PERSONALITY ASSESSMENT THROUGH INTERNET: FACTOR ANALYSES BY AGE GROUPS OF THE ZKA PERSONALITY QUESTIONNAIRE

Angel Blanch*, Anton Aluja, & Salvador Gallart

This study evaluated the psychometric properties of an on-line version of the Zuckerman-Kuhlman-Aluja Personality Questionnaire (ZKA-PQ) by sex and age. The questionnaire was responded by 1598 people, 474 males and 1124 females, with a mean age of 32.57 (SD = 11.72). Males and females differed in their responses to all personality dimensions evaluated by this instrument, in a similar way as that reported in past research. In addition, younger people scored higher in the Aggressiveness factor, especially concerning the Physical Aggression facet, whereas older people scored higher in the Activity factor. Besides, younger people scored higher in the Neuroticism and the Sensation Seeking factors, even though there were no age differences in the Extraversion factor. The ZKA-PQ five-factor structure was clear and yielded high congruence coefficients with the original Spanish validation sample. Altogether, the findings support the validity of the online version of this instrument. The ZKA-PQ online version is therefore helpful in both, basic and applied research settings about human personality and individual differences.

Introduction

The Zuckerman-Kuhlman Personality Questionnaire (ZKPQ) relies on five factors approached from a biological and temperamental perspective (Zuckerman, Kuhlman, Thornquist, & Kiers, 1991; Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993; Zuckerman, 2002, 2008): Neuroticism-Anxiety (N-Anx), Sociability (Sy), Aggression-Hostility (Agg-Host), Impulsive Sensation Seeking (ImpSS), and Activity (Act). This instrument has been successfully tested in several languages, such as Chinese (Wu, Wang, Du, Li, Jiang, & Wang, 2000), German (Schmitz, 2004), French (Rossier, Verardi, Massoudi, & Aluja, 2008), Italian (De Pascalis, & Russo, 2003), and Spanish (Aluja, García, & García, 2004; Goma-i-Freixanet, Valero, Punti, & Zuckerman, 2004). Shorter versions of the ZKPQ have provided additional forms of this instrument showing sound psychometric properties (Aluja, García & García, 2003; Aluja, Rossier, García, Angleitner, Kuhlman, & Zuckerman, 2006), and have been used in basic and applied research (Aluja & Garcia, 2005; Aluja & Blanch, 2007; Blanch & Aluja, 2009).

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Despite the fair construct validity and reliability of the ZKPQ factors, this instrument was needed of an update in its format to keep its pace with other personality assessment instruments such as the NEO-PI-R (Costa & McCrae, 1992), or the TCI-R (Svrakic et al., 2002). The latter rely on facets or groups of items, which are more stable and replicable, improve the descriptive capacity of these instruments in applied settings, and its predictive potential concerning third variables such as personnel selection or personality disorders. A recent further development of the ZKPQ has been the ZKA-PQ (Aluja, Kuhlman, & Zuckerman, 2010), a 200 item questionnaire in Spanish and English languages with five factors (Aggressiveness, Activity, Extraversion, Neuroticism, and Sensation Seeking), and four facets per factor that showed a clear five-factor structure, acceptable reliabilities, and convergent and discriminant validity. The ZKA-PQ needs, however, to be replicated in different samples to assess its facets, factors internal consistency, and structural validity in order to be used appropriately in both, basic and applied research.

The present study was based in a Catalan language version of the instrument, with the data collection procedure being carried out through Internet instead of with the more traditional paper-and-pencil used in the original study (Aluja et al., 2010). Some of the advantages of on-line personality questionnaires lie in their lower cost and to access to a greater number of subjects in a lesser amount of time. In addition, there are no data entries requirements with potential errors also being highly reduced (Barak & English, 2002; Buchanan, 2002, 2007; Buchanan & Smith, 1999). The on-line formats of personality questionnaires have generally shown good equivalence and similar psychometric properties when compared to the traditional paper and pencil forms (Chuah, Drasgow, & Roberts, 2006; Gosling, Vazire, Srivastava, & John, 2004). The equivalence between both types of response format, paper and pencil (PP) and on-line (OL) is generally demonstrated when differences in means, standard deviations, internal consistency, and factor structure can be considered as negligible (Chuah et al., 2006; Ferrando & Lorenzo-Seva, 2005).

Past research has already addressed the comparison of PP versus OL versions of the ZKPQ-based instruments. For instance, Aluja, Rossier and Zuckerman (2007) carried out a comparative study with the ZKPQ-50-CC administered by means of paper and pencil and on-line versions of the instrument in Spanish and Swiss samples. Differences in means and deviations were significant in some scales, but with minimal effect sizes except for Sociability in the Spanish sample. Alpha reliabilities were also very similar in both versions with no significant differences between both paper and pencil and on-line versions. Besides, there was a robust factorial structure for the two formats with average congruency coefficients of 0.98. The goodness-of-fit indexes and sample invariance tests obtained with confirmatory factorial analysis yielded

no significant differences between both formats and countries, providing support for the validity and reliability of the Internet version in investigations using the ZKPQ-50-CC (Aluja et al., 2007).

Study aims and design

In the present study, the ZKA-PQ factors and facets including normality assumptions, mean differences, internal consistency and factor structure were studied regarding sex and age. Past research on the ZKPQ reports significant sex differences in ImpSS, N-Anx, and Sy, and sometimes in Act and Agg-Host (Zuckerman, 2008). In the ZKA-PQ original work males scored significantly higher in SS and AG, whereas females scored higher in AC, NE, and EX, even though there are no data supporting sex or age differences at the facet level (Aluja et al., 2010). Equivalent sex differences in the responses to the personality dimensions addressed by the online version of the instrument would provide partial support to its validity.

Concerning age and the big-five personality model, there are consistent declines in Neuroticism, Extraversion, and Openness across different cultures. Thus, it has been argued that these changes in personality would be independent of the particular socioeconomic environment and attributable to developmental changes (McCrae, Costa, Pedroso de Lima, & Simöes, 1999). Similar declines are also apparent with the Eysenck model, where P and E scores also tend to decrease with age (Haapasalo, 1990). Moreover, younger people also tend to score higher in ImpSS, N-Anx, and Sy (Gutierrez et al, 2001), an effect that has been also observed in a ZKPQ study with samples from different countries (Aluja, et al., 2006).

The aims of this study were: a) to analyse descriptive statistics and internal consistency for sex and age group; b) to replicate the factor structure of the ZKA-PQ obtained with the PP instrument version by means of the factorial congruence analyses; c) to analyse the stability and factor congruence regarding age groups.

Method

Participants

The ZKA-PQ was completed by 1598 people, 474 males and 1124 females, with a mean age of 32.57 ($SD = 11.72$), between 18 and 69 years old. It was considered that an adequate amount of time to complete the questionnaire was over 15 minutes therefore, those who took less than 15 minutes in completing the on-line questionnaire were excluded from subsequent analyses, leaving 1564 usable protocols (466 men and 1098 women). There were four age

groups considering an equivalent proportion of subjects in each age group resembling the general population distribution (see Figure 1) in accordance with the 2010 Catalan population census (http://www.ine.es). Age descriptive statistics for the whole sample were: Group 1 ($\leq$ 22 years, $M = 20.20$, $SD = 1.32$, $n = 365$, 23.3%), Group 2 (23-29, $M = 25.52$, $SD = 1.90$, $n = 436$, 27.9%), Group 3 (30-41, $M = 35.25$, $SD = 3.43$, $n = 385$, 24.6%), and Group 4 (42-69, $M = 49.85$, $SD = 6.21$, $n = 378$, 24.2%). There were significant age differences between males and females as evaluated by a t-test (6.10; $p < 0.001$), with a small effect size ($d = 0.35$) (see Table 1). The paper and pencil form was completed by 529 subjects, 258 males and 271 females, with a mean age of 44.21 ($SD = 18.12$), and it corresponds to the original ZKA-PQ study (Aluja et al., 2010).
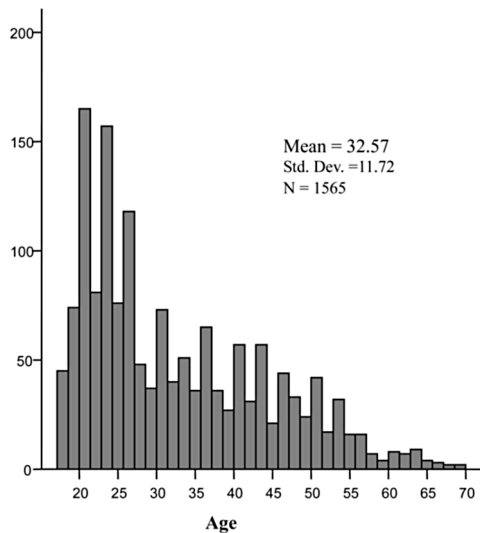

Figure 1
Distribution of age

Instrument and procedure

The ZKA-PQ (Aluja, Kuhlman, & Zuckerman, 2010) contains five factors with four facets per factor: a) Aggressiveness (Physical Aggression, Verbal Aggression, Anger, and Hostility); b) Activity (Work Compulsion, General Activity, Restlessness, and Work Energy); c) Extraversion (Positive Emotions, Social Warmth, Exhibitionism, and Sociability); d) Neuroticism (Anxiety, Depression, Dependency, and Low Self-Esteem); and e) Sensation

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Table 1
Descriptive statistics and alpha internal consistencies of the ZKA-PQ

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	Men (N = 466)					Women (N = 1098)					
	M	**SD**	**K**	**S**	**α**	**M**	**SD**	**K**	**S**	**α**	**d**
Age	*35.39*	*12.16*	*-.67*	*.51*	---	*31.38*	*11.32*	*-.13*	*.89*	---	*.35*
AG1	17.99	5.72	.42	.82	.87	15.99	5.05	1.63	1.24	.86	.38
AG2	24.63	4.72	-.17	-.14	.75	25.52	4.86	-.22	-.06	.78	-.18
AG3	20.49	5.44	-.27	.37	.87	22.55	5.66	-.26	.22	.87	-.37
AG4	21.25	4.56	-.43	-.08	.72	21.56	4.45	-.34	.01	.72	-.07
AC1	24.82	5.67	-.37	.14	.84	25.07	5.26	-.35	.05	.80	-.05
AC2	26.73	6.09	-.36	.00	.88	26.72	5.51	-.54	.04	.86	.00
AC3	26.78	4.46	-.21	-.04	.69	27.97	4.26	-.29	-.00	.66	-.28
AC4	29.84	4.62	.03	-.48	.78	30.78	4.14	-.07	-.42	.74	-.22
EX1	32.95	4.72	1.68	-.98	.84	34.14	4.34	.89	-.90	.83	-.27
EX2	29.02	6.06	-.32	-.29	.89	31.64	5.82	-.29	-.51	.89	-.44
EX3	25.67	5.44	.01	-.01	.84	25.39	5.50	-.34	.07	.84	.05
EX4	27.53	5.41	-.46	-.23	.83	29.74	5.05	.20	-.52	.80	-.43
NE1	22.86	5.40	-.24	.06	.81	24.34	5.13	.06	.07	.80	-.28
NE2	22.12	5.79	-.38	.32	.83	23.64	5.58	-.37	.19	.81	-.27
NE3	23.01	5.10	-.06	.07	.78	25.16	4.91	-.09	-.02	.78	-.43
NE4	21.32	6.64	-.38	.39	.91	23.00	6.51	-.45	.22	.91	-.26
SS1	24.11	6.43	-.73	-.02	.82	20.81	6.06	-.55	.31	.81	.53
SS2	25.93	5.40	-.34	-.16	.79	26.21	5.48	-.33	-.22	.80	-.05
SS3	22.25	5.43	-.32	.18	.81	22.09	5.42	-.52	.07	.81	.03
SS4	19.05	3.58	.58	.31	.63	19.30	3.72	-.05	.10	.67	-.07
AG	84.36	16.54	.21	.33	.92	85.62	16.23	-.06	.27	.92	-.08
AC	108.20	15.13	.01	-.02	.89	110.50	13.58	-.28	.01	.87	-.16
EX	115.20	17.32	-.01	-.33	.93	120.90	16.13	.23	-.44	.92	-.35
NE	89.323	19.88	-.17	.27	.94	96.15	19.07	-.13	.17	.94	-.35
SS	91.35	16.46	-.35	-.00	.90	88.41	16.62	-.35	.10	.91	.18

Note: AG1: Physical Aggression; AG2: Verbal Aggression; AG3: Anger; AG4: Hostility; AC1: Work Compulsion); AC2: General Activity; AC3: Restlessness; and AC4: Work Energy; EX1: Positive Emotions; EX2: Social Warmth; EX3: Exhibitionism; EX4: Sociability; NE1: Anxiety; NE2: Depression; NE3: Dependency; NE4: Low Self-Esteem; SS1: Trill and Adventure Seeking; SS2: Experience Seeking; SS3: Disinhibition; SS4: Boredom Susceptibility/Impulsivity; AG: Aggressiveness; AC: Activity; EX: Extraversion; NE: Neuroticism; SS: Impulsive-Sensation Seeking;.

Seeking (Thrill and Adventure Seeking, Experience Seeking, Disinhibition, and Boredom Susceptibility). Each facet is composed by ten items, making a 200 item instrument with a 4-point Likert-type response format (1, Disagree Strongly; 2, Disagree Somewhat; 3, Agree somewhat; 4, Agree Strongly). Approximately half of the items are reversed key-scored. In the original study (Aluja et al., 2010), alpha reliabilities were acceptable for both facets and fac-

tors in both the Spanish and English language versions of the instrument, ranging .65 to .92 (Spanish) and .56 to .93 (English).

Anton Aluja (Catalan-Spanish bilingual speaker) developed the ZKA-PQ in Catalan, Spanish and English at the same time with the help of Marvin Zuckerman. This was validated only in Spanish and English original study (Aluja et al., 2010). The data about the Catalan version are presented in this work. Participation in this project was required through several Catalan universities mailing lists. Responses were mainly obtained from people at the university community (students, and teaching and administrative staff). To stimulate participation, an interpretative report automatically generated after finishing the questionnaire was provided to all respondents (see Figure 2).

Figure 2
The ZKA-PQ online version (http://www.recerca-petra.udl.cat/test200/cata_ol.php)

Table 2

ZKA-PQ facets descriptive statistics, means comparison and alpha reliabilities by age groups

Facets and dimensions	Group 1 ≤ 22 years (n = 365)			Group 2 23-29 years (n = 436)			Group 3 30-41 years (n = 385)			Group 4 42-69 years (n = 379)		
	M	SD	α	M	SD	α	M	SD	α	M	SD	α
AG1 Physical Aggression	17.34	5.75	.88	17.09	5.77	.88	15.58	4.57	.83	16.36	5.02	.85
AG2 Verbal Aggression	26.98	4.66	.74	26.04	4.60	.76	24.11	4.66	.76	23.87	4.75	.76
AG3 Anger	23.16	5.83	.86	22.11	5.70	.87	21.12	5.35	.86	21.38	5.62	.89
AG4 Hostility	22.90	4.31	.65	22.03	4.37	.70	20.66	4.33	.72	20.26	4.45	.73
AG Aggressiveness	*90.37*	*16.35*	*.91*	*87.27*	*16.00*	*.91*	*81.47*	*14.98*	*.91*	*81.87*	*16.35*	*.92*
[F:27.85; p < 0.001. *Scheffee: 1>2,3,4;2>3,4]												
AC1 Work Compulsion	24.78	5.30	.80	24.83	5.15	.80	24.98	5.65	.82	25.45	5.47	.81
AC2 General Activity	26.12	5.65	.85	27.46	5.58	.86	26.62	5.54	.85	26.58	5.92	.87
AC3 Restlessness	27.29	4.40	.66	27.92	4.37	.68	27.69	4.36	.69	27.50	4.27	.66
AC4 Work Energy	29.44	4.30	.74	30.05	4.12	.74	30.72	4.49	.76	31.82	3.99	.73
AC Activity	*107.63*	*13.99*	*.87*	*110.25*	*13.67*	*.87*	*110.01*	*14.25*	*.88*	*111.36*	*14.35*	*.88*
[F:4.63; p < 0.003. *Scheffee: 4>1]												
EX1 Positive Emotions	33.20	4.51	.82	33.44	4.69	.86	34.22	4.47	.85	34.32	4.13	.81
EX2 Social Warmth	29.65	6.37	.89	30.62	6.27	.91	31.36	5.85	.90	31.79	5.27	.87
EX3 Exhibicionism	25.48	5.25	.82	25.50	5.63	.86	25.54	5.61	.86	25.35	5.42	.84
EX4 Sociability	29.59	5.15	.80	29.61	5.35	.83	28.86	5.51	.84	28.21	4.89	.79
EX Extraversion	*117.92*	*15.94*	*.91*	*119.17*	*17.85*	*.94*	*119.98*	*17.34*	*.94*	*119.67*	*15.27*	*.92*
[F:1.10; ns.]												
NE1 Anxiety	25.38	4.78	.74	24.67	5.30	.81	23.00	5.36	.82	22.51	5.01	.78
NE2 Depression	25.09	5.37	.79	23.72	5.88	.83	22.12	5.54	.81	21.81	5.31	.79

Table 2

ZKA-PQ facets descriptive statistics, means comparison and alpha reliabilities by age groups (Continued)

Facets and dimensions	Group 1 ≤ 22 years (n = 365)			Group 2 23–29 years (n = 436)			Group 3 30–41 years (n = 385)			Group 4 42–69 years (n = 379)		
	M	SD	α	M	SD	α	M	SD	α	M	SD	α
NE3 Dependence	25.89	5.00	.77	24.58	5.23	.80	24.16	5.03	.78	23.50	4.67	.76
NE4 Low Self-esteem	24.29	6.52	.90	23.30	6.93	.92	21.53	6.38	.91	20.84	5.91	.90
NE Neuroticism	100.65	18.05	.93	96.27	20.37	.95	90.81	19.15	.94	88.67	18.24	.94
[F:30.38; p < 0.001. *Scheffee: 1>2,3,4;2>3,4]												
SS1 Thrill and Adv. Seeking	23.31	5.96	.79	23.26	6.52	.83	21.09	6.15	.80	19.34	5.88	.79
SS2 Experience Seeking	27.83	5.41	.79	27.06	5.36	.80	25.11	5.52	.81	24.42	4.81	.75
SS3 Desinhibition	24.45	4.99	.76	23.86	5.20	.80	21.11	5.08	.79	18.96	4.54	.75
SS4 Boredom Suscep./Imp.	19.55	3.87	.64	19.81	3.60	.64	18.89	3.65	.68	18.56	3.48	.66
SS Sensation Seeking	95.15	15.90	.89	94.00	16.30	.90	86.19	15.92	.90	81.27	14.32	.88
[F:68.36; p < 0.001. *Scheffee: 1>3,4;2>3,4;3>4]												

Note: *Scheffee: $p < .01$

Results

Table 1 shows descriptive statistics, alpha reliabilities, correlations and effect sizes for both, ZKA-PQ facets and dimensions by sex. Frequencies distributions for the facets were normal as indicated by kurtosis and skewness values (±1) for males and females, except for Physical Aggression (AG1), and Positive Emotions (EX1). Figure 3 displays the facets frequencies distributions for the whole sample. Females scored significantly higher than males in Neuroticism and Extraversion (96.15 vs 89.32 and 120.90 vs 115.20, respectively). The effect sizes indicated a medium effect ($d = -0.35$) for both factors. Males scored higher than females in Physical Aggression (AG1; $d = 0.38$) and Thrill an Adventure Seeking (SS1; $d = 0.53$), but females scored higher than males in Anger (AG3; $d = -.037$), Social Warmth (EX2; $d = -0.44$), Sociability (EX4; $d = -0.43$), and Dependence (NE3, $d = -.043$). Alpha reliabilities were above 0.70, except for Restlessness (AC3), and Boredom Susceptibility / Impulsivity (SS4) for both males and females. Factors reliability ranged between 0.88 and 0.93.

Table 2 shows descriptive statistics, and internal consistencies for each age group, with mean differences by age group (Scheffe). Younger subjects scored higher than older ones in Aggressiveness (G1 and G2 versus G3 and G4; AG, $p < 0.001$), in Neuroticism (G1 versus G2, G3 and G4; and G2 versus G3 and G4; NE, $p < 0.001$), and in Sensation Seeking (G1 and G2 versus G3 and G4; SS, $p < 0.001$). On the contrary, older subjects displayed higher levels of Activity than younger ones (G4 versus G1, $p < 0.003$). There were no significant mean differences for Extraversion (EX) amongst the four age groups.

Table 3 shows principal axis analyses with a varimax rotation of the 20 ZKA-PQ facets. The Kaiser-Meyer-Olkin measures of sample adequacy were above 0.83. The total accounted variance was 59.02% (F-I: 23.65%; F-II: 15.50%, F-III: 8.40%; F-IV: 6.33%; F-V: 5.14%). The Catalan version indicates a neat five factor structure in accordance with eigenvalue >1, scree test, and Velicer's MAP methods. There were two secondary loadings above 0.40 in the Neuroticism dimension: Hostility (AG3; 0.47) and Positive Emotions (EX1; -0.50). The congruency coefficient between the different structures for each age group was between 0.98 and 0.99. Congruence coefficients with the original Spanish version were mostly above 0.95, except for Work Energy (AC4: 0.72). The global congruence coefficient was 0.97, indicating that the factorial structures for the Catalan and Spanish language versions of the ZKA-PQ were equivalent.

The Confirmatory Factor Analyses (CFA) of the 20 ZKA-PQ facets relied in five latent variables, with parameter estimates obtained with the Maximum Likelihood (ML) method. Three different types of models of growing com-
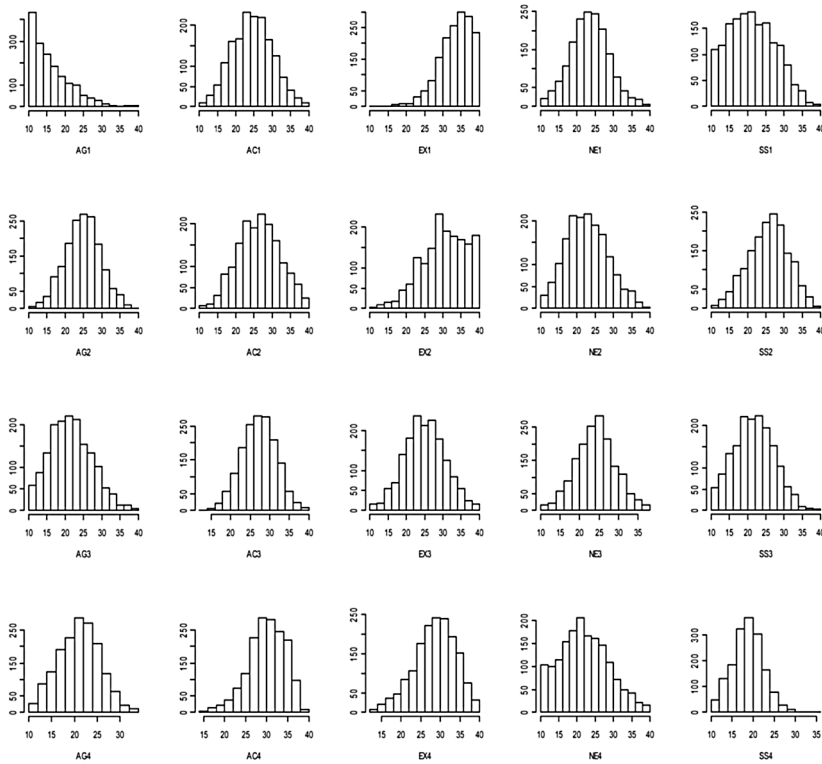
Figure 3
ZKA-PQ facets frequency distributions

plexity were designed and assessed, incorporating secondary loadings for all subjects and age groups (McCrae et al., 1996): 1) *Simple structure* (160 degrees of freedom). All facets were linked to its own single latent factor only; 2) *Salient loadings* (158 degrees of freedom). All loadings larger than ± .30; 3) *Modest loadings* (144 degrees of freedom). Loadings larger than ± .20. Figure 5 shows that the best fit was obtained in the modest loadings situation, with progressively decreasing chi-square values as model complexity increased regardless of the age group. Global fit indices were, however, far from acceptable (GFI = .76 ~ .87; TLI = .67 ~ .83; RMSEA = .09 ~ .13).
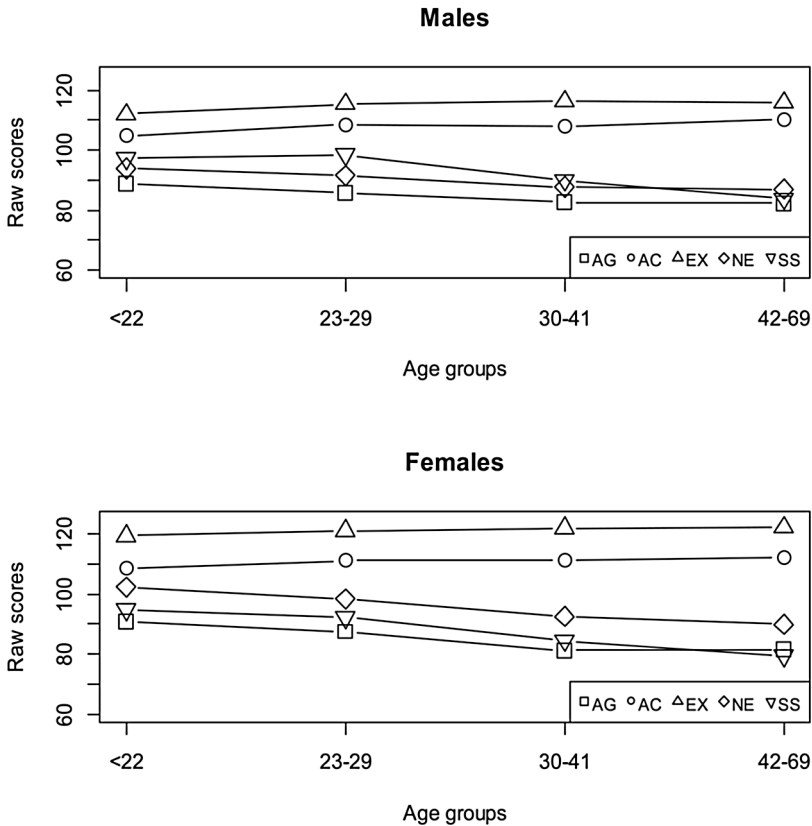
Males

Females

Figure 4
Raw mean scores for the ZKA-PQ dimensions by sex and age groups

Table 3
Principal axis analysis (Varimax) of ZKA-PQ facets and congruency coefficients between age groups.
Congruency coefficients (CC) with original Spanish version structure

ZKA-PQ facets (*n*= 1,565)	F-I	F-II	F-III	F-IV	F-V	G1-G2	G1-G3	G1-G4	G2-G3	G2-G4	G3-G4	CC
			All sample									
AG1 Physical Aggression	**.55**	-.03	-.13	-.01	.19	1	.99	.99	.99	.98	.99	.99
AG2 Verbal Aggression	**.76**	-.03	.14	.03	.19	.99	.99	.97	.99	.97	.98	.99
AG3 Anger	**.82**	.05	-.01	.32	.02	.99	.99	.99	1	1	1	.98
AG4 Hostility	**.66**	-.04	-.23	b	.11	.99	.99	1	.99	.99	.99	.97
AC1 Work Compulsion	-.07	**.57**	.02	.06	-.14	.99	.91	.96	.94	.98	.96	.99
AC2 General Activity	-.04	**.68**	.07	-.03	.24	.98	.99	.98	.99	.98	.96	.98
AC3 Restlessness	.30	**.58**	.13	.09	.19	.97	.95	.97	.98	.98	.97	.99
AC4 Work Energy	-.15	**.55**	.23	-.31	-.28	.97	.96	.97	.99	.97	.98	.72
EX1 Positive Emotions	-.17	.24	**.58**	**-.50**	.05	.99	1	.99	.99	.99	.99	.97
EX2 Social Warmth	-.14	.10	**.76**	-.15	-.08	1	1	.99	1	.99	.99	.99
EX3 Exhibitionism	.24	.10	**.56**	-.11	.17	.96	.94	.97	.97	.97	.99	.89
EX4 Sociability	-.09	.06	**.76**	-.12	.22	.96	.96	.95	.99	.96	.97	.99
NE1 Anxiety	.30	.21	-.11	**.73**	.06	.99	.97	.98	.99	.99	.98	.99
NE2 Depression	.16	-.05	-.23	**.83**	.05	1	.98	.98	.99	.98	.98	.99
NE3 Dependence	.05	.02	.03	**.77**	-.10	.96	.98	.97	.98	.99	.98	.98
NE4 Low Self-esteem	-.02	-.09	-.25	**.86**	.04	.99	.98	.99	.99	.99	.99	.99
SS1 Thrill and Adv. Seeking	.07	.08	-.05	-.10	**.68**	1	.99	.99	.99	.99	.98	.99
SS2 Experience Seeking	.04	.01	.10	-.02	**.73**	.99	.99	.96	.99	.98	.96	.97
SS3 Desinhibition	.16	.00	.18	.08	**.79**	1	.99	.99	.99	.99	.99	.99
SS4 Boredom Suscep./Imp.	.24	-.03	.06	.09	**.56**	.99	.94	.98	.98	.99	.95	.94

Table 3

Principal axis analysis (Varimax) of ZKA-PQ facets and congruency coefficients between age groups. (Continued)
Congruency coefficients (CC) with original Spanish version structure (Continued)

ZKA-PQ facets (*n*= 1,565)	F-I	F-II	F-IV	F-V	G1-G2	G1-G3	G1-G4	G2-G3	G2-G4	G3-G4	CC
			All sample								
Eigenvalue	4.73	3.10	1.68	1.27	1.09						
% variance accounted	23.65%	15.50%	8.40%	6.33%	5.14%						
Total congruency coefficient					.98	.98	.98	.99	.98	.98	.97

Note: G-1: <22 years; G-2: 23-29 years; G-3: 30-41 years; G-4: 42-69 years. Values above .40 are shown in boldface.
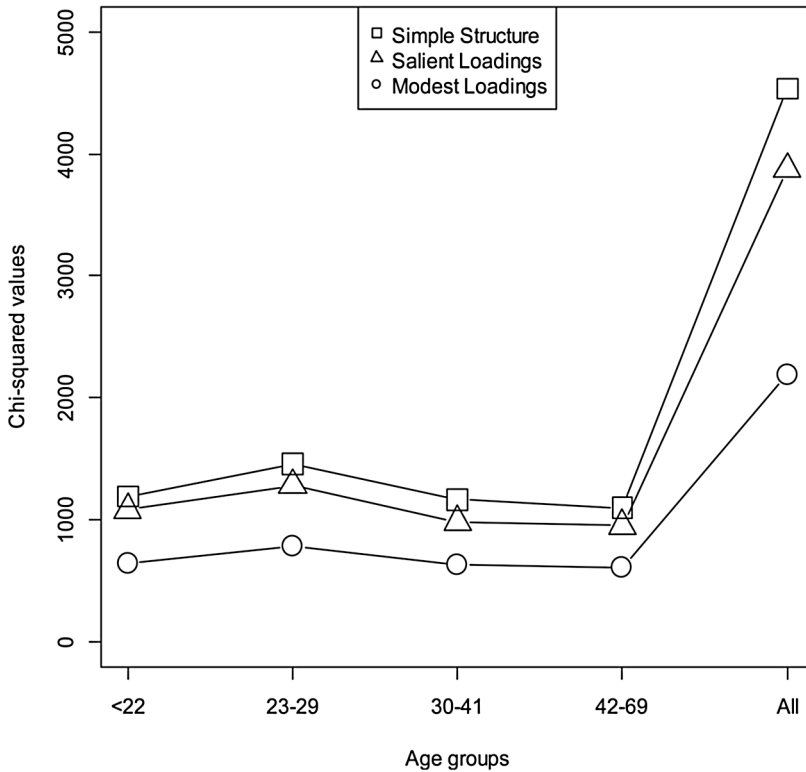
Figure 5
*Confirmatory factor analyses chi-square values for three types of models (simple
structure, salient loadings, and modest loadings) by age group*

Discussion

This research was designed to analyse the psychometric properties of the on-
line version of the ZKA-PQ, considering the sex and age of respondents. The
studied sample was large and composed by healthy and anonymous subjects
that represented four age groups between 18 and 69 years. Factor and facets
internal consistency were high and equivalent to the paper and pencil versions
of the instrument, which supports the equivalence between both versions
(Aluja et al., 2007; Ferrando & Lorenzo-Seva, 2005). The global descriptive
and factorial analyses suggest that the means, standard deviation, and internal
consistencies were similar to those obtained in the original validation study
(Aluja et al., 2010).The factorial structure of the ZKA-PQ replicated clearly

the five-factor structure obtained in the original paper and pencil study. The five factors remained relatively independent and there were only two secondary loadings: the facet of Hostility (AG4) and the facet of Positive Emotions (EX1), which loaded in the Neuroticism factor, even though facet loadings on their respective factors were all above 0.50. Nevertheless, the principal axis method imposes higher restrictions than the principal components method, which is usually applied in the analysis of the factor structure of the NEO-PI-R and TCI-R. Besides, there were no differences between factor matrices of the age groups, suggesting that the factor structure of the instrument maintains its stability regardless of age. Moreover, the CFA analyses indicate a better fit for the salient and modest loadings models, providing additional support to the notion of no differences in age groups due to their similar fit indices. These results point out that highly complex models show an acceptable fit. However, CFAs of personality questionnaires report generally an ill fit to data despite their consistent factor structures (NEO-PI-R: Aluja, García, García, & Seisdedos, 2005; McCrae, Zonderman, Costa, Bond, & Paunonen, 1996; Eysenck Personality Questionnaire, EPQ: Aluja, García, & García, 2004; TCI-R: Aluja, Blanch, Gallart, & Dolçet, 2010; ZKPQ: Aluja, García, & García, 2003). To a certain degree, this body of research has suggested that he low fit to data in the CFA concerning personality questionnaires might be due to: a) an excessive number of observed and latent variables, yielding a high chi-square value; b) high secondary loadings, and c) high correlations between facets.

The relationship between the ZKA-PQ factors with sex is similar to data obtained with the ZKPQ in previous studies and to sex differences reported in the original ZKA-PQ study (Aluja et al., 2010). Females scored significantly higher than males in Neuroticism and Extraversion, and slightly above males in Activity, whereas males scored higher in Sensation Seeking and Aggressiveness. This pattern is equivalent to past meta-analytic outcomes, and suggests that males could be higher than females on agentic-instrumental traits, whereas females would be higher than males on communal-instrumental traits (Feingold, 1994). Besides, these outcomes parallel those reported in extant research about sex differences in personality across different cultures. Apparently, there may be more room for variations in personality traits between men and women in developed than in underdeveloped countries. Constrained social and economic conditions might contribute to dilute in turn inherent sex-related personality differences (Schmitt, Realo, Voracek, & Allik, 2008). Concerning age, there were significant differences in Neuroticism and Sensation Seeking between young and older groups of individuals. This was analogue to the findings reported in past research regarding age differences in personality (Aluja et al., 2006; Gutiérrez et al., 2001; Haapasalo, 1990; McCrae et al., 1999). Furthermore, younger subjects also scored signif-

icantly higher in the Aggressiveness factor. This pattern was also observed at the facet level. On the other hand, older participants, those between 42 and 69 years old, reported higher means in AC in respect to the rest of age groups. Future studies with the on-line version of the ZKA-PQ might be addressed to study age differences in greater depth. For instance, a large study based in data obtained with an on-line questionnaire of over a million subjects, suggested that in adolescence some traits might be exaggeratedly pronounced and that age differences in personality could be strongly intertwined with gender differences (Soto, John, Gosling, & Potter, 2011). Interestingly, this study highlighted the importance of carrying out further research at the facet-level to apprehend age differences in personality along the life span. In this regard, the ZKA-PQ may be particularly useful because of its facet basic structure.

The outcomes in the present study indicate that the psychometric properties of the on-line ZKA-PQ version in Catalan language are equivalent to those found for the paper and pencil version with American and Spanish samples (Aluja et al., 2010). The alpha internal consistency coefficients behave well at the facet level, even though considering that there are only 10 items per facet. Sex and age differences in factors and facets were similar to those reported in past research about the former versions of this instrument. Moreover, the clear five orthogonal factors structure, with marginal secondary loadings and high congruence coefficients indicated that there were no differences in the factorial structure regarding age groups and provided additional strong support for the construct validity of the ZKA-PQ. Taken together, these results underscore the usefulness of the ZKA-PQ in both, basic and applied research about human personality.

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