

IMPULSIVITY IN PORTUGUESE AND SPANISH COLLEGE STUDENTS: AN INVARIANCE STUDY OF THE BRIEF UPPS IMPULSIVE BEHAVIOR SCALES

PAULO DIAS

CATHOLIC UNIVERSITY OF PORTUGAL

MARIANO CHÓLIZ

UNIVERSITY OF VALENCIA

IRENE CADIME

UNIVERSITY OF MINHO

This study aims to assess the measurement invariance of the brief UPPS impulsive behavior scales-short version in Portuguese and Spanish college students. The sample was composed of 351 Portuguese and 716 Spanish students with ages ranging between 18 and 26 years. The four-factor structure — urgency, premeditation, perseverance, and sensation seeking — fit the data, although two of the 20 items had to be discarded. Results also indicated adequate reliability for each of the four factors in each sample. The invariance testing results supported partial invariance. No mean differences between both samples were found in urgency, premeditation, and sensation seeking, but the Portuguese sample had higher levels of perseverance. These findings indicate that although this version is reliable, and the four-factor structure is supported in both samples, cross-cultural comparisons should be interpreted with caution due to the lack of invariance of some parameters. Implications for further studies are discussed.

Key words: Impulsivity; Brief UPPS impulsive behavior scales; Invariance study; Confirmatory factor analysis; Youth.

Correspondence concerning this article should be addressed to Paulo Dias, Philosophy Faculty, Catholic University of Portugal, Praça da Faculdade 1, 4710 - 297 Braga, Portugal. Email: pcdias@braga.ucp.pt

Impulsivity is the tendency to act prematurely, without reflective cognition, with no control or foresight (Dalley, Everlitt, & Robbins, 2011; Shapiro, 1965). Impulsivity has been associated with several maladaptive conditions, such as substance abuse and addictions (Coskunpinar, Dir, & Cyders, 2013; Cyders, Littlefield, Coffey, & Karyadi, 2014; de Wit, 2009; Verdejo-Garcia, Lawrence, & Clark, 2008), externalizing behaviors (Carlson, Prichard, & Dominelli, 2013; Finch & Nelson, 1976), personality disorders (Lawrence, Allen, & Chanen, 2010; Turner, Sebastian, & Tüscher, 2017) and developmental disorders (Aman, Farmer, Hollway, & Arnold, 2008; McClain, Mills, & Murph, 2017; Tomasi & Volkow, 2012; Willcutt et al., 2012).

Research about impulsivity has increased in recent decades because of its determinant role in risk behaviors and mental health disorders (Grant & Potenza, 2011; Olmstead, 2014). Therefore, the development of robust and developmentally appropriate measures of impulsivity is crucial because they can be used as tools for prevention of and intervention for these maladaptive conditions.

One of the most widely used measures is the urgency, premeditation, perseverance, sensation seeking (UPPS) Impulsive Behavior Scale. This measure was originally developed by Whiteside and Lynam (2001) to cover four personality facets of impulsivity: 1) urgency — the tendency to act by impulse under negative emotions in order to relieve stress; 2) (lack of) premeditation — the tendency to act without appropriate reflection on long-term consequences; 3) (lack of) perseverance — difficulty or inability to maintain focus on a specific task; and 4) sensation seeking — disposition to seek exciting and potentially dangerous activities. This theoretical multifaceted model was tested with over 400 young adults, resulting in the development of the first version of the UPPS Impulsive Behavior Scale, composed of 45 items (Whiteside & Lynam, 2001).

Further studies (Cyders, Smith, Spillane, Fischer, Annus, & Peterson, 2007; Lynam, Whiteside, Smith, & Cyders, 2006) resulted in the addition of 14 items related to positive urgency — a tendency to behave impulsively under extreme positive emotions. Thus, a final version of the measure — the UPPS-P Impulsive Behavior Scale — was obtained, consisting of 59 items. The factor structure of this version, composed of five dimensions, was tested in several countries, and the results of these studies indicated that the structure fits the data (Bousardt, Noorthoorn, Hoogendoorn, Nijman, & Hummelen, 2017; Kampfe, & Mitte, 2009; Sedyama et al., 2017; Van der Linden et al. 2006; Verdejo-García, Lozano, Moya, Alcázar, & Pérez-García, 2010); a version specifically for children (Zapolski, Stairs, Settles, Combs, & Smith, 2011) and short versions of the original measure were also developed (Billieux et al., 2012; Cyders et al., 2014; Keye, Wilhelm, & Oberauer, 2009).

Because of the length of the original version, the development of short versions generated major interest. These short versions allow more efficient data collection, given that they take less time to administer and preserve good psychometric properties. There is evidence that these short versions maintained adequate reliability while they eliminated redundancies and achieved purer facets of impulsivity (Cyders et al., 2014). Currently, three different short versions are available. The first was developed based on the original four-facet model of impulsivity, using a sample of German high school students (Keye et al., 2009). This short version, the brief UPPS scales, contained 20 items, distributed among the four original facets. Using confirmatory factor analysis and two samples of college students, Keye et al., found a solution that replicates the original model with adequate reliability indicators (see Table 1). The second short version was based on the UPPS-P, which was grounded on a five-factor model of impulsivity (Billieux et al., 2012). This French short version also consisted of 20 items, and the theoretical model was tested using confirmatory factor analysis and a sample of 650 French undergraduate psychology students. This short version was the basis for a Spanish adaptation study (Cándido, Orduña, Perales, Verdejo-García, & Billieux, 2012), an Italian adaptation (D'Orta et al., 2015), and an Arabic version developed in Lebanon (Bteich, Berbiche, & Khazaal, 2017). Although the French and Italian short versions presented adequate psychometric properties, the Spanish and Arabic versions had some reliability problems (see Table 1). A third short version was developed in English (Cyders et al., 2014). This version, based on previous work by Lynam (2013), also included 20 items distributed among the five facets of the UPPS-P model, but only seven of these 20 items were present in the French version. Confirmatory factor analysis conducted on data collected from 251 undergraduate English-speaking U.S. students yielded inadequate fit indices for a one-factor solution but adequate fit and reliability indices for the five-factor model. This version was translated and validated in Italy (D'Orta et al., 2015). Both the English and Italian short versions had adequate validity and reliability indicators (see Table 1).

The adaptation of an identical version in different countries and languages allows cross-cultural comparisons of average impulsivity levels. However, to obtain fair comparisons, measurement invariance

TABLE 1
Internal consistency of the items (α) and factor structure of each short version

	English UPPS-P (Cyders et al., 2014)	French UPPS-P (Billieux et al., 2012)	Italian short UPPS-P (D'Orta et al., 2015)	Arabic short UPPS-P (Bteich et al., 2017)	Spanish UPPS-P (Cándido et al., 2012)	German brief UPPS scales (Keye et al., 2009)
Negative urgency (α)	.78	.78	.78	.63	.68	.74
Positive urgency (α)	.85	.70	.78	.63	.61	-
Lack of perseverance (α)	.79	.84	.84	.72	.79	.75
Lack of premeditation (α)	.85	.79	.73	.58	.78	.75
Sensation seeking (α)	.74	.83	.82	.81	.81	.72
Measurement model	Five-factor	Five-factor	Five-factor	Five-factor	Five-factor	Four-factor
Model Fit	$\chi^2/df = 2.31$ RMSEA = .07 CFI = .96	$\chi^2/df = 2.614$ RMSEA = .05 CFI = .93	$\chi^2/df = 1.90$ RMSEA = .07 CFI = .94	$\chi^2/df = 2.84$ RMSEA = .05 CFI = .90	$\chi^2/df = 1.47$ RMSEA = .05 CFI = .93	$\chi^2/df = 1.14$ RMSEA = .03 CFI = .97

Note. RMSEA = root mean square error of approximation; CFI = comparative fit index.

must be guaranteed. In this study, the invariance of the brief UPPS scales between a Spanish sample and a Portuguese sample was tested. For this purpose, the short version developed by Keye et al. (2009) was used. The four-factor structure of this version was tested and compared across both samples. Portugal and Spain share strong social and cultural links, but it is not clear if the average levels of impulsivity in the population differ. The results of the invariance study can offer some insight into this issue. Therefore, the research questions of this study were as follows: (a) Does a four-factor model consisting of urgency, premeditation, perseverance, and sensation seeking fit the data in both samples?; (b) Are the scores in both the Portuguese and Spanish versions reliable?; (c) Is the measure invariant between the Portuguese and Spanish samples? We hypothesize that the theoretical model that underlies this version of the brief UPPS scales, which identifies urgency, (lack of) premeditation, (lack of) perseverance, and sensation seeking as the core dimensions of impulsivity, adequately fits the data, as indicated by statistical fit indices. We also hypothesize that the scores obtained in both the Spanish and the Portuguese versions are reliable and that the measurement model is invariant across both samples.

METHOD

Participants

Two samples were used in this study: one sample of Portuguese college students and one sample of Spanish college students. The Portuguese sample consisted of 351 participants, with ages ranging from 18 to 26 years ($M = 20.52$, $SD = 2.06$). The percentage of women (69.8%) was higher than the percentage of men (30.2%). The Spanish sample was composed of 716 participants, with ages also ranging from 18 to 26 ($M = 21.63$, $SD = 2.11$). As with the Portuguese sample, the percentage of women (66%) in the Spanish sample was also higher than the percentage of men (34%).

Measure

The short German version of the brief UPPS impulsive behavior scales (Keye et al., 2009) was used. This version contains 20 items distributed among the original four facets of impulsivity: (1) urgency (five items, e.g.: "I have trouble controlling my impulses"); (2) lack of premeditation (five items, e.g.: "I usually make up my mind through careful reasoning"); (3) lack of perseverance (five items, e.g.: "I tend to give up easily"); and (4) sensation seeking (five items, e.g.: "I generally seek new and exciting experiences and sensations"). Items are rated using a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The psychometric properties of this version are shown in Table 1. Additionally, a socio-demographic questionnaire was used to collect data regarding the participants' age and gender. Spanish and Portuguese versions are available upon request from Authors.

Procedure

The 20 items that composed the short version of the brief UPPS impulsive behavior scales developed by Keye et al., (2009) were translated into both Portuguese and Spanish. This translation was performed using the English formulation of the 20 items by Whiteside and Lynam (2001). The items were

translated from English into Portuguese and Spanish by experienced translators who considered the cultural and linguistic particularities of each country/language. This version was then back-translated by another professional translator, and this translation was compared with the original version. Any incongruencies were resolved by the researchers. To assure the equivalence of the Spanish and Portuguese versions, the Spanish version was translated into Portuguese and vice versa by one of the researchers who was fluent in both languages. Both translations were then compared with the original version.

In Spain, a convenience sample was recruited. The researchers presented the goals and the methodology of the study and asked for authorization to collect data in one university located in the south of Spain. Data were collected using a paper-and-pencil format. Measures were applied collectively, in the classroom, in moments scheduled with the professors, guaranteeing the anonymous, confidential, and voluntary character of the participation. In Portugal, data were collected using an online form (Google Docs). The sample was recruited using a snowball process. The study was advertised, along with the link to the online form, using email lists of university students from the North of Portugal and social media platforms, such as Facebook and Instagram. The online form included the measures and an informed consent form, informing the participants about the anonymous, confidential, and voluntary nature of their participation in the study. Participants were also asked to share the questionnaire with their contacts from March to June 2016.

Statistical Analyses

Descriptive statistics for the items were calculated using IBM SPSS Statistics 25. In a second set of analyses, factor models were tested. Analyses were conducted with Mplus version 7 (Muthén & Muthén, 2012). The maximum likelihood estimation with robust standard errors (MLR) was used, as it accounts for deviations to normality (Li, 2016). To account for missing data, the full information maximum likelihood (FIML) method was used. FIML uses all the data available to estimate the model, without imputing data or removing cases from the analysis (Peeters, Zondervan-Zwijnenburg, Vink, & van de Schoot, 2015).

First, the theoretical four-factor model was fitted separately in each sample using confirmatory factor analysis (CFA). To assess the global fit of the tested models, the following criteria were used: the chi-square (χ^2) values, the comparative fit index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Model fit was considered acceptable if CFI values were higher than .90, RMSEA lower than .05, and SRMR lower than .10 (Schermelleh-Engel, Moosbrugger, & Müller, 2003). After we established the factor structure, composite reliability (ω) was calculated for each factor in each sample. Values higher than .70 were considered adequate (George & Malley, 2002; Hair, Black, Babin, & Anderson, 2009).

In a second step, multigroup CFA was performed to test the invariance of the factor structure across both samples, following the guidelines indicated by van de Schoot, Lugtig, and Hox (2012). Configural, metric, and scalar invariance were tested in three successive models. Evidence for the invariance of the model across both samples is achieved when the constraint of parameters performed in testing the subsequent models does not worsen the fit indices. To perform this comparison, the Satorra-Bentler scaled chi-square difference test ($\Delta SB-\chi^2$) was conducted, and the difference in CFI (ΔCFI) and the difference in RMSEA ($\Delta RMSEA$) were calculated. Values of ΔCFI equal to or lower than .01 and values of $\Delta RMSEA$ equal to or lower than .015 indicate that the hypothesis of invariance should not be rejected (Chen, 2007; Cheung & Rensvold, 2002). The Bayesian information criterion (BIC) was also used. The model with the lowest BIC value was considered the most adequate. When full invariance was not achieved, partial invariance was established by freely estimating the parameters identified after examining the Lagrange multiplier

tests. After we established the invariance of the factor structure, differences in the latent means between the Portuguese and Spanish samples were calculated. For purposes of model identification, the latent means of the first group (Spain) were constrained to zero, and the latent means of the second group (Portugal) were freely estimated and then compared by means of a z -test. In all analyses, the results were considered statistically significant when $p < .05$.

RESULTS

Table 2 presents the descriptive statistics of the observed scores in each item. Most of the corrected item-total correlations were higher than .30, excepting the ones related to Item 6 (“I’m pretty good about pacing myself so as to get things done on time”) in both samples, and the correlations of Items 10 (“There are so many little jobs that need to be done that I sometimes just ignore them all”) and 17 (“Before I get into a new situation I like to find out what to expect from it”) in the Portuguese sample (see Table 2).

TABLE 2
 Descriptive statistics for the observed scores in the items in each sample

Items	Portugal				Spain			
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>r</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>r</i>
Urgency								
UPPS 1	349	2.13	1.12	.42	716	2.46	1.05	.50
UPPS 9	348	2.61	1.21	.42	716	2.69	1.10	.32
UPPS 12	345	2.24	1.17	.57	714	2.43	1.12	.43
UPPS 15	347	2.95	1.19	.57	715	2.95	1.17	.53
UPPS 20	348	3.36	1.21	.47	716	3.32	1.16	.42
Premeditation								
UPPS 3	350	3.10	1.21	.36	715	3.35	1.05	.40
UPPS 4	346	3.55	1.05	.64	715	3.53	1.05	.44
UPPS 8	349	3.77	1.02	.55	711	3.59	0.99	.49
UPPS 17	345	4.02	0.88	.29	714	3.97	0.92	.35
UPPS 19	348	3.64	0.96	.62	715	3.62	0.97	.56
Perseverance								
UPPS 5	347	3.85	1.16	.38	714	3.63	1.11	.55
UPPS 6	348	4.08	0.93	.19	716	3.83	1.03	.25
UPPS 10	348	3.61	1.24	.28	716	3.48	1.20	.41
UPPS 13	349	4.01	0.88	.56	715	3.92	0.91	.64
UPPS 16	347	4.10	0.86	.55	716	3.84	0.96	.66
Sensation seeking								
UPPS 2	348	3.05	1.50	.53	715	3.53	1.34	.49
UPPS 7	347	2.69	1.51	.55	715	2.64	1.49	.57
UPPS 11	349	3.87	0.99	.45	716	3.35	1.00	.40
UPPS 14	346	3.66	1.54	.58	713	3.08	1.54	.59
UPPS 18	347	2.85	1.50	.58	715	3.10	1.48	.53

Note. *M* = mean; *SD* = standard deviation; *r* = corrected item-total correlation.

The inter-item correlations are presented in Table 3. Most of the items correlated significantly with the items within the same impulsivity dimension but had low or no correlation with the items from other dimensions.

Table 4 presents the model fit for the Portuguese and Spanish samples. The fit of the four-factor model was adequate in the Spanish sample but poor in the Portuguese sample.

In the Portuguese sample, the factor loadings of Items 6 and 10, both from the perseverance factor, were $\leq .30$. The factor loading of Item 6 was also lower than $.30$ in the Spanish sample. Therefore, the two items were removed and the analysis was rerun. The fit indices improved as a result of the deletion of these two items (see Table 4). Consequently, only the remaining 18 items were kept in the next analyses. All factor loadings were higher than $.30$ (see Table 5). In the Portuguese sample, the correlations between the latent factors were significant, excepting the correlations between perseverance and urgency, between premeditation and sensation seeking, and between premeditation and urgency. In the Spanish sample, only the correlation between perseverance and sensation seeking was not significant. All other correlations between latent factors were statistically significant. Composite reliability was adequate for the four factors in both samples, excepting the value for the urgency factor in the Spanish sample, which was close but did not reach $.70$ (see Table 5).

Table 6 shows the descriptive statistics for the observed scores in each dimension, considering the results for the 18 items. The mean scores for urgency were slightly lower than those obtained for perseverance, premeditation, and sensation seeking in both samples. The range of scores was very similar across dimensions and samples.

Table 7 shows the results of the invariance testing across the Portuguese and Spanish samples. The results for the configural model indicated an acceptable fit. The fit indices for the metric invariance model were also adequate. Although the $SB-\Delta\chi^2$ was significant, ΔCFI and $\Delta RMSEA$ did not exceed the reference values, indicating that the metric invariance model fitted as well as the configural invariance model. The BIC for the metric model was also lower than that obtained for the configural model. The fit of the scalar invariance model was significantly worse than the fit of the previous model, as indicated by the $SB-\Delta\chi^2$, the ΔCFI , and the BIC value. The examination of the Lagrange multiplier tests suggested that five intercepts were non-invariant — modification index (MI) higher than 15. If these five intercepts were freely estimated in each group, partial scalar invariance was supported (see Table 7). Therefore, this model was taken as the final model. The comparison of the latent means indicated that the Portuguese sample had higher perseverance levels than the Spanish sample ($\Delta M = .27, p = .001$). No differences between both samples were found in the mean values of urgency ($\Delta M = -0.07, p = .399$), premeditation ($\Delta M = 0.05, p = .495$), and sensation seeking ($\Delta M = 0.05, p = .582$).

DISCUSSION AND CONCLUSIONS

The first goal of this study was to test the four-factor structure in each of the samples. Although an intercorrelated four-factor solution showed adequate fit to the data in both samples, two items from the perseverance scale had to be deleted. Given that adequate procedures for the translation of the items were followed, it is unlikely that the low factor loadings of these items are due to translation inadequacy. Instead, it is possible that this result is due to the complexity of the items. Whereas the remaining three items of the perseverance scale are short and clearly refer to the (in)ability to maintain the focus on a specific task



TABLE 3
Correlation matrix of the items in the Portuguese and Spanish samples

	UPPS 1	UPPS 2	UPPS 3	UPPS 4	UPPS 5	UPPS 6	UPPS 7	UPPS 8	UPPS 9	UPPS 10	UPPS 11	UPPS 12	UPPS 13	UPPS 14	UPPS 15	UPPS 16	UPPS 17	UPPS 18	UPPS 19	UPPS 20
UPPS 1	–	.06	–.28***	–.10**	–.19***	–.01	.11**	–.21***	.22***	–.18***	.12**	.29***	–.11**	.12**	.43***	–.15***	–.05	.16***	–.27***	.36***
UPPS 2	–.01	–	–.06	–.08*	.01	.07	.42***	–.02	–.01	–.07	.29***	.03	.07	.44***	.04	.05	.02	.35***	–.04	.01
UPPS 3	.01	.21***	–	.25***	.06	–.01	–.12**	.33***	–.11**	.06	–.06	–.15***	.11**	–.05	–.29***	.14***	.19***	–.06	.35***	–.19***
UPPS 4	–.07	.10	.41***	–	.23***	.16***	–.13**	.37***	–.04	.18***	–.08*	–.14***	.28***	–.06	–.17***	.30***	.27***	–.06	.41***	–.11**
UPPS 5	–.22***	.11*	.11*	.10	–	.18***	–.04	.18***	–.11**	.40***	–.04	–.28***	.52***	–.07	–.20***	.51***	.10**	–.06	.22***	–.13**
UPPS 6	–.08	.13*	.08	.12*	.12*	–	.07	.11**	–.01	.14***	.07	–.09*	.26***	.01	.01	.28***	.14***	.02	.13**	.01
UPPS 7	–.01	.36***	.02	.04	.04	.04	–	–.03	.02	–.09*	.32***	.08*	–.04	.47***	.06	–.01	–.07	.43***	–.12**	–.04
UPPS 8	–.13*	.10	.29***	.53***	.11*	.21***	.06	–	–.08*	.13***	.00	–.09*	.24***	.02	–.24***	.26***	.23***	–.08*	.47***	–.17***
UPPS 9	.26***	.04	.04	.02	–.19***	.03	.11*	.07	–	–.19***	.06	.32***	–.09*	.03	.23***	–.07	–.04	.07	–.18***	.15***
UPPS 10	–.29***	–.01	–.03	.16**	.27***	.09	–.20***	.12*	–.26***	–	–.10**	–.25***	.33***	–.08*	–.24***	.34***	.14***	–.07	.18***	–.14***
UPPS 11	–.02	.44***	.09	.11*	.19***	.18**	.30***	.21***	.08	–.07	–	.15***	.00	.32***	.16***	–.02	.06	.29***	–.03	.01
UPPS 12	.32***	.02	.01	–.05	–.27***	–.11*	.08	–.05	.45***	–.32***	.05	–	–.26***	.03	.34***	–.26***	–.09*	.08*	–.18***	.22***
UPPS 13	–.14*	.11*	.10	.23***	.36***	.24***	.05	.26***	.02	.27***	.16**	–.11*	–	–.02	–.16***	.75***	.23***	–.06	.27***	–.10**
UPPS 14	.03	.38***	–.05	.01	.03	.13*	.49***	.00	.18***	–.14**	.35***	.09	.11*	–	.13***	–.03	–.03	.48***	–.06	.03
UPPS 15	.29***	.07	–.10	–.18**	–.19***	.00	.04	–.14**	.33***	–.22***	.05	.47***	–.04	.15**	–	–.15***	–.06	.11**	–.38***	.41***
UPPS 16	–.10	.12*	.10	.21***	.38***	.23***	.07	.27***	–.03	.24***	.20***	–.11*	.63***	.09	–.06	–	.25***	–.03	.27***	–.08*
UPPS 17	.04	–.04	.06	.22***	.11*	.14*	–.01	.21***	.04	.20***	.05	–.09	.27***	.00	.00	.34***	–	.03	.30***	–.06
UPPS 18	.05	.44***	–.03	–.04	.02	.03	.43***	.02	.16**	–.17**	.29***	.13*	.09	.47***	.13*	.06	–.07	–	–.07	.03
UPPS 19	–.09	.08	.29***	.56***	.19***	.18**	.05	.55***	.04	.29***	.08	–.06	.35***	–.03	–.19**	.30***	.33***	.04	–	–.29***
UPPS 20	.35***	–.01	–.08	–.13*	–.06	.03	–.01	–.11*	.20***	–.17**	.07	.31***	–.02	.07	.50***	.02	.04	.02	–.13*	–

Note. Correlations above the diagonal refer to the results of the Spanish sample and correlation below the diagonal refer to the Portuguese sample.

*p < .05; **p < .01; ***p < .001.

TABLE 4
Model fit for the four-factor model in each country

Group	χ^2	df	p	CFI	RMSEA	RMSEA [90% CI]	SRMR	BIC
Portugal								
20 items	362.388	164	< .001	.859	.059	[.051, .067]	.075	20442.130
18 items	247.995	129	< .001	.907	.051	[.042, .061]	.061	18384.888
Spain								
20 items	371.327	164	< .001	.921	.042	[.036, .048]	.051	41186.581
18 items	274.158	129	< .001	.940	.040	[.033, .046]	.047	36963.440

Note: CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = standardized root mean square residual; BIC = Bayesian information criterion.

TABLE 5
Factor loadings of the items, correlations between the latent factors,
and MacDonald's omegas for the latent factors (composite reliability)

Construct/indicator	Portugal		Spain	
	Standardized estimate	ω	Standardized estimate	ω
Urgency		.73		.69
UPPS 1	.467***		.621***	
UPPS 9	.510***		.356***	
UPPS 12	.677***		.500***	
UPPS 15	.734***		.718***	
UPPS 20	.569***		.543***	
Premeditation		.75		.70
UPPS 3	.427***		.488***	
UPPS 4	.732***		.531***	
UPPS 8	.691***		.600***	
UPPS 17	.391***		.418***	
UPPS 19	.766***		.744***	
Perseverance		.74		.82
UPPS 5	.434***		.576***	
UPPS 13	.826***		.865***	
UPPS 16	.788***		.858***	
Sensation seeking		.77		.75
UPPS 2	.612***		.575***	
UPPS 7	.642***		.671***	
UPPS 11	.530***		.472***	
UPPS 14	.691***		.711***	
UPPS 18	.667***		.636***	
Latent factor correlations				
Premeditation with urgency	-.152		-.538***	
Perseverance with urgency	-.123		-.308***	
Perseverance with premeditation	.453***		.481***	
Sensation seeking with urgency	.193*		.195***	
Sensation seeking with premeditation	.102		-.122*	
Sensation seeking with perseverance	.218*		-.016	

* $p < .05$; *** $p < .001$.

TABLE 6
Descriptive statistics for the manifest scores in each dimension

Dimension	Items	Portugal		Spain	
		<i>M (SD)</i>	Min-Max.	<i>M (SD)</i>	Min-Max.
Urgency	5	2.65 (0.82)	1.00-4.80	2.77 (0.74)	1.00-5.00
Premeditation	5	3.62 (0.71)	1.00-5.00	3.62 (0.67)	1.20-5.00
Perseverance	3	3.98 (0.77)	1.00-5.00	3.80 (0.84)	1.00-5.00
Sensation seeking	5	3.22 (1.02)	1.00-5.00	3.14 (0.98)	1.00-5.00

Note: *M* = mean; *SD* = standard deviation; Min-Max. = minimum-maximum. Mean subscale scores were obtained by adding the scores in the items and dividing the total by the number of items in each scale.

TABLE 7
Measurement invariance across countries

Model	χ^2	<i>df</i>	<i>p</i>	CFI	RMSEA	RMSEA [90% CI]	SRMR	BIC	$\Delta SB - \chi^2(df)$	ΔCFI	$\Delta RMSEA$
Model 0: Configural	522.980	258	< .001	.929	.044	[.038, .049]	.052	55438.973	–	–	–
Model 1: Metric	547.194	272	< .001	.926	.044	[.038, .049]	.055	55369.533	24.274(14)*	.003	.000
Model 2: Scalar	763.134	286	< .001	.872	.056	[.051, .061]	.063	55512.978	245.259(14)***	.054	.012
Final model: Partial scalar ^a	591.616	281	< .001	.916	.046	[.040, .051]	.056	55354.453	48.728(9)***	.010	.002

Note. CFI = comparative fit index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; BIC = Bayesian information criterion; $\Delta SB - \chi^2$ = Satorra-Bentler scaled chi-square difference test.

^aFreely estimating the intercepts of items 1, 2, 11, 14, and 18.

p* < .05; **p* < .001.

(e.g., “I tend to give up easily” or “I finish what I start”), the formulation of the two deleted items is more complex and perhaps is not as clear to the respondents — Item 10: “There are so many little jobs that need to be done that I sometimes just ignore them all” and Item 6: “I’m pretty good about pacing myself so as to get things done on time” (English version of the items available in Keye et al., 2009, p.185). This aspect may explain the low factor loadings of these two items; consequently, we suggest that the formulation of these items in the Portuguese and the Spanish versions of the brief UPPS impulsive behavior scales should be revised in future studies. Regardless of this aspect, the results of our study empirically support the theoretical model of impulsivity that includes (negative) urgency, (lack of) premeditation, (lack of) perseverance, and sensation seeking as the core dimensions of this construct.

The second goal of this study was to test the reliability of the scores obtained in the Portuguese and Spanish versions of the measure. Due to limitations of the Cronbach’s alpha (for a discussion see, for example, Sijtsma, 2009), only composite reliability was calculated. These scores indicated adequate reliability for all four dimensions in both samples. Overall, these indicators are highly similar to the ones obtained for the original version of the same instrument (Keye et al., 2009) and slightly better than the ones obtained for other short versions of the UPPS impulsivity scale (e.g., Bteich et al., 2017; Cándido et al., 2012).

The last goal of the study was to investigate the measurement invariance across countries. The results supported metric (weak) invariance, but only partial scalar (strong) invariance, given the existence of some non-invariant intercepts. Most of these non-invariant item intercepts were from the sensation seeking factor, meaning that the affirmations provided in the brief UPPS scales to assess the disposition to seek exciting and potentially dangerous activities probably have different connotations for Portuguese and Spanish college students. These differences might be explained by cultural factors. Although the Portuguese and Spanish cultures are usually classified as collectivist when compared with other European countries (Ciochină, & Faria, 2009, Hofstede, 2001), the value attributed to emotions related to sensation seeking might be different. The data compiled by Hofstede (2001), collected in 50 countries around the world, suggest that Portuguese and Spanish societies are both characterized by a high uncertainty avoidance, that is, people feel threatened by unknown situations, try to avoid them, and as a consequence only take known risks. However, the same data indicate that Portugal is much more marked by this characteristic than is Spain. Thus, the way participants from both countries perceive the uncertainty of the outcomes of engaging in new, exciting, and potentially dangerous activities might lead to a different understanding and valorization of the items of the sensation seeking subscale. As a consequence, cross-cultural comparisons between the countries must be made with caution. Regardless, the mean difference testing results indicated that both samples did not differ in terms of sensation seeking, as well as in urgency and premeditation. However, the Portuguese sample had higher levels of perseverance. Therefore, we can conclude that, on average, the Spanish sample had more difficulty focusing or an inability to maintain focus on specific tasks. This finding reflects almost certainly cultural differences between the samples.

One limitation of this study was that no information regarding the presence of addictions, substance abuse, or other disorders was collected. It is possible that differences between both countries are moderated by the presence of these types of disorders in the sample, given the bulk of research that suggest a close relationship between impulsivity and these variables (e.g., Carlson et al., 2013; Cyders et al., 2014; Coskunpinar et al., 2013; Lawrence et al., 2010; Turner et al., 2017; Verdejo-Garcia et al., 2008; de Wit, 2009). A second limitation of the study is the differences in the sample recruiting and data collection procedures used in each country, but the extent to which these differences may affect the results is unclear. Existing research suggests that, in general, the psychometric properties are highly comparable in computer and paper-and-pencil assessments (Boo & Vispoel, 2012; Campos, Zucoloto, Bonafé, Jordani, & Maroco,

2011; Dias, Maroco, & Campos, 2015). Future studies should investigate whether different means of data collection also yield similar measurement properties in the case of the brief UPPS impulsive behavior scales. Future research would also benefit from wider data collection, including other countries for a cross-cultural invariance study, and considering the collection of criterion validity evidence.

To conclude, the findings of this study provide indicators of the robustness of the brief UPPS impulsive behavior scales in two new cultural contexts. Additionally, although different short versions of the UPPS have been developed and adapted for several languages and countries, to our knowledge, no invariance studies across countries have been conducted. Therefore, this is the first study to provide evidence of the usefulness of a short version for cross-cultural comparisons of impulsivity, although more studies are needed to clarify the lack of invariance of some items between both countries.

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