Alternate Forms Public Domain RIASEC Markers for Interests and Self-Efficacy: Spanish version

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Abstract

Introduction: The Alternate Forms Public Domain (AFPD) RIASEC markers are tools that since its creation have been widely used in various cultures for the study of personality and interests, mainly in the academic field. The main purpose of the present study was to develop a Spanish version of the AFPD RIASEC and analyze their psychometric properties in Argentinean samples.

Method: The sample was 1107 university students (61.6% female and 38% male), aged between 18 to 62 years old. The translation of the items, studies of internal structure, convergent validity and internal consistency were carried out.

Results: The results suggested that the Spanish version of the AFPD has an adequate internal structure and can be used to accurately assess the six basic personality types that were proposed by Holland. We verified the same psychometric properties of the markers for occupational and activity items to measure interest and self-efficacy.

Discussion: Overall, the results were encouraging, indicating that this instrument can be considered an acceptable option for Argentinean college students to measure professional interests and self-efficacy as an auxiliary tool for career counseling

Keywords: Interests; Self-Efficacy; RIASEC; AFPD

Resumen

Introducción: Las Escalas de Actividades y Ocupaciones de Dominio Público de indicadores del RIASEC (AFPD) son herramientas que desde su creación han sido ampliamente utilizadas en diversas culturas para el estudio de la personalidad y los intereses, fundamentalmente en el ámbito académico. El objetivo principal del presente estudio fue desarrollar la versión en español de AFPD RIASEC y analizar sus propiedades psicométricas en muestra argentina.

Método: La muestra estuvo compuesta por 1107 universitarios (61.6% mujeres y 38% hombres), con edades comprendidas entre 18 y 62 años. Se realizó la traducción de los ítems, estudios de estructura interna, validez convergente y consistencia interna.

Resultados: Los resultados sugieren que la versión en español de la AFPD tiene una estructura adecuada y puede utilizarse para evaluar con precisión los seis tipos de personalidad básicos propuestos por Holland. Verificamos las mismas propiedades psicométricas de los marcadores de los ítems ocupacionales y de actividad para medir el interés y la autoeficacia.

Discusión: Los resultados fueron alentadores, lo que indica que este instrumento podría considerarse una opción aceptable para para medir los intereses profesionales y la autoeficacia en los estudiantes universitarios argentinos, considerándose una herramienta auxiliar en la orientación vocacional.

Keywords: Intereses; Autoeficacia; RIASEC; AFPD

Introduction

In the field of vocational psychology, vocational interests are one of the constructs that has received the most attention from health researches and professionals. The main purpose of vocational psychology is to facilitate the linking process between the individuals and the academic and working opportunities that allow them to reach success and satisfaction (Nye, Su, Rounds, & Drasgow, 2012). Interests refers to the preferences for certain activities and contexts that encourage individuals to reach the environment and roles consistent with their preferences (Armstrong & Vogel, 2010). The interests are very stable in time, even during mid-adolescence, an aspect that contributes to its strong predictive validation (Low, Yoon, Roberts, & Rounds, 2005).

The investigation about vocational interests is generally based on the RIASEC model (Holland, 1997). This model includes six types of interests and working environments: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Realistic refers to people that manipulate objects, work with their hands, and have mechanical abilities. Investigative refers to people who have analytic abilities, handle abstract ideas, and have no conventional values. Within the artistic personality, we find people who are creative, original, innovative, and like independence. Social refers to people who enjoy helping others and have excellent interpersonal skills. Enterprising refers to people who value positions of power, are eloquent and persuasive, and have leadership qualities. Finally, within the conventional personality we find individuals who show abilities for numbers and data handling; they are known for being methodical and practical.

Generally, the meta-analytical studies support the Holland theory structure (Foutch, McHugh, Bertoch, & Reardon, 2014; Tracey & Rounds, 1993). Nevertheless, there is a certain controversy about the adjustment of the model in minority groups in the United States, as well as in international samples (Rounds & Tracey, 1996). Besides, meta-analytical studies (Su, Rounds, & Armstrong, 2009) have found a substantial difference in the typology according to the sex of the participants, for example, men have higher interests in Realistic (d=.84) and Investigator (d=.26), and women in Artistic (d=.35), Social (d=.68), and Conventional (d=.33).

The vocational interest's scales are the most popular instruments among career counselors and they are good predictors for career goals and academic satisfaction, which are two critical variables of career development (Lubinski, 2000). Liao, Armstrong, and Rounds (2008) proposed the development of indicators of interests in the public domain (IPIP), from where the investigators can obtain, without permission or additional costs, items for their subsequent inspection, translation to other languages, and administration.

Armstrong, Allison, and Rounds (2008) developed and validated a scale of activities and occupations of Alternate Forms Public Domain (AFPD) RIASEC markers. The AFPD is composed of four measures of activities and occupations that are related to the RIASEC model. Sets A and B for Occupations consist of 48 items that are organized into six subscales (eight items each) that are selected from the O-NET database (Peterson, Mumford, Borman, Jeanneret, & Fleishman, 1999). Activities in Sets A and B have the same structure, and the eight items in each subscale were selected from the 30 items of the Interest Profiler (Lewis & Rivkin, 1999). One particularity of these items is that by changing the response scale, other important heuristic variables in the career guidance field (e.g., self-efficacy beliefs) can be measured (Armstrong & Vogel, 2010). Self-efficacy, defined as the beliefs in one's capabilities to organize and execute the courses of action required to manage prospective situations (Bandura, 1987), has been shown to have predictive power for critical variables in career development, such as academic achievement (Cupani & Pautassi, 2013) and choice goals and achievement (Ghaleb, Ghaith & Akour, 2015; Jansen, Scherer & Schroeders, 2015).

The AFPD scales have been used in different studies, for different purposes and cultures (Açıkgöz & Toker, 2018; Nye, Butt, Bradburn, & Prasad, 2018; Phan, 2015). The literature review showed that many studies of the AFPD scales were carry out with university students samples (Callahan, 2017; Ludwikowski, Armstrong, & Lannin, 2018; Perera & McIlveen, 2018) but none of them included Latino population or Spanish speaker's participants.

Although translating and exporting measures of interest from the United States to other countries is increasingly common, few studies have examined the validity of these adaptations (Zhang, Kube, Wang, & Tracey, 2013). To adapt a test to a particular environment is necessary to evaluate the technical requirements of validity and reliability, in addition to carefully translating the items (Kline, 2015; Rust & Golombok, 2014). Moreover, a critical issue with regard to the RIASEC model is its validity in different cultural and social contexts. Alt-

hough it has wide recognition and acceptance in the United States, researchers and professionals from other countries have incautiously adopted the model, although the generalization of this kind of instrument is still questionable (Rounds & Tracey, 1996). Some authors (Walsh, Savickas, & Hartung, 2013) argue that interest scales can have different results according to different samples.

In Argentina, Cupani and Perez (2014) conducted a preliminary study of Sets A and B for Activities from the AFPD. This study was conducted with sample of 365 university students. The main objective was to perform a back translation of the items and analyze their psychometric properties, such as verifying the internal structure of the test and reliability of the scales and obtaining evidence of external validity (convergent validity, sex-related differences between groups, and predictive validity). The results indicated that both Sets A and B for Activities had a proper structure and could be accurately used to assess the six personality types that were proposed by Holland. The main limitation of this work, however, was that only sets that corresponded to Activities were evaluated, with no data for Sets A and B for Occupations. The only procedure that was used to assess the internal structure of the instrument was an exploratory factor analysis.

The aim of the present work was to develop a Spanish version for Argentinian college students of the four measures of AFPD RIASEC markers (Sets A and B for Activities and Sets A and B for Occupations), which would allow measuring both interests and self-efficacy beliefs. To reach this goal, we analyzed the psychometric properties of the scores such as validity, reliability and differences by gender.

Method

Participants

A total of 1,107 individuals participated in the study (682 [61.6%] female and 421 [38%] male, 4 did not respond [0,4%]). The participants were native Spanish speaker's college students. They were 18 to 62 years old (M = 21.88 years; SD = 4.41 years) and lived in Cordoba, Argentina. The age diversity of the participants responds to the fact that the Argentine University System is public and free; and age does not constitute a limit to enrol in the University. The range distribution was from 18 to 21 years old (57.6%), 22 to 25 years old (31.8%), 26 to 29 years old (5.5%), 30 to 37 years old (3.7%), and more than 38 years old (1.4%). The participants were studying in different academic units of the National University

of Córdoba, National Technological University, and Business and Administration Higher School. The distribution according to the categorization of the Holland typology was Realistic = 18.9%, Investigative = 16.1%, Artistic = 16.5%, Social = 18.5%, Enterprising = 15.6% and Conventional = 14.5%.

Instruments

AFPD RIASEC markers (Armstrong et al., 2008). The AFPD is composed of two forms for Activities (Sets A and B) and two forms (Sets A and B) for Occupations. It has 48 items for each scale (A and B) of Activities and Occupations. These scales allow the measurement of interests and self-efficacy beliefs in the six RIASEC domains. The participants responded to Sets A and B for Activities (e.g. *Test the quality of parts before shipment*) and Occupations (e.g. *Electronics Engineering Technicians*), rating the degree to which they would like to perform the work activity. The ratings were made on a 5-point Likert-type scale, ranging from 1 (Strongly Dislike) to 5 (Strongly Like). Following the procedures that were outlined by Armstrong and Vogel (2010), Sets A and B for Activities and Occupations were administered using an alternative self-efficacy rating format. The participants were asked to rate the degree of their confidence in their abilities to perform each work-related activity. The ratings were made on a 5-point Likert-type scale, ranging from 1 (Very Low Confidence) to 5 (Very High Confidence). Armstrong et al. (2008) reported that the internal consistency (Cronbach's α) of the Activities subscales varied from .79 to .94 (M = .88), and the Occupations subscales varied from .74 to .88 (M = .84). According to convergent validity, the Activities scales correlated from .56 to .72 with theoretically similar scales of the Strong Interest Inventory-SII (Harmon, Hansen, Borgen, & Hammer, 1994) and from .73 to .86 with the subscales of Forms A and B of the Occupational AFPD. The structural analysis of AFPD scales supported the predictions according to the model of Holland.

Procedure

Both, activities and occupations items were translated by reverse translation procedure, conducted by professional translators in order to assure the equivalence between the two versions. Then, cognitive interviews were conducted with university students of the National University of Córdoba to analyze and correct the cultural and linguistic appropriateness. These interviews helped identify some occupations that are unrepresentative in our environment, even though, those items were retained for the time being.

The translated version of the complete AFPD (Activities and Occupations) was administered by the authors of this work. The eight scales were distributed in two protocols to facilitate its implementation. Half of the sample responded to Protocol I, which was composed by the following scales: Set A Activities-Interests (AAI), Set A Occupations-Self-efficacy (AOS), Set B Activities-Self-efficacy (BAS) and Set B Occupations-Interests (BOI). The other half of the sample responded to Protocol II, which was composed by: Set B Activities-Interests (BAI), Set B Occupations-Self-efficacy (BOS), Set A Activities-Self-efficacy (AAS) and Set A Occupations-Interests (AOI). This administration was made on a collective basis and in a regular school schedule, with previous permission of the teachers, asking each student´s collaboration and emphasizing the voluntary nature of their participation. The students signed a written informed consent and they were provided detailed instructions about how to complete the survey, and they were given an opportunity to ask questions.

Data Analysis

The patterns of missing values were first analyzed. We identified item nonresponse as one source of missing data. Missing data for item nonresponse ranged from 0.3% to 2.8%. Because this percentage is relatively small, we decided to impute the missing data with a measure of central tendency (mode) that was calculated from the participant's complete answers on the same scale. This method provides a conceptually attractive balance of accuracy and simplicity in cases in which some items are missing (Shrive, Stuart, Quan, & Ghali, 2006).

A confirmatory factor analysis (CFA) was conducted with Mplus to examine the underlying factor structure of the AFPD. We independently analyzed eight models that were composed of six latent correlated factors and items as observable variables with their respective measurement errors. Robust weighted least squares (WLS) was used to estimate the model because this method is better suited for factor analyses with ordinal indicators (Flora & Curran, 2004). Multiple indices of goodness of fit were used to evaluate the fit of the model: Tucker-Lewis index (TLI), Comparative Fit Index (CFI), root mean square error of approximation (RMSEA), and Weighted Root Mean Square Residual (WRMR). Values between .90 and .95 or higher for the CFI and TLI are considered acceptable to excellent adjustments. For the RMSEA, values between .05 and .08 are expected and for the WRMR, values less than 1.00 (Yu & Muthén, 2002). For this analysis, the sample was divided into two parts at random. The first half was selected to perform the CFA, and the second half was reserved for

cross-validation of the model. If the fit of the model was inadequate, then it is convenient to perform a maximum-likelihood CFA using item parceling as indicators. Thus, the parcels may serve as input variables for the CFA (De Bruin, 2004). To estimate the model, the method of maximum likelihood estimation was used. To assess the model adjustment, the CFI, TLI, RMSEA, and root mean square residual (RMSR) were calculated.

To evaluate internal consistency, composite reliability and Cronbach´s alpha was estimated for each subscale of the instrument. Values ≥ .70 were considered acceptable (Nunnally, 1978).

Convergent validity correlations between direct scores of the six scales of Sets A and B for Activities and Occupations, were analyzed because they are theoretically similar. Independent *t*-tests were used to assess sex-related differences, and Cohen's *d* was calculated to estimate effect sizes. According to the criteria of Cohen (1988), *d* values of .02, .50, and .80 indicate small, medium, and large effect sizes, respectively. Finally, a multivariate discriminant function analysis was used to assess the ability of the AFPD scales to discriminate among different college majors. The aim of this analysis was to find a lineal combination of the predictor variables that allows a better group differentiation or discrimination (criterion variable). Effect sizes for each set of predictors were indicated by Wilks's λ, which is the proportion of variance that is not accounted for by group membership. Conversely, $1 - \lambda$ indicates the proportion of variance that is explained by the predictor variables.

Results

Confirmatory Factor Analysis (AFC). Table 1 shows a summary of model fit indices for the eight sets of models tested. The results indicated that the eight models showed an acceptable to poor fit to the data for half of the sample. *Post hoc* model modifications were conducted taking into account the modification indexes and factorial loadings of some items in more than one factor. Thus, six items, one per subscale, to keep a similar number of items per subscale, were removed to improve model fit. A new CFA was conducted with the second half of the sample to confirm the new structure, but just in some cases the fit was adequate. Therefore, we tested new models using maximum-likelihood estimator and parceling with two and three items for each latent variable as indicators. The model fit of the eight 42-item version was acceptable. Table 1 shows the standardized factor loadings of the modified versions.

Table 1. *Factor Loadings for Each Model, Cronbach´s alpha, Composite Reliability and Model Fit*

| | Activities | | | | Occupations | | | |
| | Interest | | Self-Efficacy | | Interest | | Self-Efficacy | |
	AAI	BAI	AAS	BAS	AOI	BOI	AOS	BOS
R1	.38	.19	.64	.50	.41	.60	.62	.73
R2	.63	.70	.78	.66	.63	.74	.80	.80
R3	.74	.65	.75	.67	.45	.77	.64	.86
R4	.78	.83	.84	.79	.86	.68	.85	.73
R5	.69	.74	.72	.80	.76	.71	.81	.65
R6	.85	.83	.79	.78	.76	.78	.85	.77
R7	.63	.61	.75	.75	.69	.77	.80	.75
α	.82	.79	.87	.84	.78	.84	.86	.85
CR	.86	.85	.90	.88	.84	.88	.91	.90
I1	.60	.43	.69	.59	.72	.70	.78	.78
I2	.72	.83	.71	.74	.70	.71	.77	.78
I3	.78	.81	.86	.89	.69	.75	.75	.77
I4	.69	.90	.80	.92	.83	.75	.86	.86
I5	.91	.48	.89	.62	.60	.74	.77	.70
I6	.77	.92	.86	.93	.70	.69	.82	.71
I7	.88	.81	.86	.88	.78	.76	.77	.78
α	.88	.85	.89	.89	.81	.85	.87	.86
CR	.91	.90	.93	.93	.88	.89	.92	.91
A1	.62	.45	.75	.53	.73	.78	.83	.59
A2	.85	.47	.87	.62	.54	.73	.71	.70
A3	.68	.71	.76	.82	.76	.84	.77	.69
A4	.76	.69	.75	.83	.57	.68	.64	.70
A5	.82	.55	.72	.71	.88	.60	.89	.61
A6	.68	.77	.67	.69	.71	.65	.84	.68
A7	.84	.72	.82	.75	.87	.78	.69	.77
α	.87	.79	.87	.85	.84	.84	.89	.81
CR	.90	.82	.91	.89	.89	.89	.91	.86
S1	.58	.50	.59	.63	.55	.56	.77	.60
S2	.66	.81	.64	.82	.52	.68	.58	.74
S3	.77	.87	.74	.85	.45	.74	.63	.83
S4	.89	.85	.81	.92	.57	.64	.56	.59
S5	.71	.61	.65	.60	.78	.57	.71	.53
S6	.79	.67	.71	.72	.62	.63	.67	.67
S7	.76	.77	.73	.79	.75	.67	.66	.58
α	.85	.85	.84	.87	.71	.78	.79	.76
CR	.90	.89	.87	.91	.81	.83	.90	.84
E1	.67	.51	.71	.49	.74	.51	.83	.56
E2	.65	.65	.66	.62	.88	.82	.90	.74
E3	.70	.62	.76	.71	.67	.77	.52	.70
E4	.85	.50	.69	.52	.58	.30	.53	.42
E5	.64	.73	.59	.63	.72	.76	.77	.79
E6	.68	.75	.68	.78	.53	.62	.37	.74
E7	.66	.56	.70	.60	.73	.80	.74	.75
α	.82	.79	.83	.82	.80	.78	.82	.82
CR	.87	.81	.86	.82	.87	.85	.86	.86
C1	.82	.81	.85	.82	.67	.78	.65	.81
C2	.79	.84	.74	.74	.88	.81	.82	.87

C3	.82	.87	.79	.81	.70	.78	.72	.88
C4	.85	.69	.80	.67	.78	.86	.68	.79
C5	.75	.86	.78	.84	.38	.70	.54	.64
C6	.88	.89	.86	.86	.75	.77	.68	.78
C7	.80	.90	.83	.82	.75	.68	.64	.69
α	.90	.91	.89	.89	.79	.85	.82	.82
CR	.93	.93	.93	.92	.88	.91	.88	.92
Original model								
CFI	.87	.87	.86	.87	.78	.68	.83	.75
TLI	.86	.86	.85	.86	.77	.67	.81	.74
RMSEA	.07	.07	.07	.07	.09	.10	.09	.10
WRMR	1.68	1.71	1.77	1.70	2.30	2.52	2.18	2.45
Modified final model								
CFI	.92	.91	.89	.90	.87	.89	.91	.88
TLI	.91	.90	.88	.90	.84	.86	.88	.85
RMSEA	.06	.07	.07	.07	.10	.09	.09	.10
WRMR	1.42	1.54	1.59	1.52	.08	.06	.08	.09

Note. CR= Composite reliability. Set A of Activities - Interests (AAI), Set A of Occupations - Self-Efficacy (AOS), set B of Activities -Self- Efficacy (BAS), and set B of Occupations - Interests (BOI). Set B of Activities - Interests (BAI), set B of Occupations - Self-Efficacy (BOS), set A of Activities -Self-efficacy (AAS), and set A of Occupations - Interests (AOI).

Internal consistency. Cronbach´s coefficients for the Realistic factor were greater than .78; for the Investigative factor were greater than .81; for the Artistic factor, greater than .79; for the Social factor, greater than .71; for the Enterprising factor, greater than .78; and for the Conventional factor, greater than .79. Composite reliability indices for the Realistic factor varied between .84 and .91; for the Investigative factor, between .88 and .93; for the Artistic factor, between .82 and .91; for the Social factor, between .81 and .91; for the Enterprising factor, between .83 and .87; and for the Conventional factor, between .88 and .93 (see Table 1).

Convergent validity. We calculated the correlations between the eight sets of RIASEC measures, including eight measures of within-type correlation between interests and efficacy for each of the six RIASEC types. For the Realistic (R) type, the mean correlation across these eight comparisons was .62 with a range between .55 and .71; for the Investigative (I) type, the mean correlation was .65 (between .53 and .81); for the Artistic (A) type, the mean correlation was .79 (between .72 and .85); for the Social (S) type, the mean correlation was .65 (between .52 and 73); for the Enterprising (E) type, the mean correlation was .60 (between .46 and .72) and for the Conventional (C) type the mean correlation was .66 (between .53 and .78). All the correlations were significant at $p \leq .001$ level (See Appendix). These results pro-

vide validity evidence for the AFPD RIASEC scales for it use in evaluating the relationships between interests and self-efficacy beliefs (Armstrong & Vogel, 2010).

Sex Difference. The independent t-tests showed consistently that men had higher values than women in Realistic type (mean d = .78), whereas women had higher values in the Social type (mean d = .51). Significant difference was also observed in other scales of the Investigative, Artistic, Enterprising, and Conventional types, but the effect size was not constant in all forms (See Table 2).

Table 2. *Mean, standard deviation and significant t test*

	Female		Male			
	M	SD	M	SD	*t*	*d*
AAI						
R	14.28	4.40	18.10	5.30	9.29***	0.79
S	24.63	5.53	20.86	6.09	7.64***	0.65
AOS						
R	13.42	4.89	18.31	6.54	10.0***	0.86
I	13.41	5.49	14.48	5.82	2.22*	0.19
S	19.59	5.61	18.23	5.56	2.86**	0.24
E	18.50	5.75	20.32	6.06	3.61***	0.31
C	19.67	6.20	22.05	6.60	4.37***	0.37
BAS						
R	16.29	5.22	20.82	6.12	9.40***	0.80
S	21.96	6.37	17.64	6.29	7.98***	0.68
C	20.66	7.25	22.70	6.54	3.45***	0.29
BOI						
R	14.70	4.93	18.33	5.98	7.86***	0.67
S	18.43	5.29	16.11	5.44	5.08***	0.43
C	14.73	5.26	15.66	5.85	1.98*	0.17
BAI						
R	15.81	4.96	19.03	5.35	7.15***	0.63
S	22.98	5.68	17.62	5.47	10.86***	0.96
BOS						
R	13.58	5.19	18.70	6.10	10.48***	0.92
I	15.02	6.22	16.37	6.24	2.46*	0.22
S	19.75	5.90	17.38	5.43	4.71***	0.41
E	21.31	6.12	20.00	5.85	2.47*	0.22
AAS						
R	16.27	5.70	21.47	6.21	10.00***	0.88
S	25.14	5.83	20.92	5.85	8.21***	0.72
E	22.08	5.82	21.02	5.60	2.10*	0.19
AOI						
R	15.70	5.78	19.74	5.49	8.10***	0.71
S	19.86	5.22	17.25	5.02	5.751***	0.51

*p≤.05; **p≤01; ***p≤.001

Note. M= mean. SD= standard deviation. Set A of Activities - Interests (AAI). Set A of Occupations - Self-Efficacy (AOS). set B of Activities -Self- Efficacy (BAS). and set B of Occupations - Interests (BOI). Set B of Activities - Interests (BAI). set B of Occupations - Self-Efficacy (BOS). set A of Activities -Self-efficacy (AAS). and set A of Occupations - Interests (AOI).

Concurrent validity. A Multiple Discriminant Analysis was conducted using as a criterion variable the student´s belonging to each of the Careers classified according to the RIASEC model. The *enter* method was applied and five discriminant functions were obtained. The six scales of Interest yielded a mean Wilks's λ of .25 and accounted for 75% (1 - λ) of the variance in the major fields of education. The percentage of the students correctly classified cases in different majors using the predictors ranging from 48.4% to 56.5%, which significantly improves the *a priori* probability of correct answers (3 to 19%). In Tables 3 and 4, it can be observed more globally the majors classified by the different discriminant functions.

Table 3. *Discriminant Function Results for Set A of Activities – Interests (AAI). Set A of Occupations-Self-Efficacy (AOS). Set B of Activities Self-efficacy (BAS). and Set B of Occupations- Interests (BOI).*

Discriminant function	% of variance	Canonical correlation	After function removed	Lambda de Wilks	p
AAI					
			0	0.27	.000
1	47.50	0.66	1	0.48	.000
2	27.64	0.56	2	0.69	.000
3	14.74	0.44	3	0.86	.000
4	8.39	0.35	4	0.97	.018
5	0.98	0.12	5	0.99	.037
6	0.75	0.11			
AOS					
			0	0.23	.000
1	42.84	0.67	1	0.41	.000
2	33.44	0.62	2	0.67	.000
3	12.99	0.44	3	0.83	.000
4	7.53	0.35	4	0.94	.000
5	3.06	0.23	5	0.99	.493
6	0.14	0.05			
BAS					
			0	0.30	.000
1	48.92	0.65	1	0.51	.000
2	24.88	0.52	2	0.70	.000
3	19.73	0.48	3	0.91	.000
4	4.96	0.26	4	0.98	.056
5	1.12	0.13	5	0.99	.203
6	0.39	0.08			
BOI					
			0	0.23	.000
1	41.63	0.65	1	0.41	.000
2	31.21	0.60	2	0.64	.000
3	14.96	0.46	3	0.81	.000
4	9.85	0.39	4	0.96	.001
5	1.42	0.16	5	0.98	.011
6	0.93	0.13			

Table 4. *Discriminant function results for: set B of Activities-Interests (BAI). set B of Occupations Self-Efficacy (BOS). set A of Activities Self-efficacy (AAS). and set A of Occupations-Interests (AOI).*

Discriminant function	% of variance	Canonical correlation	After function removed	Lambda de Wilks	p
BAI					
			0	0.27	.000
1	55.18	0.70	1	0.53	.000
2	31.54	0.59	2	0.81	.000
3	9.64	0.38	3	0.94	.000
4	3.44	0.24	4	0.99	.418
5	0.19	0.06	5		
BOS					
			0	0.25	.000
1	50.89	0.70	1	0.48	.000
2	34.75	0.62	2	0.78	.000
3	11.26	0.41	3	0.95	.000
4	2.65	0.22	4	0.99	.109
5	0.44	0.09	5		
AAS					
			0	0.25	.000
1	44.88	0.66	1	0.45	.000
2	34.85	0.61	2	0.73	.000
3	14.74	0.45	3	0.91	.000
4	5.44	0.29	4	0.99	.616
5	0.10	0.04	5		
AOI					
			0	0.22	.000
1	54.20	0.73	1	0.46	.000
2	37.19	0.66	2	0.84	.000
3	6.14	0.34	3	0.95	.000
4	1.87	0.20	4	0.99	.031
5	0.60	0.11	5		

Discussion and conclusion

The main purpose of the present study was to develop and validate a Spanish version of the Activities and Occupations scales of AFPD RIASEC markers to measure interest and self-efficacy. The CFA results showed that none of the eight models fit the data well when 48 items were used as indicators. However, the model adjustment was acceptable when a modified 42-item version for Activities was used as indicators or when parcels for Occupations were used. These results showed that the model of six typologies is feasible for our popula-

tion. Composite reliability and Cronbach´s indices of different forms of the AFPD were satisfactory.

Convergent validity with the Occupations subscales was verified. All of the correlations showed moderate to large effect sizes, although these correlations were lower than the original version. Consistent with the meta-analytical study of Su et al. (2009), and Cupani and Perez (2014), in this study also women had higher scores for the Social type, whereas men had higher scores for the Realistic type and the effect size (*d*) found was similar to both cited studies. These findings are also consistent with the reports of Atli (2017), Johnson, Trent and Baron (2017) and Lee, Lawson and McHale (2015), who argument that women were more likely to report interest in social and artistic activities, whereas men were more interested in scientific, mechanical, and technical activities. In relation to this, Morgan and de Bruin (2019), in their study about gender differences in Holland's interest structure, reported that men tend to prefer working with people or things, while women prefer working with data or ideas but the difference is more robust in the first dimension.

With regard to criterion validity, the *a priori* probability of correctly classifying the participants in the chosen major improved by an average of 48.40% to 56.5%. The results showed that the Realistic type differentiated more than the other types, whereas the Enterprising type presented less of a difference. These levels of adjustment between the Realistic type and types of Occupations (i.e., career types) supported the proposals of the RIASEC model.

These results are consistent with the assumptions of Holland (1997), who considered that people seek occupations or careers where they can exercise their skills and express their attitudes, values, and ways to address problems. Meta-analytical studies (Kristof-Brown, Zimmerman, & Johnson, 2005) have supported these hypotheses of congruence between people and their occupation (i.e., environment), and, moreover, their performance (Nye, Su, Rounds & Drasgow, 2017).

As seen in other countries and cultures (Holtrop, Born, & de Vries, 2015; Hurtado Rua, Stead & Poklar, 2018; Iliescu, Popa & Dimache, 2016), the hexagonal pattern that was proposed by Holland (1997) is a practical alternative way to explain people's interests and abilities. Considering the results of the present study, we can confirm that this model is feasible for the Argentinian college student's population. According to the last census conducted at

the National University of Cordoba (Mangeaud, Maccagno, Somazzi, Oehlenschäger, & Esbry, 2017), 40% of students study and work, 20% are in search of employment, and 38% have their studies paid by their parents. The parents have jobs such as specialized, professional, and informal jobs. Thus, based on the classification given by the National Institute of Statistics and Censuses (INDEC, in its Spanish acronym), the sample is representative of the lower-middle and middle-high socio-economic classes, since 89.4% are young people whose parents support them economically.

Of Interest of Public Domain that was proposed by Liao et al. (2008), providing items that are adapted to Spanish-speaking people. The free availability of the items implies an important contribution for researchers and professionals in the field of vocational psychology, in which they can rely on an auxiliary instrument that allows future adaptations without the aforementioned restrictions. Moreover, the scales for Sets A and B can be alternated in longitudinal or experimental studies, thus eliminating learning bias when the same items are used.

The present study has some limitations that should be considered when interpreting the results. One of these limitations is related to the composition of the sample. Only university-level students were included in the study. It is advisable to also administer the instrument to adolescents and adults with different occupations. Future studies should evaluate adjustment of the model in different populations of students (e.g., high school) and workers. Another limitation is that only internal consistency was assessed. Test-retest reliability should also be evaluated to assess temporal stability. The Occupations items that were translated into Spanish were previously selected from the occupations O_NET database (Peterson et al., 1999); therefore, some of them may not be fully representative in our context. Although this limitation was already mentioned in a previous work (Cupani & Perez, 2014), making modifications to the original version involves the development of a new instrument, which needs the author´s permission. Another limitation is represented by the very high correlations for Interest-Efficacy scales, suggesting the concern about common method bias. Future research should develop a more representative and acceptable list of occupations for our social environment.

In summary, the present study suggests that AFPD RIASEC markers (Armstrong et al., 2008) have adequate psychometric qualities (i.e., internal consistency and criterion validity) and can be used with relative confidence as an auxiliary tool for career counseling.

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Appendix

Table 5. *Correlations Between Interest -and Self-Efficacy- RIASEC Measures.*

Scale		AI R	I	A	S	E	C	AS R	I	A	S	E	C	OS R	I	A	S	E	C	OI R	I	A	S	E	C
AI	R	-	.21**	.22**	-.01	.29**	.25**	.55**	.17**	.14**	.07	.07	.20**	.65**	.16**	.13**	-.01	.18**	.19**	.57**	.25**	.15**	.13**	.15**	.22**
	I	.20**	-	.23**	.26**	.10	-.02	.22**	.60**	.15**	.25**	-.06	-.04	.15**	.69**	.13**	.16**	-.04	-.09*	.46**	.71**	.14**	.25**	-.03	.02
	A	.03	.31**	-	.28**	.11*	-.18**	.26**	.25**	.74**	.35**	.03	-.06	.14**	.28**	.78**	.28**	.10*	-.12**	.14**	.27**	.82**	.39**	-.06	-.09*
	S	-.04	.16**	.39**	-	.13**	-.05	-.08	.10*	.26**	.58**	.18**	.00	-.18**	.23**	.26**	.72**	.07	-.13**	-.11*	.26**	.35**	.71**	.12**	.09*
	E	.27**	-.17**	-.05	.21**	-	.59**	.06	-.07	.04	.05	.46**	.42**	.15**	-.09*	-.01	.00	.59**	.39**	.17**	.09*	.04	.17**	.71	.63**
	C	.33**	-.18**	-.26**	.03	.68**	-	-.01	-.14**	-.23**	-.17**	.42**	.60**	.15**	-.19**	-.27**	-.18**	.50**	.68**	.14**	-.02	-.27**	-.04	.69**	.78**
AS	R	.56**	.31**	.05	-.17**	-.04	.00	-	.61**	.39**	.33**	.21**	.33**	.71**	.45**	.29**	.02	.15**	.14**	.56**	.29**	.21**	.07	-.04	.04
	I	.24**	.58**	.17**	-.01	-.14**	-.15**	.66**	-	.39**	.46**	.06	.13**	.35**	.81**	.31**	.14**	-.03	-.06	.43**	.53**	.20**	.17**	-.15**	-.07
	A	.04	.24**	.77**	.26**	-.05	-.29**	.24**	.37**	-	.56**	.22**	.06	.19**	.35**	.83**	.36**	.18**	-.09*	.07	.22**	.72**	.37**	-.07	-.09*
	S	.04	.20**	.39**	.52**	.05	-.12**	.23**	.36**	.54**	-	.42**	.24**	.12**	.45**	.44**	.68**	.21**	-.03	.03	.29**	.42**	.57**	.00	.01
	E	.21**	-.17**	-.01	.03	.57**	.49**	.21**	.03	.09*	.30**	-	.70**	.18**	-.04	.08	.23**	.68**	.53**	.00	-.01	.04	.22**	.56	.52**
	C	.27**	-.11**	.01	.03	.49**	.53**	.31**	.11**	.15**	.32**	.83**	-	.33**	-.02	-.05	.02	.65**	.72**	.15**	.01	-.07	.06	.56**	.66**
OS	R	.65**	.19**	.16**	-.03	.16**	.11**	.61**	.34**	.27**	.23**	.32**	.34**	-	.31**	.13**	-.06	.29**	.39**	.60**	.17**	.08	-.02	.02	.12**
	I	.17**	.61**	.19**	.05	-.13**	-.12**	.50**	.74**	.30**	.29**	-.03	.03	.27**	-	.37**	.29**	-.07	-.11*	.40**	.61**	.25**	.26**	-.20**	-.12**
	A	.07	.20**	.78**	.25**	-.02	-.22**	.18**	.25**	.84**	.43**	.09*	.11**	.28**	.28**	-	.40**	.11*	-.15**	.03	.18**	.78**	.34**	-.12**	-.15**
	S	-.12**	.12**	.36**	.73**	.06	-.10*	-.10*	.07	.35**	.70**	.10*	.07	.07	.15**	.33**	-	.15**	-.06	-.14**	.16**	.36**	.59**	-.03	-.03
	E	.20**	-.10*	.14**	.17**	.56**	.34**	.09**	-.02	.20**	.30**	.69**	.59**	.40**	.00	.24**	.25**	-	.69**	.06	-.01	.08	.15**	.61**	.56**
	C	.28**	-.18**	-.20**	-.07	.49**	.70**	.16**	-.07	-.15**	-.02	.62**	.67**	.31**	-.05	-.09*	-.07	.56**	-	.11**	-.06	-.16**	-.04	.51**	.60**
OI	R	.69**	.34**	.26**	.04	.14**	.09*	.61**	.39**	.26**	.19**	.19**	.25**	.64**	.27**	.25**	.01	.20**	.13**	-	.58**	.12**	.10*	.09*	.18**
	I	.31**	.76**	.33**	.14**	-.10*	-.09*	.45**	.62**	.31**	.28**	-.05	.04	.32**	.59**	.26**	.13**	.01	-.06	.59**	-	.32**	.41**	.06	.11*
	A	.07	.25**	.85**	.40**	.05	-.18**	.06	.18**	.75**	.44**	.06	.09*	.18**	.17**	.76**	.38**	.20**	-.13**	.36**	.39**	-	.54**	-.04	-.08
	S	.10*	.28**	.44**	.70**	.20**	.01	-.03	.17**	.37**	.59**	.11*	.11**	.09*	.15**	.31**	.65**	.17**	-.10*	.32**	.41**	.56**	-	.23**	.19**
	E	.18**	-.13**	.01	.25**	.69**	.60**	-.07	-.13**	-.02	.14**	.58**	.48**	.08*	-.10*	.01	.16**	.50**	.43**	.17**	.01	.15**	.33**	-	.82**
	C	.33**	-.14**	-.15**	.09*	.63**	.76**	.02	-.10*	-.19**	-.01	.56**	.59**	.12**	-.10*	-.13**	-.02	.38**	.58**	.26**	.03	-.02	.22**	.67**	-

Table 6. *Mean, standard deviation and t test of each subscale by set*

	Female		Male			
	M	SD	M	SD	*t*	*d*
AAI						
R	14.28	4.40	18.10	5.30	9.29***	0.79
I	19.22	6.89	19.46	6.10	0.42	0.04
A	19.84	6.66	19.40	7.07	-0.75	0.06
S	24.63	5.53	20.86	6.09	7.64***	0.65
E	19.84	5.47	20.13	5.86	0.60	0.05
C	18.72	6.99	19.62	6.52	1.56	0.13
AOS						
R	13.42	4.89	18.31	6.54	10.0***	0.86
I	13.41	5.49	14.48	5.82	2.22*	0.19
A	17.08	6.69	16.85	6.77	0.40	0.03
S	19.59	5.61	18.23	5.56	2.86**	0.24
E	18.50	5.75	20.32	6.06	3.61***	0.31
C	19.67	6.20	22.05	6.60	4.37***	0.37
BAS						
R	16.29	5.22	20.82	6.12	9.40***	0.80
I	15.25	6.18	15.66	6.17	0.79	0.07
A	17.51	6.07	17.75	6.38	0.46	0.04
S	21.96	6.37	17.64	6.29	7.98***	0.68
E	20.94	5.41	21.04	5.55	0.22	0.02
C	20.66	7.25	22.70	6.54	3.45***	0.29
BOI						
R	14.70	4.93	18.33	5.98	7.86***	0.67
I	17.14	6.14	17.82	5.86	1.32	0.11
A	19.64	6.45	18.58	6.79	1.88	0.16
S	18.43	5.29	16.11	5.44	5.08***	0.43
E	19.39	5.62	19.60	6.03	0.43	0.04
C	14.73	5.26	15.66	5.85	1.98*	0.17
BAI						
R	15.81	4.96	19.03	5.35	7.15***	0.63
I	20.01	6.70	19.00	5.72	1.81	0.16
A	19.76	5.86	20.01	5.97	0.49	0.04
S	22.98	5.68	17.62	5.47	10.86***	0.96
E	19.35	5.38	19.31	4.73	0.10	0.01
C	19.30	7.96	19.43	6.55	0.20	0.02
BOS						
R	13.58	5.19	18.70	6.10	10.48***	0.92
I	15.02	6.22	16.37	6.24	2.46*	0.22
A	18.08	6.58	18.03	6.21	0.08	0.01
S	19.75	5.90	17.38	5.43	4.71***	0.41
E	21.31	6.12	20.00	5.85	2.47*	0.22
C	17.36	6.52	17.88	6.22	0.91	0.08
AAS						
R	16.27	5.70	21.47	6.21	10.00***	0.88
I	18.07	6.60	18.05	6.39	0.03	0.00
A	18.90	6.95	18.38	6.86	0.86	0.08
S	25.14	5.83	20.92	5.85	8.21***	0.72
E	22.08	5.82	21.02	5.60	2.10*	0.19
C	22.09	7.26	22.75	6.74	1.05	0.09
AOI						
R	15.70	5.78	19.74	5.49	8.10***	0.71
I	16.50	5.83	16.30	5.62	0.39	0.03
A	19.94	6.81	18.96	6.69	1.64	0.14
S	19.86	5.22	17.25	5.02	5.751***	0.51
E	17.59	6.14	16.66	5.70	1.76	0.16
C	16.94	6.21	16.13	5.24	1.59	0.14

*p<.05; **p<.01; ***p<.001
Note. M= mean. SD= standard deviation. Set A of Activities - Interests (AAI). Set A of Occupations - Self-Efficacy (AOS). set B of Activities -Self- Efficacy (BAS). and set B of Occupations - Interests (BOI). Set B of Activities - Interests (BAI). set B of Occupations - Self-Efficacy (BOS). set A of Activities -Self-efficacy (AAS). and set A of Occupations - Interests (AOI).