Eysenck Personality Questionnaire Revised-Abbreviated: invariance gender in Spanish university students

Juan Manuel García-González¹, Juan José Fernández-Muñoz², Esperanza Vergara-Moragues³, Luis Miguel García-Moreno³

¹ Departament of Sociology. Universidad Pablo de Olavide, Sevilla, Spain

² Area of Behavioral Sciences Methodology. Universidad Rey Juan Carlos, Madrid, Spain

³ Department of Psychobiology and Methods in Behavioral Sciences. Universidad Complutense de Madrid, Madrid, Spain

Spain

Correspondence: Juan Manuel García González. Universidad Pablo de Olavide, Sevilla, Spain. Ctra. Utrera, km. 1, Sevilla (Spain). e-mail address: jmgargon@upo.es

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Resumen

Introducción. Este artículo tiene dos objetivos: a) examinar la estructura factorial de la versión en castellano del Eysenck Personality Questionnaire Revised–Abbreviated (EPQR-A) a través de un análisis factorial exploratorio y b) realizar un análisis factorial confirmatorio para determinar las propiedades psicométricas de la versión en castellano del EPQR-A en términos de validez de constructo.

Método. La muestra fue de 826 estudiantes universitarios de grado que se ofrecieron como voluntarios para completar la versión en español del EPQR-A y de la versión en castellano del cuestionario disejecutivo DEX-Sp, para así examinar la validez concurrente del EPQR-A. Se aplicó análisis factorial exploratorio y confirmatorio.

Resultados. El instrumento demostró tener buenas propiedades psicométricas y reforzó la estructura dimensional original de la escala. El EPQR-A presenta características psicométricas comparables a cuestionarios más largos, como el EPQ-R; por lo tanto, tiene una gran idoneidad cuando se inserta en protocolos más extensos.

Discusión y conclusiones. Las diferencias entre hombres y mujeres nos permitieron afirmar que en la adolescencia tardía y la juventud temprana se deben llevar a cabo estrategias de promoción, prevención e intervención en salud diferenciadas por género.

Palabras Clave: propiedades psicométricas, análisis factorial, personalidad, universidad

Abstract

Introduction. This article has two objectives: a) to examine the factorial structure of the Spanish version of the EPQR-A through an exploratory factor analysis and b) to perform a confirmatory factor analysis to determine the psychometric properties of the Spanish version of the EPQR-A in terms of construct validity in an adult academic population.

Method: The sample was 826 university undergraduate students volunteered to complete the Spanish version of the Eysenck Personality Questionnaire Revised-Abbreviated (EPQR-A) and to examine the concurrent validity of the EPQR-A, the Spanish version of the questionnaire Dysexecutive Questionnaire (DEX-Sp). We applied exploratory and confirmatory factor analysis.

Results. The instrument demonstrated good psychometric properties and reinforcing the original dimensional structure of the scale. The EPQR-A has psychometric characteristics comparable to longer questionnaires, such as the EPQ-R; therefore, it has great suitability when inserted into more extensive protocols.

Conclusion. The differences between males and females allow us to affirm that in late adolescence and early youth, promotion, prevention, and intervention health strategies differentiated by gender should be conducted.

Keywords: psychometric properties, factor analysis, personality, university

Introduction

According to Eysenck (1970), personality can be defined as the more or less stable organization of human emotional and behavioral characteristics that reflect an individual's adaptation to the environment. The structure of personality is composed of three basic nonpathological dimensions, neuroticism, extraversion and psychoticism, which, to a greater or lesser extent, characterize all people and can explain their emotional and behavioral differences (Almiro, Moura, & Simoes, 2016; Colledani, Anselmi, & Robusto, 2018; Eysenck & Eysenck, 1991). These dimensions can be divided as a continuum with two extreme poles (Almiro et al., 2016; 1998; Eysenck & Eysenck, 1975). At first, Eysenck (1959) proposed assessing personality through two dimensions, neuroticism and extraversion. Later, psychoticism was introduced as a third dimensions in the *Eysenck Personality Questionnaire* (EPQ, Eysenck & Eysenck, 1975). The EPQ represents significant refinement in the description of personality, using only three dimensions, to which the lie scale/social desirability scale was added as a validity scale (Eysenck, 1998; Eysenck & Eysenck, 2008; Furnham, Eysenck, & Saklofske, 2008).

However, the different psychometric validations of the psychoticism scale that were carried out in different cultural contexts revealed low internal reliability, a low range of scores, with large standard deviations comparable to the measures, and asymmetry in the scores in both combined samples and in male only and female only scores (Claridge, 1981; Eysenck, Eysenck & Barrett, 1985). Aware of this limitation, a series of psychometric tests were carried out to improve the psychometric characteristics of the questionnaire (Eysenck et al., 1985), creating the *Eysenck Personality Questionnaire-Revised*, which contains 100 items (EPQ-R, Eysenck et al., 1985). Among the conceptual improvements, several new items were introduced in the psychoticism scale, the questions associated with neuroticism and extraversion were slightly modified, but the lie scale dimension remained the same.

The validation of this new version showed a four factor structure and better functioning of the psychoticism scale, especially when trying to differentiate by gender (Eysenck & Eysenck, 1991). However, its length made administration complex, especially when it was included within a protocol with multiple psychometric questionnaires or when the main objective was to obtain a quick assessment of personality and its dimensions. For this reason, the Short version of the EPQR was designed (EPQR-S, Eysenck & Eysenck, 1991), a 48-item

personality measurement instrument known and used internationally in different settings (Almiro et al., 2016). Subsequently, Francis, Brown, and Philipchalk (1992) reduced this scale to only 24 items (EPQR-Abbreviated, EPQR-A), with four scales of six items that coincide with the four-factor model of the EPQR. In general, the validation of the EPQR, the EPQR-S and the EPQR-A in the different versions to which it has been adapted has confirmed a factorial solution of four dimensions. For the reliability of the dimensions, psychoticism factor presents internal consistency issues (Alexopoulos & Kalaitzidis, 2004; Almiro et al., 2016; Barrett, Petrides, Eysenck, & Eysenck, 1998; Bowden, Saklofske, van de Vijver, Sudarshan, & Eysenck, 2016; Dazzi, 2011; van Hemert, van de Vijver, Poortinga, & Georgas, 2002).

In addition, the questionnaire has been applied in different cultural contexts, and validations have been published in several languages in different countries, as well as intercultural comparisons, the four-factor factorial structure for the total population and for males and females posed certain reliability problems in psychoticism in all cases (Alexopoulos & Kalaitzidis, 2004; Almiro et al., 2016; Dazzi, 2011; Hosokawa & Ohyama, 1993; Katz & Francis, 2000; Lewis, Francis, Shevlin, & Forrest, 2002; Sato, 2005; Tiwari, Singh, & Singh, 2009; Wilson & Doolabh, 1992). In Spain, some studies have been conducted to adapt the EPQR to the Spanish language (Aguilar, Tous, & Andrés-Pueyo, 1990; Alcázar-Córcoles, Verdejo-García, Bouso-Sáiz, Revuelta-Menéndez, & Ramírez-Lira, 2017; Aluja, García, & García, 2003; Sandín, Valiente, Chorot, Montes, & Germán, 2002; Sandín, Valiente, Montes, Chorot, & Germán, 2002).

Nevertheless, to our knowledge, there have been no recent factorial studies of the Spanish EPQR-A that have focused on determining the differences in scores between males and females. Therefore, this article has two objectives: a) to examine the factorial structure of the Spanish version of the EPQR-A through an exploratory factor analysis (Sandín, Valiente, Chorot, et al., 2002) and b) to perform a confirmatory factor analysis to determine the psychometric properties of the Spanish version of the EPQR-A in terms of construct validity.

Method

Sample

The initial sample consisted of 1294 university students from different Spanish universities. There were no initial exclusion criteria. Nevertheless, a total of 468 participants were not considered because they did not complete the questionnaire fully, their age was out of the

ordinary range of university students (the usual age at which studies are considered to have been completed is 25 years), or the duration of completion of the questionnaire was suspiciously low or high according to the average. We did not have missing data, the questionnaire selected had to be fullfilled completely. Thus, the final sample consisted of 826 university undergraduate students: 79.3% were female (655), with a mean age of 18.9 years ($SD = 1.56$), and 20.7% were male (171), with a mean age of 19.6 years ($SD = 1.99$).

Instruments

EPQR-A Questionnaire (Eysenck Personality Questionnaire Revised-Abbreviated) (Francis et al., 1992). The Spanish version of the questionnaire in Appendix II of Sandín, Valiente, Chorot, et al. (2002) was used, consisting of 24 items and four subscales (neuroticism, extraversion, psychoticism and lie scale), each composed of six items. The responses to the items are dichotomous, 'yes' (value 1) and 'no' (value 0), and the subscales are summative in nature, such that the range of scores for each subscale is 0 to 6. Lie scale is calculated inversely in the Spanish version so that what is really measured is honesty. Moreover, items with factorial weights < 0.30 were deleted because an item with a weight less than 0.30 is not enough relevance for that factor.

DEX Questionnaire. (Dysexecutive Questionnaire) (Wilson, Alderman, Burgess, Em-slie, & Evans, 1996). To examine the concurrent validity of the EPQR-A, the Spanish version of the questionnaire was applied (DEX-Sp, Pedrero-Pérez et al., 2009). As DEX-Sp measures another dimension of personality than EPQR, it is appropriate to be used as a suitable criterion scale to test concurrent validity in EPQR-A. The DEX-Sp is a 20-item questionnaire that evaluates the behavioral assessment of the dysexecutive syndrome. The responses to the items are measured on a 5-point Likert scale of a summative nature: never (value 0), occasionally, sometimes, quite frequently and very frequently (value 4).

Procedure

The EPQR-A Spanish version of Sandín, Valiente, Chorot, et al. (2002) was used; therefore, it was not necessary to perform reverse or direct reverse translation to confirm the content validity of the items. The battery of questionnaires was applied in an online format, LimeSurvey, hosted on the institutional server of Universidad Pablo de Olavide, from November 2017 to June 2018. Participants were invited to participate in the study within the classroom and were provided with the necessary link to do so. Participation was voluntary

and anonymous. It was emphasized that the questions should be answered truthfully while in a quiet place and during a single visit to the survey site. We only considered fully complete questionnaires. The project was carried out once it was approved by the Andalusian Biomedical Research Ethics Coordinating Committee and the Research Ethics Committee of Universidad Pablo de Olavide.

Statistical analysis

To examine differences in mean score of each dimension, t-test was used. To examine the factorial structure of the EPQR-A, exploratory factor analysis (EFA) was applied to the 24 items of the questionnaire based on a four-dimensional theoretical model. The estimation method was generalized least squares. A varimax rotation method was carried; KMO index, Bartlett's test of sphericity, Cattell's scree-plot and Horn parallel analysis were the criteria in order to identify the number of dimensions for the scale (Horn, 1965). Due to the size of the sample, we applied to randomly split with the 50% of the cases and ran an EFA. To determine the reliability of the EPQR-A and its subscales, the Kuder–Richardson Formula 20 (KR20) values were calculated; the KR20 is applied to instruments that incorporate dichotomous items. In addition, the homogeneity index values for each of the items were calculated. In both cases, the values were between 0 and 1; the closer the value is to 1, the greater the internal consistency of the subscale and the greater the item-correlation with the rest of the scale.

After that, and with the best number of dimensions, a confirmatory factor analysis (CFA) was conducted on the second random half in order to confirm that the factor structure fitted to the data (Lloret-Segura, Ferreres-Traver, Hernández-Baeza, & Tomás-Marco, 2014). According to the previous literature, the authors confirmed the best fit of the model with the following measures: Chi Square and its associated probability level, Adjusted Goodness Fit Index (AGFI), the Comparative Fit Index (CFI) and Normed Fit Index (NFI), and the Incremental Fit Index (IFI). For all indices, the scores should be over .90. It would indicate a good fit. Moreover, the Standardized Root Mean Square residual (SRMR) and the error of the root mean square approximation (RMSEA) were included. Here, the scores under .06 involve a great overall fit of the model (Bollen, 1989; Hu & Bentler, 1999; Lloret-Segura et al., 2014). Last, to examine the criterion validity, a correlation analysis between the EPQR-A scales and the DEX-C scales was performed.

R commander 2.3-2 was used for EFA, FACTOR v. 10.3 (Baglin, 2014; Lorenzo-Seva & Ferrando, 2006) for the Horn parallel test, Amos 19.0 module for the CFA, and IBM SPSS Statistics for Windows v. 25.0 for the correlation analyses.

Results

Table 1 presents the means and standard deviations for the EPQR-A dimensions for the total and for a random sample of 50%. On the one hand, no statistically significant differences (according to t-test) were observed between the scores for both samples in extraversion and psychoticism ($p < .05$); on the other hand, statistically significant differences were found in neuroticism ($t = 1.86$, $p < .05$) and lie scale ($t = 1.59$, $p < .05$). In addition, a comparison of the mean scores by gender was also performed. For the psychoticism and lie scales, males had scores that were significantly higher than those of females. In contrast, females had higher mean scores for the neuroticism scale. There were no statistically significant differences in mean scores for the extraversion scale.

Table 1. Means and standard deviations of the dimensions of EPQR-A for the total sample, a 50% random sample, and t test for males and females.

	Total		50% random		Males		Females		t-test
Dimension	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>p</i>
N	2.52	1.85	2.53	1.79	2.06	1.76	2.64	1.86	.000
E	4.56	1.83	4.59	1.83	4.62	1.70	4.55	1.87	.675
P	1.71	1.20	1.69	1.21	1.88	1.25	1.67	1.19	.042
LS	3.29	1.61	3.34	1.57	3.84	1.56	3.15	1.59	.000

Note: E = Extraversion; N = Neuroticism; LS = Lie Scale, P = Psychoticism. *M* = Mean. *SD* = Standard Deviation.

Exploratory Factor Analysis

Table 2 presents the factorial solution obtained for the EFA using maximum likelihood estimation method. Bartlett's test of sphericity was $p < .001$, with a chi-square value of 1895.48 ($df = 276$) and Kaiser-Meyer-Olkin (KMO) sample index value of .747. Moreover, the parallel analysis showed a four-dimensional solution according to the set of items: extraversion, neuroticism, lie and psychoticism. Items 3, 6, 12, and 16, corresponding to psychoti-

cism scale, and items 5 and 24, corresponding to lie scale, were deleted because their factorial weights were less than .30.

Table 2. *Standardized factor loadings for each item according to the exploratory factor analysis and internal consistency for each dimension.*

item	Question	M	SD	E	N	LS	P
EPQR20EX	Do other people think of you as being very lively?	.79	.411	.745			
EPQR2EX	Are you a talkative person?	.82	.382	.734			
EPQR23EX	Do other people think of you as being very lively?	.76	.429	.710			
EPQR13EX	Can you easily get some life into a rather dull party?	.68	.467	.648			
EPQR15EX	Do you tend to keep in the background on social occasions?	.64	.481	.614			
EPQR4EX	Are you rather lively?	.88	.324	.577			
EPQR18NE	Do you suffer from 'nerves'?	.30	.457		.692		
EPQR1NE	Does your mood often go up and down?	.44	.497		.596		
EPQR14NE	Are you a worrier?	.57	.496		.512		
EPQR9NE	Do you often feel 'fed-up'? («hasta la coronilla»)	.45	.497		.504		
EPQR21NE	Do you often feel lonely?	.51	.500		.502		
EPQR11NE	Would you call yourself a nervous person?	.26	.437		.497		
EPQR19SIN	Have you ever taken advantage of someone?	.33	.471			.558	
EPQR7SIN	Have you ever blamed someone for doing something you knew was really your fault	.72	.450			.514	
EPQR17SIN	Have you ever cheated at a game?	.41	.491			.505	
EPQR10SIN	Have you ever taken anything (even a pin or button) that belonged to someone else?	.71	.452			.493	
EPQR5SIN	Were you ever greedy by helping yourself to more than your share of anything?	.52	.500			.368	
EPQR24SIN	Do you always practice what you preach?	.60	.489				
EPQR3PSI	Would it upset you a lot to see a child or an animal suffer?	.01	.109				
EPQR8PSI	Do you prefer to go your own way rather than act by the rules?	.42	.493				.580
EPQR22PSI	Is it better to follow society's rules than go your own way?	.63	.484				.535
EPQR12PSI	Do you think marriage is old-fashioned and should be done away with?	.19	.389				
EPQR6PSI	Would you take drugs which may have strange or dangerous effects	.03	.181				
EPQR16PSI	Do you think people spend too much time safeguarding their future with savings and insurance?	.44	.496				
Kuder-Richardson 20 (KR20)				.824	.713	.567	.434

Note: E = Extraversion; N = Neuroticism; LS = Lie Scale, P = Psychoticism. *M* = Mean. *SD* = Standard Deviation.

For reliability, the KR20 was calculated for the four subscales along with the homogeneity index values of the items that formed the subscales. For extraversion, the KR20 was .824, with homogeneity index values between .504 and .661; for neuroticism, the KR20 was .713, homogeneity index values between .321 and .528; for lie, the KR20 was .567, with homogeneity index values between .143 and .357; and finally, for psychoticism, the KR20 was .459, with homogeneity index values between .194 and .392.

Intercorrelations

Table 3 shows the intercorrelations between the dimensions of the EPQR-A for the total population, a random sample of 50% and for males and females. For the total sample, statistically significant intercorrelations were found between neuroticism and lie, between psychoticism and lie (negative) and between psychoticism and lie (positive). By taking a random sample of 50%, the intercorrelation between neuroticism and lie was no longer statistically significant. By gender, we found some differences in the intercorrelations between the dimensions of the EPQR-A. For males, there were significant differences between neuroticism and extraversion (negative), while for females, there were differences in extraversion-neuroticism, extraversion-psychoticism and neuroticism-lie (negative) and psychoticism-lie (positive).

Table 3. *Intercorrelations between the dimensions of EPQR-A for males, females, total sample and 50% random sample.*

Dimensions	Males	Females	Total	50% random
NE	-.207**	-.251**	-.243**	-.208**
NP	.032	.066	.049	.023
NL	.082	.141**	.103**	.072
EP	-.017	-.081**	.062	.066
EL	-.020	-.034	-.028	.035
PL	.065	.120**	.118**	.157**

Note: E = Extraversion; N = Neuroticism; L = Lie Scale, P = Psychoticism. ** $p < .001$

Confirmatory Factor Analysis

After EFA, a CFA was conducted on the second random half in order to confirm the factor structure of four dimensions (Table 4). Moreover, CFA was repeated on the data by gender in order to replicate the exploratory factorial solution of the EPQR. Fit indices are shown in Table 4 for the total sample, the 50% random sample, male, and female.

Table 4. *Goodness of fit indices for EPQR-A for the second half, male, female and total sample.*

	X^2	p	df	$AGFI$	CFI	NFI	IFI	$SRMR$	$RMSEA$
Second half (n = 415)	267.64	.001	300	.978	.991	.987	.991	.034	.032
Male (n = 171)	273.75	.007	219	.847	.914	.692	.916	.014	.038
Female (n = 652)	431.64	.000	218	.931	.922	.856	.922	.010	.039
Total (n = 826)	483.03	.000	217	.937	.921	.867	.922	.010	.038

Note: df : degrees of freedom; AGFI: Adjusted Goodness of Fit Index; CFI: Comparative Fit Index; NFI: Normed Fit Index; IFI: Bollen's Incremental Fit Index; SRMR: Standardized Root Mean Square residual; RMSEA: Root Mean Square Error of Approximation.

Criterion validity

To test the criterion validity, the subscales of the EPQR-A were gathered through correlations analysis with the subscales of DEX. According to the results of Table 5, and using Gignac and Szodorai (2016) correlation guidelines for interpretation of the magnitude of effect size (0.10, small; 0.20, medium; 0.30, large), there were significant correlation between neuroticism and the following variables: inhibition ($\rho = .167$, $p < .001$, small effect size), intentionality ($\rho = .366$, $p < .001$, large), executive memory ($\rho = .312$, $p < .001$, large), positive affect ($\rho = .405$, $p < .001$, large), and negative affect ($\rho = .348$, $p < .001$, large). Regarding to extraversion, there were significant and positive correlation with Inhibition ($\rho = .128$, $p < .001$, small) and negative correlation with intentionality ($\rho = -.200$, $p < .001$, medium) and negative affect ($\rho = -.340$, $p < .001$, large). For psychoticism and lie scale, the correlation was positive, significant, and with a generally small effect size with all dimension of the criteria ($p < .001$).

For the purpose of adding information to the validity analysis of the EPQR-A, a correlation analysis was performed between the EPQR-A factors and DEX factors corresponding to dysexecutive syndrome. Table 5 shows the strong relationship between personality characteristics and dysexecutive symptomatology. First, the neuroticism, psychoticism and lie scales were directly and significantly related to all the DEX factors: inhibition, intentionality, executive memory, positive affect and negative affect, presenting relatively high values in the case of neuroticism and positive and negative affect. In contrast, extraversion presented only three

significant correlations: direct correlations with inhibition and inverse correlations with intentionality and negative affect. All these data showed that there were generally weak correlations coefficients between subscales of EPQR-A and subscales of DEX.

Table 5. *Correlation coefficients between total EPQR-A and subscales of DEX.*

	1	2	3	4	5	6	7	8
1. Neuroticism								
2. Extraversion	-.243**							
3. Psicoticism	.049	.062						
4. Lie Scale	.103**	-.028	.118**					
5. Inhibition	.167**	.128**	.232**	.215**				
6. Intentionality	.366**	-.200**	.124**	.323**	.387**			
7. Executive Memory	.312**	-.092	.104**	.282**	.460**	.482**		
8. Positive Affect	.405**	-.051	.117**	.336**	.451**	.511**	.506**	
9. Negative Affect	.348**	-.340**	.117**	.196**	.203**	.447**	.270**	.366**

Note: ** $p < .001$, * $p < .01$

Discussion and Conclusion

The objective of this study was to examine the reliability, factorial structure and the concurrent validity of the revised Spanish version of the EPQR-A. In the same vein as the analyses by Francis et al. (1992), previous studies in the Spanish context indicated a notable internal reliability for the neuroticism and extraversion scales but weaker reliability for the psychoticism and lie scales.

Regarding the construct reliability of the instrument, exploratory factor analysis was performed, revealing a four-dimension factorial structure found for the EPQR since its development (Francis et al., 1992) and consistent with the results for Spain (Sandín, Valiente, Chorot, et al., 2002; Sandín, Valiente, Montes, et al. 2002) and other countries (Furnham et al., 2008; Lewis et al., 2002). In the present study, the neuroticism and extraversion scales were clearly defined in the rotated solution, while the psychoticism and lie scales were more ambiguous. In fact, item 3 corresponding to the psychoticism scale had to be eliminated because it had a saturation of less than .30, which confirms the problems previously found (Eysenck et

al., 1985; Francis et al., 1992; Sandín, Valiente, Chorot, et al., 2002). In addition, item 24 of the lie scale reached a loading of .32, just above the limit.

The factorial loading of the extraversion factor ranged from .619 to .800; those of the neuroticism factor ranged from .534 to .713; those of psychoticism ranged from .426 to .622; and those of the lie factor ranged from .322 to .653, with poor performance for item 24 (“Do you always put into practice what you say?”). All factorial loadings were significant and greater than .30, which shows valid and consistent psychometric performance that, in addition, presents very similar values to those of Sandín, Valiente, Chorot, et al. (2002) for Spain and those by Lewis et al. (2002) for France, both with the EPQR-A. The psychometric properties of the psychoticism scale, previously discussed by Francis et al., (1992), improved notably after excluding item 3.

Regarding the differences in mean scores by gender, the results are similar to those reported by the majority of studies; that is, males have statistically significant higher scores for psychoticism (Alexopoulos & Kalaitzidis, 2004; Aluja et al., 2003), and females have higher scores for neuroticism (Alcázar-Córcoles et al., 2017; Alexopoulos & Kalaitzidis, 2004; Aluja et al., 2003; Wilson & Doolabh, 2002) and for the lie scale (Alexopoulos & Kalaitzidis, 2004; Aluja et al., 2003; Hosokawa & Ohyama, 1993). In contrast, there are no differences in extraversion (Alcázar-Córcoles et al., 2017; Alexopoulos & Kalaitzidis, 2004; Wilson & Doolabh, 2002). This absence of differences may be due to the age of the participants, who were in late adolescence and early adulthood, sharing conduct and behaviors similar to what would be expected for the extraversion factor. The adolescence is a fundamental period in the development of gender identity, but it is necessary to consider the role of the context and assume that it is a social process too (Steensma, Kreukels, de Vries, & Cohen-Kettenis, 2013).

Table 2 shows the correlations between the four factors of the EPQR-A and other measures. First, the neuroticism, extraversion and psychoticism factors were orthogonal, confirming previous results (Dazzi, 2011; Francis et al., 1992; Lewis et al., 2002). However, there were differences in the direction of the significant correlations: neuroticism and psychoticism were directly related to the lie scale for both males and females, contrary to what is found in the majority of previous studies (Alexopoulos & Kalaitzidis, 2004; Almiro et al., 2016; Aluja et al., 2003; Francis et al., 1992; Lewis et al., 2002; Sato, 2005). This could be due to the change in two items for psychoticism that was made after the validation by Sandín,

Valiente, Chorot, et al. (2002) or the high homogeneity of the sample of females, with a very similar ages and types of studies.

Regarding the correlations between factors, among males, only the relationship between extraversion and neuroticism was significant, and among females, there were four significant relationships: extraversion-neuroticism, extraversion-psychoticism, neuroticism-lie and psychoticism-lie, differences that could be due to different sample sizes. For males, other studies found relationship between neuroticism-lie, psychoticism-lie and neuroticism-psychoticism (Aluja et al., 2003; Dazzi, 2011) or between neuroticism-lie and psychoticism-lie (Alexopoulos & Kalaitzidis, 2004). The results for females coincide to a greater extent in the statistically significant relationships that have appeared in other studies (Alexopoulos & Kalaitzidis, 2004; Aluja et al., 2003; Dazzi, 2011), although the direction of the intercorrelation for neuroticism-lie, psychoticism-lie, and extraversion-psychoticism changes. In any case, these data are of great interest because they show that there are differences in personality factors by gender and, therefore, indicate different needs when conducting health promotion and intervention programs.

Although the results were interesting, the study was not exempt from limitations. First, this was a cross-sectional study; therefore, we did not follow the evolution of the sample through the university and maturation. Second, the size of the subsample of males was substantially smaller than that of females. Third, in using the previous questionnaire by Sandín, Valiente, Chorot, et al. (2002), we did not carry out a back-translation process, either active or reverse. Despite this, to our knowledge, this is the first psychometric study of the EPQR scale in Spanish that aimed to perform, on the one hand, an analysis of the results by gender and, on the other, a confirmatory factor analysis of the Spanish version of the EPQR-A. Fourth, fieldwork was performed in 2017 and 2018, so we were not able to use a new abbreviated version of the EPQ-R questionnaire recently developed (Colledani, Anselmi, & Robusto, 2019). It will be considered for future works.

In conclusion, the results of this study replicate previous findings on the reliability, intercorrelations, construct validity and concurrent validity of the EPQR-A, confirming Eysenck's theory of the three factors extraversion, neuroticism and psychoticism, along with the lie scale. The EPQR-A has psychometric characteristics comparable to longer questionnaires, such as the EPQ-R or the EPQR-S.

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Received: 23-05-2020
Accepted: 12-01-2021