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RESEARCH ON TRANSLATIONS OF TESTS

Psychometric Properties of the Spanish Version of the UPPS–P Impulsive Behavior Scale: A Rasch Rating Scale Analysis and Confirmatory Factor Analysis

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The present study was aimed at determining the psychometric properties of the Spanish version of the UPPS-P Impulsive Behavior Scale in a sample of college students. Participants were 318 college students (36.2% men; mean age = 20.9 years, *SD* = 6.4 years). The psychometric properties of this Spanish version were analyzed using the Rasch model, and the factor structure was examined using confirmatory factor analysis. The verification of the global fit of the data showed adequate indexes for persons and items. The reliability estimates were high for both items and persons. Differential item functioning across gender was found for 23 items, which likely reflects known differences in impulsivity levels between men and women. The factor structure of the Spanish version of the UPPS-P replicates previous work with the original UPPS-P Scale. Overall, results suggest that test scores from the Spanish version of the UPPS-P show adequate psychometric properties to accurately assess the multidimensional model of impulsivity, which represents the most exhaustive measure of this construct.

Keywords: UPPS-P impulsivity model, Rasch model, item response theory, confirmatory factor analysis

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Impulsivity is a multidimensional construct (Billieux, Rochat, et al., 2012; Cándido, Orduña, Perales, Verdejo-García, & Billieux, 2012; Cyders, 2013) that has received considerable attention in the study of addictive behaviors, such as alcohol use (Jones, Chryssanthakis, & Groom, 2014; LaBrie, Kenney, Napper, & Miller, 2014), drug use (Balodis, Potenza, & Olmstead, 2009; Moreno et al., 2012; Zapolski, Cyders, & Smith, 2009), and risky sexual behaviors (Zapolski et al., 2009), which are particularly prevalent and problematic behaviors among college students (Kaloyanides, McCabe, Cranford, & Teter, 2007; Pilatti, Caneto, Vera, Garimaldi, & Pautassi, 2014; Quinn & Fromme, 2011). Research concerning the definition of impulsivity has included a wide range of tendencies, including the inability to inhibit a response, the tendency toward unplanned actions, lack of or diminished regard for consequences, and the preference for immediate but small rewards rather than delayed, larger rewards (Dom, De Wilde, Hulstijn, & Sabbe, 2007; Dougherty, Marsh-Richard, Hatzis, Nouvion, & Mathias, 2008; Verdejo-García, Lawrence, & Clark, 2008).

The UPPS-P model (Lynam, Smith, Whiteside, & Cyders, 2006) is a recent and valid operational definition of impulsivity that accounts for the multidimensional nature of impulsivity (Verdejo-García, Lozano, Moya, Alcázar, & Pérez-García, 2010). The UPPS-P model resulted from the combination of the UPPS Impulsive Behavior Scale (Whiteside & Lynam, 2001) and the Positive Urgency Measure (PUM; Cyders et al., 2007), and assesses five separate, though related, impulsivity-related traits: *Negative urgency* refers to the tendency to act impulsively when experiencing negative affect; *lack of premeditation* refers to the tendency to act without reflection about the consequences of an action; *lack of*

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perseverance reflects the tendency to not persist in an activity that can be boring or difficult; *sensation seeking* reflects the tendency to seek new and exciting experiences and sensations; and *positive urgency* refers to the tendency to act impulsively when experiencing positive affect.

Research supports the adequacy of the psychometric properties of UPPS-P test scores (Billieux, Rochat, et al., 2012; Cándido et al., 2012; Cyders, 2013; Cyders & Smith, 2007; Verdejo-García et al., 2010), including the underlying structure of five distinct factors across many different samples, including healthy college students (Verdejo-García et al., 2010), alcohol drinkers (Cyders, Flory, Rainer, & Smith, 2009; Cyders et al., 2010), gamblers (Billieux, Lagrange, et al., 2012; Michalczuk, Bowden-Jones, Verdejo-García, & Clark, 2011), problematic Internet users (Billieux & Van der Linden, 2012), and drug users (Zapolski et al., 2009). The original English version of the UPPS-P model (Lynam et al., 2006) has been adapted into many different languages, including Spanish (Cándido et al., 2012; Verdejo-García et al., 2010) and French (Billieux, Rochat, et al., 2012), but research examining the performance of these newer versions is still somewhat limited. Psychometric properties of the UPPS-P scores have been exclusively examined using classical test theory (CTT); however, more recent perspectives, like item response theory (IRT), provide advantages to improve the reliability of test scores and validity of test interpretations (Embretson & Reise, 2000; Rupp & Zumbo, 2006), and thus have become more widely used in health sciences in recent years. To our knowledge, there are no previous studies assessing the psychometric properties of UPPS-P test sores using IRT.

The main goals of the current study are to (a) determine the psychometric properties of test scores using the Spanish version of the UPPS-P (Verdejo-García et al., 2010) applying a polytomous model of IRT (rating scale model), and (b) provide, through the map of persons and items, information on how separate impulsivity traits are organized along the continuum. The rating scale model (Rasch, 1960) is an extension of the dichotomic model for polytomously scored items and includes a series of psychometric models that allow for determining the response probability of an item as a function of the subject's level of the construct being measured and of the difficulty of the item. The Rasch model has a number of advantages over CTT. The Rasch model offers person-free item parameter estimation and item-free person's measure estimation, providing an optimal scaling of individual differences. In the Rasch model, each person and each item has its own standard error of estimate. In contrast with CTT, this property provides more information about how the variable is being assessed by the test. The Rasch model measures items and persons values on an interval scale, which allows applying statistical procedures not available with CTT, in which obtained data are ordinal (Embretson & Reise, 2000; Rupp & Zumbo, 2006). The Rasch model also allows for a more detailed analysis of the psychometric properties of the tests, detecting their weaknesses and strengths (Lambert et al., 2013). Thus, for example, the category probability curve allows detecting those categories of responses that are not working properly (Linacre, 1999). The information function detects regions along the continuum where it is necessary to include additional items (Lai, Cella, Chang, Bode, & Heinemann, 2003). We also examined the factor structure of the Spanish version of the UPPS-P using confirmatory factor analysis (CFA).

Method

Sample

The sample was recruited from students enrolled at the National University of Cordoba (Argentina), which mainly attracts high school graduates from middle-class and upper-middle-class families from central and northwest Argentina. We approached all department chairs via e-mail or phone, yet only those from psychology, biology, and engineering departments accepted being part of the study, and, as such, only students enrolled in these classes were included in the study.

A total of 319 native Spanish speakers who were college students were sampled. One case was eliminated because the participant did not complete any of the UPPS-P items, yielding a final sample of 318 undergraduate students (36.2% males; 40.9% enrolled in psychology courses). Age ranged from 18 to 57 years, with 91.2% falling between 18 and 25 years (52.8% were between 18 and 19 years old; 17.9% were between 20 and 21 years old; 15.1% were between 22 and 23 years old; 5.4% were between 24 and 25 years old; and 8.8% were 26 or older). One participant did not report her age and another one did not provide gender information. The mean age of 20.9 years ($SD = 6.4$ years) was statistically similar across men and women ($t = 0.96$, $p = .34$). The sample size is adequate to produce adequate estimated item parameters (Linacre, 1994, 2002).

Measures

The Spanish version of the UPPS-P Impulsive Behavior Scale (Verdejo-García et al., 2010) consists of 59 items that measure five distinct dimensions of impulsivity: Positive Urgency (14 items: 5, 10, 15, 20, 25, 30, 35, 40, 45, 49, 52, 54, 57, and 59), Negative Urgency (12 items: 2, 7, 12, 17, 22, 29, 34, 39, 44, 50, 53, and 58), Lack of Premeditation (11 items: 1, 6, 11, 16, 21, 28, 33, 38, 43, 48, and 55), Lack of Perseverance (10 items: 4, 9, 14, 19, 24, 27, 32, 37, 42, and 47), and Sensation Seeking (12 items: 3, 8, 13, 18, 23, 26, 31, 36, 41, 46, 51, and 56). The items are scored on a 4-point Likert-type scale, ranging from 1 (*strongly agree*) to 4 (*strongly disagree*). Items are coded so that a greater score is interpreted as greater level of impulsivity. All five subscales exhibited adequate reliability values (alpha values between .79 for the Lack of Perseverance scale and .93 for the Positive Urgency scale) in the Spanish adaptation developmental sample (Verdejo-García et al., 2010), with similar levels in the present sample (alpha values between .75 for the Lack of Perseverance scale and .92 for the Positive Urgency scale).

Because the study was part of a larger research project, other instruments (e.g., frequency and severity of gambling) were administered during the data collection. However, only the UPPS-P data were analyzed in the present study.

Procedure

Data were collected as part of a larger research project examining the role of impulsivity on gambling severity and cognitive

distortions. Questionnaires were administered collectively in a classroom by the principal researcher, who was assisted by three trained senior students in psychology. They explained that the general aim of the study was to describe general patterns of behaviors in college students. There was no mention of impulsivity. They also explained the instructions for answering questions for each instrument, and they answered any questions regarding how to complete the survey. They remained throughout the session until all participants had completed the survey. The trained senior psychology students did not answer specific questions that required judgment, but simply reiterated the instrument instructions. The confidentiality of the participants and the voluntary nature of participation were emphasized. Verbal informed consent was obtained before scale administration. No identifiable information was collected. Researchers periodically asked the participants if they had any questions regarding the instrument and how to answer it. They also encouraged the participants to complete the whole questionnaire. Administration of the instruments took approximately 30 min. Data were gathered during a 6-month period. Participants were not compensated for their participation. All study procedures were approved by the university's internal review board and the protocol was reviewed by the National Agency for Promotion of Science and Technology (FONCyT).

Statistical Analysis

The rating scale model was applied to the 59 items of the UPPS-P. The analysis to verify the fit of the data to the model was used to determine the extent to which the empirically obtained data matched the prediction of the model. To pursue this goal, the mean square residual (Mnsq) and the standardized mean square residual (Zstd) were computed. Fit of the items to a Rasch model was examined using Infit and Outfit statistics. *Infit* is an internal fit index assessing the fit with regard to proximal parameters, whereas *Outfit* is an external fit index assessing the fit with regard to distal parameters. According to Wright and Linacre (1994), Mnsq values between 0.6 and 1.4 and Zstd values between -2.0 and $+2.0$ indicate acceptable fit. Values provided by this model are expressed in the logit scale, which is a logistic transformation of the observed scores, with a mean of 0 and standard deviation of 1.

Both reliability and a separation index individually for persons and items scores were estimated. High reliability of persons and items scores indicates that the location of persons and items could be foreseeably reproduced (Andrich, 1982). Separation values of two or greater are considered adequate indices of separation (Linacre, 2008). The higher the separation, the better the measure is working at differentiating person ability (i.e., impulsivity) and item difficulty (i.e., level of impulsivity).

Ordered response data identify the probability of a response being made in any of the possible response categories. The category function was examined to determine whether the response categories were appropriate. These analyses inform the probability of a response being made in any of the available response categories (i.e., *strongly agree*, *agree*, *disagree*, and *strongly disagree*). The threshold is the intersection between two contiguous response alternatives (i.e., *strongly agree* and *agree*), in which either response alternative is similarly probable. To have a satisfactory response category design, the thresholds should be ordered indicating the ordinal numbering of the categories (i.e., from 1 to 4), in accordance with their substantive meaning (i.e., from *strongly agree* to *strongly disagree*); that is, higher scores indicate increasing levels of agreement with a particular item (Linacre, 2002). When response categories are ordered, the category probability curves reflect that each of the response categories is the most probable at some point on the latent construct that is being measured.

The map of persons and items shows the distribution on the continuum of the latent construct (i.e., impulsivity). The Rasch model provides an estimate of each person's level of ability (i.e., impulsivity) and an estimate of each item's difficulty. Persons and items are measured in the same scale, and therefore it is possible to compare them along the construct (i.e., impulsivity) continuum and to determine the probability of each person endorsing each item. The bottom of the map corresponds to the lower estimates (i.e., lower level of impulsivity) of the persons and items, whereas moving up in the map corresponds to higher estimates (i.e., greater impulsivity).

Differential item functioning (DIF) was also examined. When two different subgroups of examinees (i.e., women and men) show different expected performance on a given item, this item shows bias functioning or DIF. A given item shows gender bias (or other group characteristic, such as age and ethnicity) when, at a given level of ability (i.e., impulsivity), this item is endorsed for a different proportion of women compared with men. DIF is examined to ensure that all items are functioning similarly across different groups and to ensure that there are no items favoring (takes a lower level of ability to endorse the item) one group over another (Shea, Tennant, & Pallant, 2009; Wyse, 2013).

A series of CFAs were conducted with maximum likelihood estimation to examine the factor structure of the scale. Three models were tested: a one-factor model, in which all UPPS-P items load onto one overall factor (an Impulsivity factor; Model A); a five-factor model, in which items from the UPPS-P load on their individual subscale factor (Model B); and a three-factor hierarchical model, in which items load on their individual factors, which then load onto the following higher order factors: Sensation Seeking, Deficits in Conscientiousness (Lack of Perseverance and Lack of Premeditation), and Emotion-Based dispositions (Negative Urgency and Positive Urgency), as supported in Cyders and Smith (2007; Model C). The analysis was conducted with Analysis of Moment Structures (AMOS, SPSS Inc.). Item parceling was conducted to establish observed indicators of each latent dimension (Garriott, Flores, & Martens, 2013), as previous research has supported the unidimensionality of the individual UPPS-P factors (Cyders & Smith, 2007). A total of 16 parcels were constructed. Different indices of goodness of fit were examined: chi square, the ratio of the chi square statistic to degrees of freedom, the root mean square error of approximation (RMSEA), the Tucker–Lewis index (TLI), and the comparative fit index (CFI). Chi-square values with a nonsignificant p value indicate an acceptable fit; however, this index is very sensitive to sample size, and, therefore, other indices of fit were also considered. For the ratio of the chi square statistic to degrees of freedom, values between 1.00 and 3.00 are considered acceptable. A RMSEA between 0 and 0.05 indicates a good fit, and between 0.05 and 0.08, an acceptable

fit. A CFI or TLI greater than 0.95 is generally interpreted as indicating an optimal fit (Hu & Bentler, 1995).

Results

Preliminary Analyses

First, patterns of missing values were analyzed to determine that the distribution of missing data were at random (Tabachnick & Fidell, 2011). Second, because less than 5% of the data were missing, missing values were imputed by mode substitution (Shafer, 1999). This imputation method was selected because it imputes values within the four response options (discrete values such as 1, 2, 3, or 4) of the self-response scale, whereas other methods (e.g., estimation by maximization) tend to introduce continuous variables (e.g., 1.3, 2.2), changing the original distribution (Dominguez Lara, 2014).

Fit Analysis

The verification of the global fit of the data showed adequate indexes for the persons and items (see Table 1). The detailed analysis of items showed that 53 items had adequate Infit indexes, and 55 items had adequate Outfit indexes. Items 19, 24, 16, 17, 21, and 2 had values that do not fall within the acceptable range. The 59 items covered a range of the impulsivity continuum ranging from −1.09 (low impulsivity) to 1.14 (high impulsivity). The mean person-level estimate of impulsivity for this sample was −0.47 logit units (*SD* = 0.54), suggesting that these items are measuring a higher level of impulsivity than usually experienced by college students. This can be also seen in the map of persons and items. The map depicts how person and item locations are plotted on the impulsivity continuum. Figure 1 shows that person locations, compared with items locations, are placed in a lower section of the impulsivity continuum.

Category Probability Curve

The lower part of Table 2 shows the values of the threshold parameters for each response category (from 1 = *strongly agree* to 4 = *strongly disagree*). The threshold parameter corresponding to the category option *strongly agree* was lower than the threshold parameter observed for the category option *somewhat agree*, which, in turn, was lower than the threshold parameter observed for the category option *somewhat disagree*, which was lower than the threshold parameter observed in the last and fourth category *strongly disagree*. This means that the threshold parameters of the four categories were ordered. These results are displayed in Figure 2.

Table 1
Fit Indexes of the Model

	Measure	Error	Infit	Outfit	Reliability
Persons					
Mean	−.47	.17	1.03	1.01	
SD	.54	.03	.40	.41	.90
Items					
Mean	.00	.07	1.01	1.01	
SD	.49	.01	.25	.27	.98

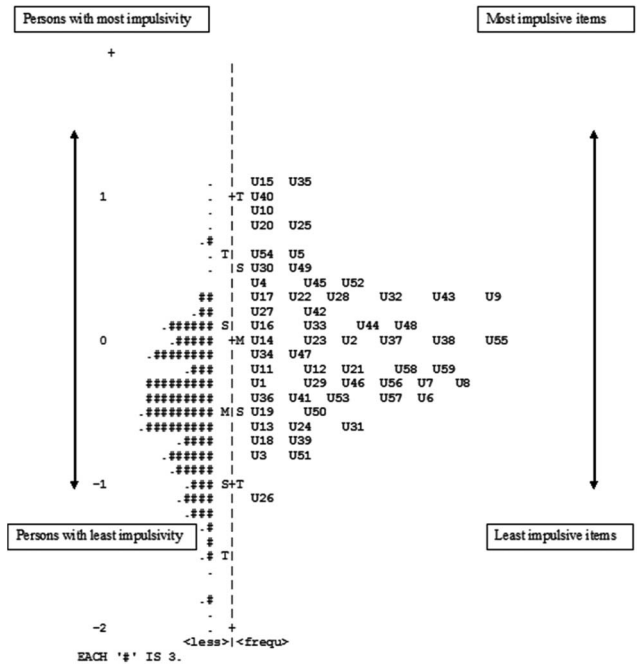

Figure 1. Person and item map for the UPPS-P. Items from the scale are shown on the right-hand side of the figure, and person measures are highlighted by a '#'. Each '#' represents three subjects. M = mean, S = 1 *SD* from the mean, T = 2 *SD* from the mean.

Item Map

Figure 1 shows that items values (*M* = 0.0 logit units) were located in a slightly higher level of impulsivity (i.e., difficulty) than persons values (*M* = −0.47 logit units), suggesting this set of items is measuring a higher level of the impulsivity construct than the typical level of impulsivity usually found in college students. Regarding the content measured by the items, 11 of the 14 item values located at the higher end of the continuum (higher level of impulsivity) belonged to the Positive Urgency subscale (Items 5, 10, 15, 20, 25, 30, 35, 40, 49, 52, and 54). At the lower end of the continuum (lower level of impulsivity), six of the eight less difficult items belonged to the Sensation Seeking subscale (Items 3, 13, 18, 26, 31, and 51). The rest of the items, which mostly belong to the Negative Urgency, Lack of Perseveration, and Lack of Premeditation subscales, were located in a more central position, at the medium level of the continuum.

Different Item Functioning

Table 2 presents severity estimates obtained for women and men. Twenty-three items showed estimated location values that were significantly different for men and women, suggesting these items are not functioning uniformly across gender. Specifically, 12 of these 23 items showed that it takes a higher level of impulsivity in men, compared with women, before there is a 50% chance of endorsing each of these items. This happened with Items 2, 7, 19, 29, 34, 38, 44, 50, 53, 55, 57, and 58. Eight of these 12 items belonged to the Negative Urgency subscale. On the other hand, 11 items showed it takes a higher level of impulsivity in women, compared with men, before there is a 50% chance of endorsing each these 11 items. This

Table 2
Item Difficulty Estimates and Measurement Errors

Item	Item content	Sev est.	*SE*	Infit		Outfit		Men	Women	Dif
				Mnsq	Zstd	Mnsq	*Z*			
26[a]	I would enjoy parachute jumping	−1.09	0.07	1.57	1.96	1.63	2.02	−1.29	−.99	−.30
51[a]	I would like to go scuba diving	−0.84	0.06	1.59	2.12	1.61	2.12	−1.00	−.76	−.24
3[a]	I generally seek new and exciting experiences and sensations	−0.77	0.06	0.84	−0.7	0.86	−0.6	−.96	−.67	−.29
39[a]	It is hard for me to resist acting on my feelings	−0.7	0.06	0.94	−0.27	0.95	−0.21	−.50	−.80	.30
18[a]	I would enjoy water skiing	−0.65	0.06	1.74	2.65	1.79	2.72	−.83	−.55	−.28
13[a]	I like sports and games (. . .) to choose your next move very quickly	−0.62	0.06	1.58	2.17	1.7	2.45	−1.29	−.28	−1.01
31[a]	I welcome new and exciting experiences and sensations	−0.57	0.06	0.88	−0.53	0.88	−0.5	−.65	−.51	−.14
24	I concentrate easily	−0.57	0.06	0.96	−0.16	1	−0.01	−.41	−.66	.25
19	Once I get going on something I hate to stop	−0.47	0.06	1.17	0.69	1.28	1.11	−.19	−.63	.45
50[a]	In the heat of an argument, I will often say things that I later regret	−0.46	0.06	0.98	−0.1	0.98	−0.07	−.18	−.63	.46
53	I always keep my feelings under control	−0.44	0.06	0.82	−0.82	0.82	−0.79	−.05	−.67	.62
36[a]	I would like to learn to fly an airplane	−0.39	0.06	1.68	2.49	1.71	2.49	−.99	−.04	−.95
41[a]	I sometimes like doing things that are a bit frightening	−0.37	0.06	0.93	−0.33	0.93	−0.29	−.72	−.16	−.56
57[a]	When I am very happy, I feel like it is ok to give in to cravings	−0.37	0.06	0.99	−0.04	1.02	0.09	−.15	−.51	.37
6	My thinking is usually careful and purposeful	−0.36	0.06	0.88	−0.53	0.92	−0.33	−.30	−.40	.09
7[a]	I have trouble resisting my cravings (for food, cigarettes, etc.)	−0.34	0.06	1.49	1.84	1.54	1.96	.12	−.60	.72
29[a]	When I am upset I often act without thinking	−0.34	0.06	0.85	−0.7	0.86	−0.61	−.15	−.46	.31
8[a]	I'll try anything once	−0.3	0.06	1.01	0.05	1.05	0.2	−.49	−.18	−.31
46[a]	I would enjoy (. . .) skiing very fast down a high mountain slope	−0.3	0.06	1.41	1.57	1.4	1.49	−.73	−.04	−.70
56[a]	I would enjoy fast driving	−0.3	0.06	1.36	1.41	1.37	1.38	−.57	−.13	−.44
1	I have a reserved and cautious attitude toward life	−0.29	0.06	0.82	−0.8	0.85	−0.65	−.15	−.37	.22
21	I don't like to start a project until I know exactly how to proceed	−0.24	0.06	1.09	0.37	1.12	0.49	−.10	−.33	.23
58[a]	Sometimes I do impulsive things that I later regret	−0.23	0.06	0.9	−0.42	0.9	−0.4	−.05	−.34	.29
11	I am not one of those people who blurt out things without thinking	−0.18	0.06	1.09	0.38	1.12	0.48	.03	−.31	.33
59[a]	I am surprised at the things I do while in a great mood	−0.17	0.06	1.01	0.06	1.04	0.18	−.14	−.20	.07
12[a]	I often get involved in things I later wish I could get out of	−0.16	0.06	0.94	−0.24	0.94	−0.22	−.26	−.09	−.17
34[a]	When I feel rejected, I will often say things that I later regret	−0.11	0.06	1.16	0.64	1.18	0.69	.08	−.22	.30
47[a]	Sometimes there are many things to be done (. . .) I just ignore them	−0.06	0.06	1	0.01	1.06	0.22	−.19	.00	−.19
14	Unfinished tasks really bother me	−0.04	0.06	1.09	0.38	1.15	0.57	−.12	.02	−.14
55	(. . .) I consider all the advantages and disadvantages	−0.02	0.06	0.77	−1.03	0.79	−0.88	.18	−.15	−.34
2[a]	I have trouble controlling my impulses	−0.01	0.06	0.99	−0.04	1	0.01	.27	−.16	.43
23[a]	I quite enjoy taking risks	0	0.06	0.88	−0.52	0.87	−0.55	−.35	.22	−.56
37	I am a person who always gets the job done	0	0.06	0.66	−1.59	0.69	−1.35	−.01	.00	.00
38	I am a cautious person	0.01	0.06	0.62	−1.78	0.66	−1.53	.22	−.12	.34
44[a]	I often make matters worse (. . .) act without thinking when upset	0.05	0.06	1.04	0.18	1.08	0.31	.24	−.07	.31
33	I usually make up my mind through careful reasoning	0.08	0.06	0.65	−1.62	0.66	−1.46	.24	−.02	.27
48	I usually think carefully before doing anything	0.1	0.07	0.68	−1.43	0.69	−1.32	.24	.02	.23
16	Once I get going on something I hate to stop	0.14	0.07	0.79	−0.87	0.85	−0.58	.30	.05	.25
27	I finish what I start	0.2	0.07	0.74	−1.1	0.74	−1.04	.35	.10	.25
42	I almost always finish projects that I start	0.23	0.07	0.71	−1.26	0.72	−1.11	.29	.19	.10
22	Sometimes when I feel bad, I can't seem to stop what I am doing (. . .)	0.27	0.07	1.04	0.14	1.05	0.2	.34	.23	.11

(*table continues*)

Table 2 (*continued*)

Item	Item content	Sev est.	*SE*	Infit		Outfit		Men	Women	Dif
				Mnsq	Zstd	Mnsq	*Z*			
32	I am able to pace myself so as to get things done on time	0.28	0.07	0.82	−0.73	0.83	−0.65	.32	.25	.06
43	(. . .) I like to find out what to expect from a new situation	0.28	0.07	0.83	−0.67	0.85	−0.56	.30	.25	.06
17[a]	When I feel bad, I will often do things I later regret (. . .)	0.32	0.07	0.89	−0.43	0.86	−0.5	.38	.29	.09
28	I tend to value and follow a rational, "sensible" approach to things	0.32	0.07	0.68	−1.36	0.69	−1.22	.37	.29	.07
9[a]	I tend to give up easily	0.35	0.07	1.23	0.79	1.27	0.86	.53	.25	.29
45[a]	When overjoyed, I feel like I can't stop myself from going overboard	0.35	0.07	1.07	0.24	1.06	0.21	.40	.31	.10
52[a]	I tend to act without thinking when I am really excited	0.44	0.07	0.84	−0.61	0.79	−0.76	.55	.38	.17
4	I generally like to see things through to the end	0.44	0.07	1.05	0.2	1.03	0.1	.37	.49	−.13
30[a]	Others would say I make bad choices when I am extremely happy (. . .)	0.47	0.07	0.9	−0.37	0.97	−0.08	.47	.48	−.01
49[a]	When I am really excited, I tend not to think of the consequences (. . .)	0.49	0.07	0.83	−0.63	0.76	−0.86	.53	.46	.07
54[a]	When I am really happy, I often find myself in situations (. . .)	0.56	0.07	0.98	−0.06	0.98	−0.06	.38	.70	−.32
5[a]	When I am very happy, I can't seem to stop myself from doing (. . .)	0.6	0.07	1.05	0.17	1.03	0.1	.39	.73	−.34
20[a]	I tend to lose control when I am in a great mood	0.8	0.08	0.94	−0.18	0.84	−0.48	.65	.93	−.28
25[a]	When I am really ecstatic, I tend to get out of control	0.82	0.08	0.89	−0.35	0.79	−0.65	.51	1.07	−.56
10[a]	When I am in great mood, I tend to get into (. . .) problems	0.95	0.08	1	0	0.85	−0.43	.75	1.09	−.34
40[a]	When really happy, I tend to do things (. . .) with bad consequences	1.01	0.08	1.03	0.09	0.83	−0.46	.85	1.13	−.28
15[a]	When very happy, I tend to do things that cause problems (. . .)	1.06	0.09	1.01	0.04	0.83	−0.45	.83	1.22	−.39
35[a]	Others are worried about the things I do when very excited (. . .)	1.14	0.09	1.1	0.26	0.95	−0.13	.78	1.44	−.65
	Threshold parameter τ1=-.72 τ2=.05 τ3=.67									

Note. Sev. est. = severity estimate; Mnsq = mean square residual; Zstd = standardized mean square residual. Dif reflects the difference in item severity estimates obtained in men compared to women. Items are ordered from least to most difficult.
[a] Reverse-coding items.

happened with Items 3, 5, 13, 23, 25, 35, 36, 41, 46, 56, 54, and 56. Seven of these 11 items belonged to the Sensation Seeking subscale and four belonged to the Positive Urgency subscale.

Information Function

The reliability estimate of both items and persons values was high (0.98 and 0.90, respectively), and separation indices for items and persons values were 7.0 and 3.01, respectively. The estimated error of the parameters was low, indicating adequate precision of the item scores. Item values were estimated with similar precision along the continuum, which is reflected in the uniformity of the estimation error along the continuum. Estimates for each of the 59 item values and their associated standard errors are presented in Table 2.

The information function shows that the highest precision of the test was found in the intermediate values of the continuum. Table 3 shows the estimated level of impulsivity that is expected to be associated with different ranges of raw scores on this measure. These results show that the great majority of the sample is concentrated close to the middle level of the continuum. None of the participants scored at the lowest or at the highest level of the continuum. With regard to the precision with which the examinees are measured, 5.4% of the participants fell in the range between −1.99 and −1.3 logits, which corresponded to a mean estimation error of 0.21 logits; another 24.5% of the examinees fell in the range between −1.26 and −0.74 logits, which corresponded to a mean estimation error of 0.17; 65.2% fell in the range between −0.71 and 0.3 logits, which corresponded to a mean estimation error of 0.14; and finally, 4.5% of the examinees fell in the range between 0.32 and 1.09 logits, which corresponded to a mean estimation error of 0.16.

Evidence Based on Internal Structure

Replicating previous research (Cyders, 2013; Cyders & Smith, 2007), results from the CFA found that Model B (χ^2 = 198.929, p = .000; χ^2/df = 2.116, CFI = .963, TLI = .953, RMSEA = .059) and Model C (χ^2 = 209.539, p = .000; χ^2/df = 2.117, CFI = .961, TLI = .953, RMSEA = .059) both provided acceptable fit to the data and fit the data equally well (see Figures 3 and 4). Model A provided poor fit to the data (χ^2 = 1408.186, p = .000; χ^2/df = 13.54, CFI = .544, TLI = .474, RMSEA = .199).

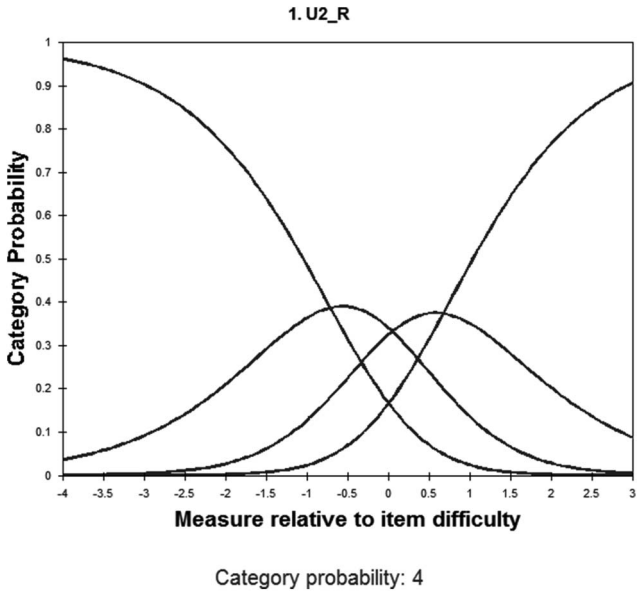

Figure 2. The probability of selecting each of the four response alternatives is plotted along the y-axis showing that the threshold parameters of the four categories were ordered (the threshold parameter corresponding to the category option *strongly agree* was lower than the threshold parameter observed for the category option *somewhat agree*, which in turn was lower than the threshold parameter observed for the category option *somewhat disagree* which was lower than the threshold parameter observed in the last and fourth category *strongly disagree*).

Discussion

The present study utilized IRT to analyze the psychometric properties of test scores on the Spanish version of the UPPS-P, a measure of impulsivity that accounts for the multidimensionality of this construct. To our knowledge, this is the first study to analyze the psychometric properties of the UPPS-P model applying IRT, and the Rasch model in particular. The high precision for the items and persons parameters suggests that the Spanish version of the UPPS-P provides scores that would be reproducible in a sample with similar characteristics. The high reliability of scores obtained by the Spanish version of the UPPS-P indicates that it is possible to identify the response patterns that were predicted by the model (Andrich, 1982); that is, college students who were predicted to have higher levels of impulsivity had higher scores, and students who were predicted to have lower levels of impulsivity had lower scores. Finally, the person separation index of the UPPS-P indicates that the scores effectively distinguish among

Table 3
Raw Total Scores on the Sum of the 59 items, Estimated Impulsivity of the Scores in Logit Units, and Frequencies of Scores in the Sample

Impulsivity estimate	Raw score	Mean *SE*	Frequency	% of the sample
−2.6/−1.93	69–78	0.272	3	0.9
−1.88/−1.47	79–88	0.212	10	3
−1.44/−1.14	89–98	0.183	20	6.3
−1.11/−0.86	99–108	0.165	40	12.7
−0.84/−0.62	109–118	0.155	46	14.5
−0.6/−0.4	119–128	0.15	66	20.9
−0.38/−0.19	129–138	0.143	40	12.5
−0.17/0.01	139–148	0.14	43	13.5
0.03/0.22	149–158	0.14	28	8.8
0.24/0.43	159–168	0.145	7	2.1
0.45/0.65	169–178	0.15	5	1.5
0.67/0.89	179–188	0.157	5	1.5
0.92/1.17	189–198	0.167	5	1.5

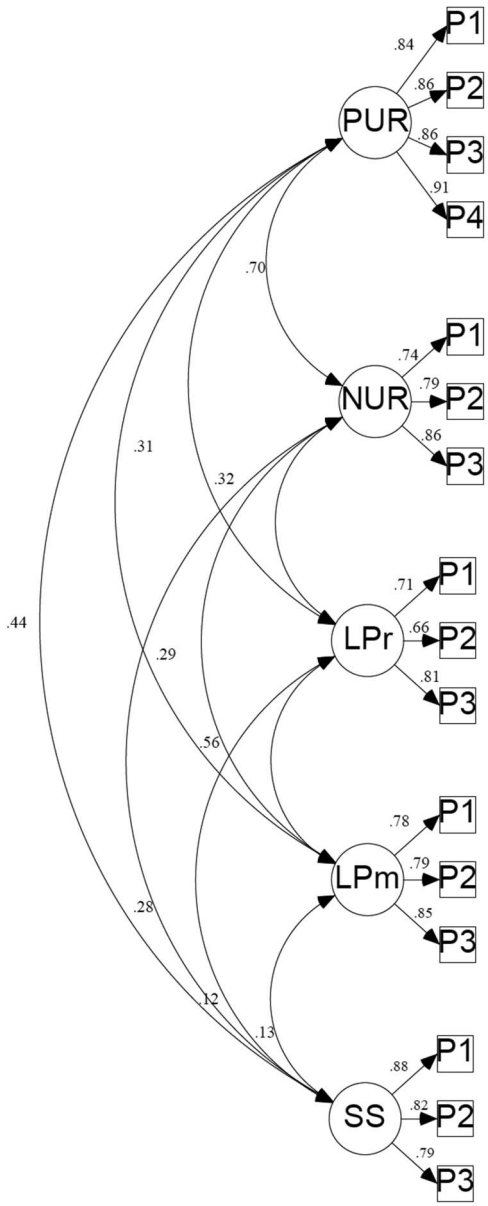

Figure 3. This figure depicts a five-factor model (Model B), in which items from the UPPS-P load on their individual subscale. Circles reflect latent variables and squares reflect measured variables. The measured indicators of the latent traits are parcels of items: P1 stands for Parcel 1 for a given factor. For ease of presentation, error variances are not depicted. PUR = Positive Urgency; NUR = Negative Urgency; LPr = Lack of Perseverance; LPm = Lack of Premeditation; SS = Sensation Seeking.

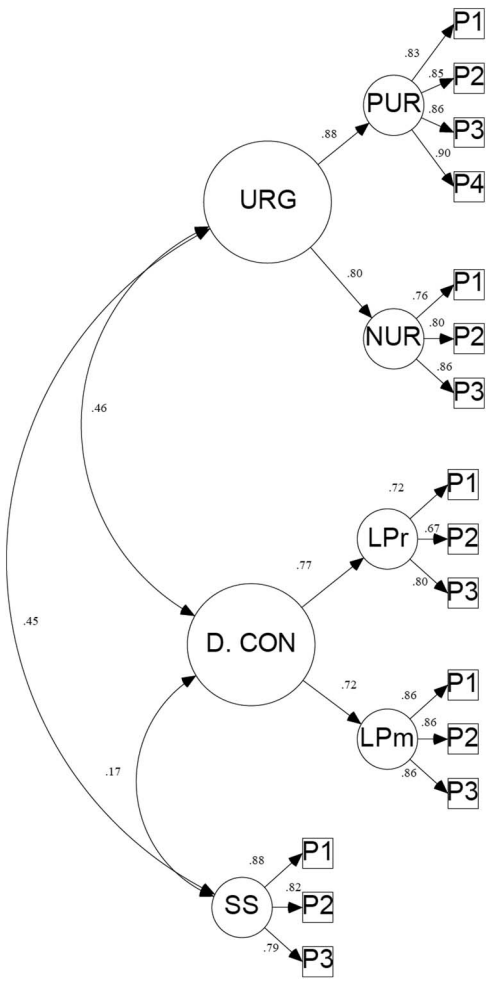

Figure 4. This figure depicts a three-factor hierarchical model (Model C), in which items load on their individual factors, which then load onto the following higher order factors—SS = sensation seeking; D.CON = deficits in conscientiousness (LPr = Lack of Perseverance; LPm = Lack of Premeditation); URG = Emotion-Based Dispositions (NUR = Negative Urgency; PUR = Positive Urgency). Circles reflect latent variables and squares reflect measured variables. The measured indicators of the latent traits are parcels of items: P1 stands for Parcel 1 for a given factor. For ease of presentation, error variances are not depicted.

persons according to their locations on the impulsivity continuum (Hendriks, Fyfe, Styles, Skinner, & Merriman, 2012), and the separation index for the items indicates that the item scores effectively discriminate between different levels of impulsivity (Andrich, 1982). Altogether, the fit of the data to the model, the consistent response structure, the low measurement error of the item scores, and the high reliability of the item scores add evidence to the feasibility of the UPPS-P model to assess five dimensions of impulsivity in Spanish-speaking college students from Argentina.

Applying the Rasch model provides information on how the impulsivity constructs are organized along the impulsivity continuum, allowing for a better understanding of the validity of the constructs being measured (Baghaei, 2008). These results showed that half of the items assessing the lower end of the continuum (i.e., lower impulsivity) were those from the Sensation Seeking subscale, whereas many of the more difficult items (i.e., higher impulsivity) were those from the Positive Urgency scale. Item location (i.e., difficulty) provides information on the ability (i.e., impulsivity level) needed to endorse each of the items measuring the latent construct. It is possible that the strong relationship between positive urgency and problem behaviors found in previous work (Coskunpinar, Dir, & Cyders, 2013; Cyders et al., 2007, 2010; Cyders & Smith, 2008) could be because those endorsing positive urgency items are simply more impulsive than those not endorsing such items. This possibility should be examined in future work. Importantly, it should be noticed that, despite many positive urgency and some sensation-seeking items being condensed at the higher and lower ends of the continuum, respectively, items featuring the five separate impulsivity dimensions fall intermingled alongside the construct. This provides empirical evidence that all the dimensions are integrated in the distribution of the impulsivity continuum.

If subjects that endorse positive urgency items are simply more impulsive, it is reasonable to expect that those individuals with a tendency to act rashly under intense positive emotional states would display higher scores in the rest of the subscales. Interestingly, Albein-Urios, Pilatti, Lozano, Martínez-González, and Verdejo-García (2014) applied latent class analysis to characterize addicted subjects based on trait (UPPS-P) and cognitive (i.e., Stroop) impulsivity scores. The two obtained classes significantly differed on seven measures of impulsivity, with one of the groups of addicted individuals displaying greater trait impulsivity in the five UPPS-P subscales and also higher impulsivity in the two cognitive measures (Albein-Urios et al., 2014). Among this high-impulsivity group, however, mean scores on Positive Urgency were higher than mean scores on the remaining UPPS-P subscales. Although all the participants in the study were addicted subjects, and almost all of them were male, these results suggest that it is not as simple as assuming that those with a tendency to act rashly under intense positive emotional states are more impulsive individuals. Similarly, Michalczuk et al. (2011) observed that pathological gamblers scored higher on both urgency scales than the rest of the UPPS-P scales. Healthy controls, on the other side, scored higher in sensation seeking than in the other four subscales, which mirrors the current study findings. Mean scores on both urgency subscales, but not on Sensation Seeking, were not significantly different between pathological gamblers and healthy controls (Michalczuk et al., 2011). Moreover, Cyders et al. (2007) observed that women with a diagnosed alcohol disorder (i.e., alcohol abuse or alcohol dependence) scored significantly higher in positive urgency than both healthy control women and women with eating disorders. Therefore, although the current finding shows that positive urgency items were more difficult than sensation-seeking items, the content and difficulty of items is likely to vary across sample types; therefore, more studies aimed at exploring how items of the UPPS-P are organized in samples of persons with disordered behaviors—such as pathological gambling, alcohol dependence, and disordered eating—are needed.

The item location along the impulsivity continuum should be interpreted in the context of the developmental characteristics of this sample. Most of the college students that took part in the study were in the age range between 18 and 25, which is a period characterized by higher levels of impulsivity, especially high risk

taking and novelty seeking (Balodis et al., 2009; Blakemore, & Robbins, 2012; Casey, Jones, & Somerville, 2011; Chambers & Potenza, 2003). It is possible, therefore, that items measuring sensation seeking were more likely to be endorsed by this highly novelty seeking sample, making them somewhat less difficult in this sample. Accordingly, sensation seeking exhibits the greatest mean scores among the five UPPS-P trait in a previously studied sample of healthy college students (Cándido et al., 2012). Additionally, McCrae, Martin, and Costa (2005) applied the NEO-PI-3 to a sample of adults aged 21 to 91 and found a gradual and steady decreased in levels of impulsivity throughout development. These results add more evidence regarding higher sensation seeking among this population. This elevated risk taking and novelty seeking are thought to be related to maturational processes in the brain and to underlie the high occurrence of risk taking and problem behaviors typically found during this developmental period (Chambers & Potenza, 2003). Because these higher levels tend to reduce throughout adulthood (Casey et al., 2011; Steinberg, 2008), it is likely that as young college students mature into adulthood a different organization of the impulsivity construct might be found.

DIF across gender subgroups was found for 23 items, such that men, compared with women, need a higher level of impulsivity before there is a 50% chance of endorsing 12 of these items, whereas women need a higher level of impulsivity on the remaining items before there is a 50% chance of endorsing the item. The most likely reason for this differential functioning relates to known differences in impulsivity levels between men and women. It is possible that cultural differences underlie these apparent gender-related differences; however, the present conclusions are, for the most part, consistent with previous work that employed the original UPPS-P. Cyders et al. (2013) found that many of the items assessing the tendency to seek for new and exciting emotions and adventures were more frequently endorsed by men, indicating that, at a same level of ability (i.e., impulsivity), men are more likely than women to endorse these items. On the other hand, most of the items measuring the tendency to act impulsively under an intense negative affect were more frequently endorsed by women, suggesting that, at a same level of impulsivity, women are more likely than men to endorse these items. Previous studies have also found that men score higher than women in sensation seeking (Cross, Cyrenne, & Brown, 2013; Cyders, 2013; Quinn & Fromme, 2011), and that women exhibit higher levels of neuroticism (which is related to negative urgency) than men (Costa, Terracciano, & McCrae, 2001; Spillane, Cyders, & Maurelli, 2012; Weisberg, Deyoung, & Hirsh, 2011). Additionally, trait-level differences between men and women do not necessarily mean that the trait scores are differentially valid for men and women; in fact, Cyders (2013) found that the UPPS-P trait scores were equally valid in predicting a wide range of risk-taking variables across men and women, despite trait-level differences on Sensation Seeking and Negative Urgency subscales.

Finally, the current study found that the Spanish version of the UPPS-P generally replicates previously supported factor structure of the original English-language version of the UPPS-P (Cyders, 2013; Cyders & Smith, 2007). Although a three-factor hierarchical model (Model C in the current study) was most highly supported in original work with the UPPS-P (Cyders & Smith, 2007), more recent work with larger and more diverse samples has found that a five-factor model fits the data equally well (Model B in the current study; see Cyders, 2013). Thus, the present study shows that, at least in the current sample, the factor structure of the Spanish version of the UPPS-P replicates previous work with the original UPPS-P.

Results from the present study should be considered in the context of some limitations. Participants were selected following an incidental sampling procedure, and they were enrolled in only three of the 13 departments of the public university of Cordoba. There was no record of the recruitment rate, and college students who agreed to participate in the present study may have differed from college students who did not agree to participate. The use of a nonprobabilistic sample may have affected the estimation of the item parameters. This limitation, however, is not a determinant factor for the calculation of the item and person parameters when using Rasch models, although this is not the case for other IRT models (Glas, 1989). Additionally, as discussed earlier, participants were fairly young and from a college student sample, so it is unclear whether or not results would generalize to other more diverse samples. However, given the high rates of addictive and risk-taking behaviors among college students, it is desirable to assess how well impulsivity traits are being measured in this high-risk sample. Moreover, although most of the participants were younger than 30 years old, 4% of them were 31 to 57 years old. This may have added additional variability to the results and further limits the representativeness of the sample.

Another limitation is the lack of analysis addressing the specific association between each UPPS-P subscale score and different risk-related outcomes, such as heavy alcohol use, disordered gambling, or illegal substance use. Despite numerous studies supporting the association between UPPS-P traits and a broad range of disordered behaviors such as problem alcohol drinking (see Coskunpinar et al., 2013, for a meta-analysis), disordered eating (see Fischer, Smith, & Cyders, 2008, for a meta-analysis), gambling frequency (Cyders & Smith, 2008), pathological gambling (Albein-Urios et al., 2014), illegal drug use (Albein-Urios et al., 2014; Torres et al., 2013; Zapolski et al., 2009), and risky sexual behavior (Zapolski et al., 2009), it would have been useful to analyze, separately for women and men, the association between each subscale score and a wide range of disordered behaviors. Previous work provided evidence about how, despite gender differences in trait impulsivity, the UPPS-P subscale scores are similarly related to greater occurrence of different risky behaviors in both men and women (Cyders, 2013).

Another limitation is the use of a nonclinical sample or the possible lack of generalization to a broader, nonuniversity population. Previous studies conducted within the student community of the National University of Cordoba, however, indicate a relatively high prevalence of alcohol abuse (Pilatti, Caneto, et al., 2014; Pilatti, Urrizaga, Chincolla, & Cupani, 2014) and gambling (Pilatti & Tuzinkievich, in press; Tuzinkievich, Vera, Caneto, Garimaldi, & Pilatti, 2013; Vera, Caneto, Tuzinkievich, & Garimaldi, 2014), making this a high-risk sample of clinical interest. Additionally, evidence exists that psychological studies conducted on university students can be successfully transferred to the general community (Levenson, Kiehl, & Fitzpatrick, 1995; Lilienfeld & Andrews, 1996).

Future lines of research suggested by the present study include exploring the organization of the impulsivity construct across

different developmental stages, and analyzing how developmental changes in the organization of the UPPS-P model relate to changes in risky and problem behaviors. Both the UPPS-Child Version (Zapolski, Stairs, Settles, Combs, & Smith, 2010) and the UPPS-P (Gunn & Smith, 2010; Zapolski & Smith, 2013) model were successfully tested in preadolescent children, with results showing a positive association between the disposition to act rashly and risky behaviors (Zapolski, Stairs, et al., 2010). New research would benefit from exploring potential structural differences across gender during early (Zapolski, Stairs, et al., 2010) and later developmental stages. In addtion, it would be interesting to replicate, with the Spanish version of the UPPS-P, previous work by Cyders (2013) that examined the role of the UPPS-P traits in the prediction of a wide variety of risk-taking behaviors across men and women. Additionally, future work should examine the measurement invariance of these scores model across Spanish men and women. Finally, although the present results indicate that the factor structure of the Spanish version of the UPPS-P replicates previous work with the original UPPS-P, this should be replicated in more diverse samples, including other Spanish-speaking countries and samples of Spanish speakers in the United States.

Despite the limitations already outlined, results from the present study suggest that scores measured by this Spanish version of the UPPS-P show adequate psychometric properties to accurately assess the multidimensional model of impulsivity, which represents the most exhaustive measure of this construct. The ultimate application of this work is to provide a comprehensive measure of impulsivity, a variable associated with several important psychological constructs such as—but not limited to—greater vulnerability to drug use and abuse in individuals of the Spanish-speaking community, which nears 400 million worldwide.

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