conducted in North America, European or Australian settings, the Brazil Mood Scale facilitates cross-cultural comparative research of mood responses across English-speaking *and* Portuguese-speaking populations. The availability of a validated scale in both languages represents an essential step in promoting such cross-cultural investigations.

Thirdly, the significance of cultural differences in sport and exercise psychology has been strongly emphasized recently (see Schinke & Hanrahan, 2008 for reviews of the area) along with recommendations that cultural differences should be given consideration by practitioners and researchers where possible. The development of the Brazil Mood Scale offers Australian and other English-speaking practitioners or researchers an alternative, culturally-relevant method of assessing mood responses among clients or research participants now living in, for example, Australia who might originate from a Portuguese-speaking culture.

To assist those who might wish to use the Brazil Mood Scale, the scale is included as Appendix A, with scoring instructions in Appendix B.

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Appendix A

Escala de Humor de Brazil

Abaixo está uma lista de palavras que descrevem sentimentos. Por favor, leia tudo atenciosamente. Em seguida assinale, em cada linha, o círculo que melhor descreve COMO VOCÊ SE SENTE AGORA. Tenha certeza de sua resposta para cada questão, antes de assinalar.

Escala: 0 = nada, 1 = um pouco, 2 = moderadamente, 3 = bastante, 4 = extremamente

1. Apavorado	⓪	①	②	③	④
2. Animado	⓪	①	②	③	④
3. Confuso	⓪	①	②	③	④
4. Esgotado	⓪	①	②	③	④
5. Deprimido	⓪	①	②	③	④
6. Desanimado	⓪	①	②	③	④
7. Irritado	⓪	①	②	③	④
8. Exausto	⓪	①	②	③	④
9. Inseguro	⓪	①	②	③	④
10. Sonolento	⓪	①	②	③	④
11. Zangado	⓪	①	②	③	④
12. Triste	⓪	①	②	③	④
13. Ansioso	⓪	①	②	③	④
14. Preocupado	⓪	①	②	③	④
15. Com disposição	⓪	①	②	③	④
16. Infeliz	⓪	①	②	③	④
17. Desorientado	⓪	①	②	③	④
18. Tenso	⓪	①	②	③	④
19. Com raiva	⓪	①	②	③	④
20. Com energia	⓪	①	②	③	④
21. Cansado	⓪	①	②	③	④
22. Mal-humorado	⓪	①	②	③	④
23. Alerta	⓪	①	②	③	④
24. Indeciso	⓪	①	②	③	④

Appendix B

Scoring Instructions for the Brazil Mood Scale

To calculate scores for the six subscales [Confusão (Confusion), Depressão (Depression), Fadiga (Fatigue), Raiva (Anger), Tensão (Tension), Vigor (Vigour)], add the responses from the four items in each subscale. This produces a subscale score in the range 0-16. The items in each subscale are:

Confusão (Confusion): Confuso, Inseguro, Desorientado, Indeciso (Items 3, 9, 17, 24).

Depressão (Depression[1]): Deprimido, Desanimado, Triste, Infeliz (Items 5, 6, 12, 16).

Fadiga (Fatigue): Esgotado, Exausto, Sonolento, Cansado (Items 4, 8, 10, 21).

Raiva (Anger): Irritado, Zangado, Com raiva, Mal-humorado (Items 7, 11, 19, 22).

Tensão (Tension): Apavorado, Ansioso, Preocupado, Tenso (Items 1, 13, 14, 18).

Vigor (Vigour): Animado, Com disposição, Com energia, Alerta (Items 2, 15, 20, 23).

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[1] Users should note that the depression scale is an indicator of depressed mood <u>not</u> clinical depression.