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ABSTRACT: Aluja, Kuhlman and Zuckerman (2010) have developed an instrument for American and Spanish populations (Zuckerman-Kuhlman-Aluja Personality Questionnaire; ZKA-PQ; *Journal of Personality Assessment*, 92, 1-17.) that includes four facets for each five basic traits of the Zuckerman's psychobiological personality model. This new instrument is intended to improve the previous measure based on the same personality model, the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ), by including the narrower traits (facets) defining the factors. The present paper explores the convergent and discriminant validity of the new instrument relative to the NEO-PI-R in a sample from the Spanish general population. A series of exploratory factor analyses comparing both instruments were conducted. Results showed good convergent and discriminant validity between both instruments, although the ZKA-PQ had a slightly better structure than the NEO-PI-R. The results support the validity of the ZKA-PQ factor domains and the facets composing them. The new instrument may be useful in both applied and research settings.

Keywords: Zuckerman-Kuhlman-Aluja personality Questionnaire (ZKA-PQ), NEO-PI-R, Zuckerman's Psychobiological personality model, Convergent validity.

INTRODUCTION

In 1993, Zuckerman, Kuhlman, Teta, Joireman, and Kraft developed the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ) to measure the five basic domains of the Zuckerman's psychobiological model of personality (Zuckerman, 1991; 2005). The ZKPQ contains 99 dichotomous items that measure five factors: Impulsive-Unsocialized Sensation Seeking, Neuroticism-Anxiety, Activity, Sociability and Aggression-Hostility plus an Infrequency scale to control the social desirability bias.

In that study, Zuckerman et al., (1993) analyzed conjointly the five domains of the ZKPQ, the three traits of the Eysenck's PEN Model measured by the EPQ-R (Eysenck, Eysenck & Barratt, 1985), and the thirty facets from the NEO-PI-R (Costa & McCrae, 1992). They obtained three different factor solutions retaining three, four and five factors successively. The five factor structure showed that Neuroticism-Anxiety (N-Anx), Sociability (Sy) and Aggression-Hostility (Agg-Hos) loaded on the factors defined by the NEO-PI-R facets of Neuroticism (N), Extraversion (E), and Agreeableness (A), respectively. Activity (Act) loaded on the Extraversion factor, and Impulsive-Unsocialized Sensation Seeking (ImpSS) had two loadings larger than 0.40, one on the NEO-Conscientiousness (-0.59) and other on the NEO-Extraversion factor (0.41). No ZKPQ scales had high loadings on the NEO factor Openness to Experience or its facets. This pattern was replicated in Spanish population (Aluja, García, & García, 2004).

Those studies showed good convergent and discriminant validity between the NEO-PI-R from the Five Factor Model (FFM; Costa & McCrae, 1992) and the ZKPQ from the Zuckerman's Alternative Five model (Zuckerman, 1991) with the exception of the fifth factor in both (Activity and Openness). However, the NEO-PI-R format has some advantages over the ZKPQ in practical settings. For instance, personality disorders are best predicted when facets instead of general domains are used as independent variables and a facet level analyses contribute to increase

specificity and discriminate between Personality Disorder (Dyce & O'Connor, 1998; Aluja, García, Cuevas, & García, 2007a). The inclusion of facets is also relevant since they are being used to generate equations to diagnose personality disorders from a dimensional approach (Costa & Widiger, 2002). However, the absence of facets in the ZKPQ precludes the possibility of developing useful equations based on the Zuckerman's Alternative Five, although they have shown a similar (even slightly better) prediction of personality disorders compared to Big Five traits (Aluja, García, Cuevas, & García, 2007a). Beyond the research on personality disorders, some studies have demonstrated that facets can be more useful than general factors in predicting some behaviors (Paunonen, Haddock, Forsterling, & Keinonen, 2003), or developmental trajectories (Morizot & Le Blanc, 2003). In general, personality profiles for clinical, educational or organizational purposes are more enriched by using many facets rather than broad general factors (Westen, 1995). An additional advantage of the new ZKA-PQ is that it uses a Likert-type answer format increases the variability of the scores leading to finer population norms and statistical information compared to the dichotomous answer format of the ZKPQ.

Zuckerman (1991, 2005) has largely focused on the psychobiological basis of personality traits. From this standpoint, individual differences on personality domains, especially on the Impulsive-Sensation Seeking trait, are strongly accounted by genetic and psychobiological variables. For instance, it is well-replicated that low levels of monoamine-oxidase (MAO) are associated with high sensation seeking scores (Zuckerman, 1991, 1994, 2005). Thus, Zuckerman has created a broad psychobiological model where differences on the five domains are linked to the role of neurotransmitters (mainly dopamine, norepinephrine and serotonin), enzymes (such as MAO and Catechol-OMethyltransferase [COMT]), and gonadal hormones (such as testosterone and cortisol) (Aluja & Torrubia, 2004; Zuckerman, 1991; 2005). In general, Zuckerman's psychobiological model has stimulated many studies about the psychobiological basis of human

personality (for reviews see: Roberti, 2004; Stelmack, 2004; Zuckerman, 1991; 2005). Assuming that facets may also improve the validity of a personality measure in research settings, a new instrument including facets for the Zuckerman's alternative five would help to extend the usefulness of this model in the psychobiological research field.

Aluja, Kuhlman, and Zuckerman (2010) designed a new psychometric instrument (Zuckerman-Kuhlman-Aluja Personality Questionnaire [ZKA-PQ]) based on the Zuckerman's psychobiological personality model and including facets. The ZKA-PQ measures the same Zuckerman's five factors as the ZKPQ: Sensation Seeking, Neuroticism, Aggressiveness, Activity and Extraversion. Although greatly similar to the ZKPQ constructs, Sensation Seeking (SS), Neuroticism (NE), Aggressiveness (AG), and Extraversion (EX) domains have been slightly changed compared to the original ZKPQ (Impulsive-Sensation Seeking, Neuroticism-Anxiety, Aggression-Hostility, and Sociability, respectively), so the names has been modified to represent the broader nature of the constructs provided by a summing of the facets within each factor.

After a rational procedure of selection of candidate facets, building a large initial pool of items and preliminary results (see Aluja et al., 2010; for details), four facets were included for each domain: *Sensation Seeking* (SS): SS1 (Thrill and Adventure Seeking), SS2 (Experience Seeking), SS3 (Disinhibition) and SS4 (Boredom Susceptibility/Impulsivity); *Neuroticism* (NE): NE1 (Anxiety), NE2 (Depression), NE3 (Dependency) and NE4 (Low Self-Esteem); *Aggressiveness* (AG): AG1 (Physical Aggression), AG2 (Verbal Aggression), AG3 (Anger) and AG4 (Hostility); *Extraversion* (EX): EX1 (Positive Emotions), EX2 (Social Warmth), EX3 (Exhibitionism) and EX4 (Sociability); and *Activity* (AC): AC1 (Work Compulsion), AC2 (General Activity), AC3 (Restlessness) and AC4 (Work Energy). Results supported the internal and factorial reliabilities of the new instrument in both American and Spanish populations (Aluja, et al., 2010).

As a new instrument, a predictive and construct validation process is required to support the usefulness of the ZKA-PQ in practical and research settings (APA, AERA, & NCME, 1999). As a first step, information about the relationships between the ZKA-PQ and other established personality measures should be gathered. Both the ZKA-PQ and the NEO-PI-R are based on facets within factors and both postulate five factor models although some of the factors appear different. Convergent and discriminant validity of the ZKA-PQ was tested with a shortened version of NEO-PI-R (NE-FFI-R) in the original study (Aluja et al., 2010), but the NEO-FFI-R does not assess facets. The current study was designed to compare the psychometric properties of both ZKA-PQ and NEO-PI-R in a new sample of subjects from a general population with a similar sex and age distribution. We are mainly concerned with exploring the similarities and differences in the psychometric properties, comparing the fit of both instruments to the expected theoretical structures through exploratory factor analysis, and testing the convergent validity of the ZKA-PQ and the NEO-PI-R at the domain and facet levels.

METHOD

Subjects

Both ZKA-PQ and NEO-PI-R were given to a sample of 654 persons (317 males and 337 females) with a mean age of 44.9 years (S.d.: 17.15). The sample was distributed among those age ranges: 18-30 (20.6%), 31-40 (19.8%), 41-50 (20.8%), 51-60 (20.1%), and elder than 60 (18.7%). In regard to the education level, 22.9% of the sample has primary or secondary studies, 21.3% completed the High School, 13% had some university studies, and the remaining 42.8% had finished a university degree. Since the 22.9% of the sample had less than a high school education, the Flesch-Kincaid reading grade level of the ZKA-PQ was computed. For the Spanish version of the ZKA-PQ, the number of words is 1951 in 200 sentences. The approximate average number of

syllables in the Spanish version of the ZKA-PQ is 16 per sentence totaling 4000 syllables. With this data, the Flesh-Kincaid grade level formula gives a value close to 8 corresponding to a typical age of 13-14 years. Most of the sample had enough years of education to understand the ZKA-PQ. In this way, a similar index was developed specifically for Spanish texts; the Fernandez-Huerta's index gave a score of 70 for the ZKA-PQ corresponding to a level of "Fairly Easy".

Instruments

The Zuckerman-Kuhlman-Aluja Personality Questionnaire (ZKA-PQ) is composed of 200 items with a response format of 4-point Likert-type in which 1 = Disagree Strongly, 2= Disagree Somewhat, 3 = Agree Somewhat, and 4 = Agree Strongly. It measures five domains and twenty facets as explained in the introduction section. Alpha reliabilities for the five factors varied between 0.85 and .92 for the Spanish sample, and between 0.88 and 0.93 for the American one (Aluja, et al., 2010). The average alpha for the twenty facets of the ZKA-PQ in the Spanish validation sample was 0.75 with a minimum and a maximum of 0.65 and 0.90, respectively.

The Revised NEO Personality Inventory (NEO PI-R) is a well-known measure of the "Five Factor Personality Model" personality domains: Neuroticism (N), Extraversion (E), Openness to Experience (O), Agreeableness (A), and Conscientiousness (C), and their thirty facets (Six facets by five factors; see McCrae & Costa, 1990, for a description of the N, E, and O facets, and Costa, McCrae, & Dye, 1991, for a description of the A and C facets). The 240 items of the questionnaire are answered in a 5-point Likert-type scale (0-4), ranged from " Strongly disagree" to " Strongly agree". The Spanish version of the NEO-PI-R (Costa & McCrae, 1999) has good psychometric properties, similar to those of the Original American version (Aluja et al., 2004; Aluja, García, García, & Seisdedos, 2005; Blanch, Aluja, Solé, Gallart, & Dolcet, 2009). The reliability

coefficients for the five NEO-PI-R domains were in the 0.83–0.90 range reported for Neuroticism and Openness to Experience factors, respectively (Costa & McCrae, 1999).

Procedure

University psychology students from the Autonomous University of Madrid were trained in the theory and instruments from the Zuckerman's and the Five Factor personality models. As a regular exercise, they had to administer both instruments, preferably individually, to ten persons with the following characteristics: one male and female with an age between 18 and 30 years, one male and female with an age between 31 and 40 years, one male and female with an age between 41 and 50 years, one male and female with an age between 51 and 60 years, and one male and female elder than 60 years. To increase the motivation, students had to complete several activities related to the profiles obtained and, as it has been told before, scores on the domains of the ZKA-PQ and NEO-PI-R as well as a minimal explanation of the scores obtained were returned to participants.

Analysis

Statistical analyses were used to compare both instruments adding evidence about the convergent and discriminant validities of the new instrument in relation to the NEO-PI-R. First, descriptive analysis and exploratory factor analysis were conducted separately for ZKA-PQ and NEO-PI-R. Second, facets of both instruments were factor analyzed conjointly. All exploratory factor analyses included in the present study were performed following the Principal axis extraction and Varimax rotation methods.

RESULTS

Table 1 and 2 shows the descriptive statistics of ZKA-PQ and NEO-PI-R in the present sample, respectively. As can be seen, facets and domains of both instruments show a normal distribution since the Skewness and Kurtosis values are within the -1 to +1 range. In regard to the internal consistency, only five out 20 facets of the ZKA-PQ showed alpha indices lower than 0.70, and the five factors had alpha values around 0.90. For the NEO-PI-R, most of the facets had alphas lower than 0.70 (26 out 30), although the five factors had reliability coefficients higher than 0.80.

 INSERT TABLES 1 AND 2 ABOUT HERE

Table 3 shows the correlations between factors from both instruments. As can be seen, Sensation Seeking correlated positively with Extraversion and Openness to Experience and negatively with Conscientiousness. Those values are congruent with previous evidence from Spanish studies about the relationships between these traits (Aluja, Garcia, & Garcia, 2003; García, Aluja, García, & Cuevas, 2005). Sensation Seeking had a negative relationship with Conscientiousness reflecting the role of sensation seeking in antisocial behavior (Aluja et al., 2004; Zuckerman, 1999). Aggressiveness and Agreeableness correlated negatively as in Zuckerman, et al., (1993). Activity is mainly related with Conscientiousness (Aluja et al., 2004) although in Zuckerman et al., (1993) it was mainly associated with Extraversion. Both Neuroticism and Extraversion correlated highly with the similarly labeled scales of the NEO-PI-R.

 INSERT TABLE 3 ABOUT HERE

Correlations between facets from ZKA-PQ and NEO-PI-R are shown in Table 4. As expected from the factor correlations in Table 3, Aggressiveness facets correlated negatively with

Agreeableness facets, especially with A4 (Compliance), and positively with N2 (Anger-Hostility). Activity facets correlated highly with the activity facet of the Extraversion factor from NEO-PI-R and with NEO facets of Conscientiousness. It is notable that all Activity facets correlated highly with Achievement Striving (C4). Extraversion facets from ZKA-PQ are strongly correlated with the Extraversion facets from NEO-PI-R, the largest correlations observed for Warmth (E1) and Positive Emotions (E6). They were also correlated with two Agreeableness facets (Trust and Altruism). It should be noted that EX1 (Positive Emotions) had high negative correlations with almost all Neuroticism facets, especially with Depression and Vulnerability.

 INSERT TABLE 4 ABOUT HERE

Neuroticism facets from ZKA-PQ are strongly related with the facets of the same factor from the NEO-PI-R, with the exception of N5 (Impulsivity) whose correlations were lower with Neuroticism and relatively higher with ZKA aggression facets. The ZKA Neuroticism facets did correlate highly with other traits with the exception of Low Self-Esteem that correlated negatively with Assertiveness (E3), Positive Emotions (E6), Competence (C1) and Self-Discipline (C5). Finally, no general pattern of relationships was found between the Sensation Seeking facets and NEO-PI-R, except for the high relationship between the Excitement Seeking facet of the NEO-PI-R (E5) and 3 of the 4 ZKA facets. ZKA Experience Seeking (SS2) correlated with all NEO Openness facets, and Boredom Susceptibility/Impulsivity (SS4) with 3 of the 6 facets of NEO Conscientiousness. As a final commentary, it should be remarked that most of the correlations between non-related factor facets reported on table 4 were lower than 0.35, showing a great degree of discriminant validity between the facets of both instruments.

Factor structures of the ZKA-PQ and NEO-PI-R are reported on Tables 5 and 6, respectively. Since Zuckerman's theory postulates five basic traits of personality, five factors were rotated. The MAP method (Verlicer, 1976; O'Connor, 2000) supports the extraction of five factors since the lowest value was obtained for the fifth component (the average squared partial correlations were 0.0336, 0.0252 and 0.0293 for the fourth, fifth and sixth factors, respectively). The five factors accounted for 57.98% of the variance. All facets loaded most highly on their appropriate factors, and no secondary loading was larger than ± 0.40 . The structure of the ZKA-PQ found in the present sample is close to that observed in the original study (Aluja et al., 2010).

On the NEO-PI-R, the MAP method also support the extraction of five factors since the lowest value was obtained for the fifth component (the average squared partial correlations were 0.0129, 0.0122 and 0.0126 for the fourth, fifth and sixth factors, respectively). Those five factors accounted for by the 47.33% of the variance, 10% less than the variance explained by the factor solution for the facets of the ZKA-PQ. All but 4 facets (E3, E5, A3, A6) loaded most highly on their postulated factor, with only four secondary loadings larger than ± 0.40 . The reported structure is quite similar to other Spanish studies using the NEO-PI-R (Aluja et al., 2005).

 INSERT TABLES 5 AND 6 ABOUT HERE

The next factor analysis included all facets from the ZKA-PQ and NEO-PI-R. No factor sum scores were included. The five factors accounted for 48.17% of the variance. All theoretical groups of 4 facets from the ZKA-PQ loaded on the corresponding factor only, except for AG3 (Anger), AG4 (Hostility), SS4 (Boredom Susceptibility/Impulsivity) and EX3 (Exhibitionism). The first two also load on the first factor formed by the facets of Neuroticism of both instruments, whereas the third and fourth ones load on the second factor mainly composed by the

Aggressiveness (ZKA-PQ) and, in negative, Agreeableness (NEO-PI-R) facets. The Assertiveness (E3), and Angry-Hostility (N2) facets from the NEO-PI-R also load on this second factor. The last one (N2) has been previously linked to the Agreeableness factor of the NEO-PI-R (Aluja, et al., 2005). The Impulsivity facet (N5) from the NEO-PI-R, and Boredom Susceptibility/Impulsivity (SS4) from the ZKA-PQ also load on this second factor. Considering that this factor is composed of Aggressiveness, Impulsivity and Agreeableness facets, this factor shows the convergence of both models in regard to the description and prediction of antisocial behavior (Costa & Widiger, 2002; Zuckerman, 1999).

The third factor includes the Sensation Seeking facets of the ZKA-PQ as well as the Openness facets of the NEO-PI-R, with the largest loading on SS2 (Experience Seeking; 0.808). The fourth factor is defined by the ZKA-PQ Extraversion facets as well as a combination of facets from the Extraversion and Agreeableness factors of the NEO-PI-R. Finally, the fifth factor included the Activity facets from the ZKA-PQ, all Conscientiousness facets, excluding C6 (Deliberation) that has no strong loading on any factor, and the facet of Activity (E4) from the NEO-PI-R. In fact, E4 presents a much larger loading on this factor than on the Extraversion one. This result may have been a function of the inclusion of more facets related to the Activity construct in the construction of the ZKA-PQ.

 INSERT TABLE 7 ABOUT HERE

DISCUSSION

The purpose of the present paper was to investigate the structure of the new instrument based on the Zuckerman's psychobiological personality model (ZKA-PQ) and its relationships

with the Five Factor Model as measured by the NEO-PI-R. The structure of the ZKA-PQ was robust and somewhat better than the NEO-PI-R structure. Because the NEO-PI-R has more secondary loadings (4) compared with the ZKA-PQ (0). This result suggests a better factor structure validity of the ZKA-PQ. Another explanation may be that the ZKA-PQ assesses more narrowly constructs than the NEO-PI-R. For instance, Aggressiveness is formed by four facets closely linked to the aggressiveness concept (Physical aggression, verbal aggression, anger and hostility), whereas the Agreeableness factor includes other content beyond aggression as suspiciousness, modesty, or sensitivity to others. Most relationships between ZKA-PQ and the NEO factors are similar to relationships previously reported with ZKPQ factors. Correlation and factor analyses show that Neuroticism and Extraversion facets and factors from both instruments were defined the same constructs with few differences. Agreeableness is negatively and strongly related with Aggressiveness. On the other hand, Activity is positively related with Conscientiousness rather than extraversion. Sensation Seeking presents a more diverse pattern but some relationships observed are supported by previous evidence with the ZKPQ (Aluja et al., 2003; García et al., 2005).

The extraversion factor does not present a simple structure when both instruments were analyzed conjointly. In the five-factor solution, Extraversion is formed by 3 of the 4 facets of the ZKA-PQ, and 3 of the 6 NEO-Extraversion facets plus two NEO-Agreeableness facets. The absence of the other E facets raises questions about the content facet validity of Extraversion, particularly in the NEO. Excitement seeking (E5) is more closely related to sensation seeking in the ZKA than to extraversion in the NEO. Activity in the NEO is more clearly related to NEO conscientiousness and activity facets in the ZKA. The absence of more than one facet sampling sensation (excitement) seeking and activity factors in the construction of the NEO reflects the initial presumptions of the authors regarding primary and secondary traits. The assertiveness facet

has a larger loading on the Aggressiveness-Agreeableness factor than on the Extraversion one, questioning the real nature of the NEO-PI-R Assertiveness scale. Those doubts are reinforced by previous evidence suggesting a significant relationship between this facet and antisocial personality disorder in American (Dyce & Connor, 1998) and, especially, Spanish (Aluja, Cuevas, García, & García, 2007b) populations.

The Openness to Experience factor of the Five Factor Model is not represented in Zuckerman's Alternative Five personality model (Zuckerman et al., 1993). However, low but consistent relationships between Openness and Sensation Seeking have been previously reported (Aluja et al., 2003; García, et al., 2005). Looking at the correlations between facets, it can be seen that just one facet correlates with all Openness facets namely Experience Seeking (EX2). This facet is defined by preference for new or unpredictable situations which matches very well with the Openness to Experience construct (Costa & McCrae, 1992; 1999). However, the lack of correlations with the other three Sensation Seeking facets suggest that the preference for risk activities (SS1: Thrill and Adventure Seeking), the searching for pleasure through risky hedonic pursuits like sex or drugs (SS3: Disinhibition), or impulsivity (SS4: Boredom Susceptibility/Impulsivity) are not core aspects of the Openness to Experience construct. This pattern replicates the findings reported in a different sample by Aluja et al., (2003).

Results in this study may be used to derive further hypotheses based on previous findings from both personality models. For instance, it is well known that the Five Factor model has been successfully used on behavioral prediction in many contexts. For instance, Conscientiousness has been described as a good predictor of job performance (Hurtz, & Donovan, 2000), so considering the links between this trait and Zuckerman's Activity it should be hypothesized that the latter will be a good predictor of job performance as well. In fact, the combination of both traits may help to go into the reasons for such prediction in depth. For instance, results of the present study suggest

that the ability to predict job success could be linked to the energy devoted to work activities since the Work Energy facet (AC4) of Activity has the strongest relationship with Conscientiousness facets. The consistent relationship found between Conscientiousness and compulsivity (Costa, & Widiger, 2002; Dyce & O'Connor, 1998) support these findings.

Considering the strong psychobiological foundation of Zuckerman's model (Stelmack, 2004; Zuckerman, 2005) and the relationships with the NEO-PI-R depicted in the present paper, Zuckerman's model may be used as a useful framework to explore the psychobiological basis of the FFM, originally developed as a descriptive taxonomy of personality. For instance, Sensation Seeking has been linked to differences on some neurotransmitters, such as dopamine, serotonin and norepinephrine, and hormones, such as testosterone and cortisol (Zuckerman, 2005; Aluja & García, 2005; Aluja & Torrubia, 2004; Aluja, García, Blanch, & Fibla, in press), as well as differences on the enzymes regulating the levels of neurotransmitters, like MAO-B (Zuckerman & Kuhlman, 2000; Roberti, 2004). Therefore, the results of the present study may help to choose the optimum psychological assessment instruments in psychobiological personality research from either or both models.

The present manuscript presents evidence favoring the facet internal reliability and structural validity of the ZKA-PQ compared to the NEO-PI-R. However, these comparisons are based on a Spanish population and may not hold for others. The convergent and discriminant validity of the new instrument should be compared to instruments derived from other personality models, particularly those with a strong psychobiological foundation such as Cloninger's, Eysenck's and Gray's models. The validity of the ZKA-PQ in practical and research settings should be tested with special emphasis of the prediction of personality disorders as well as the relationships with behavioral and biological variables.

In summary, ZKA-PQ and NEO-PI-R have good convergent and discriminant validity on at least four of the major factors replicating previous evidence about the relationships between basic factors of both models. This good convergent validity is reported for both factors and facets. Focusing on the ZKA-PQ facets, exploratory factor analysis supported their construct validity since ZKA-PQ facets grouped in the factor expected theoretically with no secondary loadings at all. In fact, this instrument shows a slightly better content validity and facet-factor structure than NEO-PI-R. The ZKA-PQ has also shown the ability to add useful information about specific facet and factor personality variables in the NEO-PI-R such as Assertiveness and Openness to Experience. Finally, this paper demonstrates the great possibilities for both models to be combined in order to increase our knowledge about basic personality structure.

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TABLES

Table 1. Descriptive, Skewness, Kurtosis and alpha internal consistency of the ZKA-PQ.

	Min	Max	M	SD	S	K	Alpha
AG1: Physical Aggression	10	40	18.30	6.52	.907	.352	.87
AG2: Verbal Aggression	10	39	25.54	5.10	-.122	.288	.73
AG3: Anger	10	40	22.68	5.89	.176	-.321	.84
AG4: Hostility	10	35	21.03	4.36	.020	-.020	.65
AC1: Work Compulsion	11	40	24.47	5.81	.234	-.299	.78
AC2: General Activity	10	40	26.87	5.40	-.044	-.124	.78
AC3: Restlessness	16	40	27.13	4.39	.166	-.046	.59
AC4: Work Energy	15	40	31.58	5.20	-.444	-.171	.80
EX1: Positive Emotions	16	40	32.43	4.68	-.596	.201	.78
EX2: Social Warmth	15	40	31.22	5.38	-.363	-.381	.83
EX3: Exhibitionism	10	39	24.47	5.23	.031	-.159	.77
EX4: Sociability	13	40	29.19	4.97	-.258	-.167	.74
NE1: Anxiety	10	38	23.46	4.76	.121	.144	.68
NE2: Depression	10	38	22.64	5.06	.100	-.389	.71
NE3: Dependence	11	39	23.89	4.73	.077	-.117	.67
NE4: Low Self-esteem	10	40	20.82	5.46	.310	-.015	.82
SS1: Thrill and Adventure Seeking	10	40	21.84	6.64	.246	-.593	.81
SS2: Experience Seeking	10	40	24.19	5.42	-.069	-.296	.74
SS3: Disinhibition	10	38	21.33	5.16	.306	-.235	.73
SS4: Boredom Susceptibility/Impulsivity	10	32	19.44	4.06	.248	-.120	.65
AG: Aggressiveness	42	144	87.55	17.54	.176	.129	.91
AC: Activity	57	153	110.04	15.11	.079	.147	.87
EX: Extraversion	57	154	117.32	15.46	-.318	-.059	.89
NE: Neuroticism	49	155	90.81	16.19	.160	.161	.89
SS: Sensation Seeking	45	140	86.80	17.09	.137	-.245	.89

Min: Minimum; Max: Maximum; M: Mean; SD: Standard Deviation; S: Skewness, K: Kurtosis.

Table 2. Descriptive, Skewness, Kurtosis and alpha internal consistency of the NEO-PI-R.

	Min	Max	Mean	SD	S	K	Alpha
N1: Anxiety	1	32	17.16	5.27	.152	-.111	.61
N2: Angry Hostility	1	29	12.54	5.18	.244	-.256	.62
N3: Depression	0	32	12.75	5.63	.333	-.160	.67
N4: Self-Consciousness	3	31	14.74	4.79	.235	-.319	.48
N5: Impulsiveness	0	32	15.27	5.41	.024	-.179	.58
N6: Vulnerability	0	31	11.76	5.20	.342	.095	.68
E1: Warmth	3	32	21.38	5.05	-.280	-.276	.67
E2: Gregariousness	0	31	16.63	5.49	-.055	-.167	.60
E3: Assertiveness	3	29	15.06	5.02	.085	-.159	.59
E4: Activity	3	32	17.07	4.82	.081	.113	.53
E5: Excitement seeking	0	32	14.36	5.94	.081	-.464	.63
E6: Positive emotions	1	32	22.13	5.72	-.578	.250	.72
O1: Fantasy	0	32	16.35	5.74	.087	-.031	.68
O2: Aesthetics	0	32	16.88	6.24	-.014	-.260	.71
O3: Feelings	2	31	18.85	4.78	-.053	-.069	.53
O4: Actions	2	27	14.12	4.34	.012	-.288	.44
O5: Ideas	0	32	17.37	6.39	-.088	-.247	.73
O6: Values	4	32	20.17	4.62	-.169	.035	.50
A1: Trust	3	32	19.45	5.22	-.141	-.438	.68
A2: Straightforwardness	5	32	20.19	4.66	-.356	-.080	.55
A3: Altruism	8	32	23.74	4.44	-.465	-.145	.63
A4: Compliance	4	32	19.10	4.85	-.234	-.014	.52
A5: Modesty	3	32	19.93	5.12	-.460	.059	.62
A6: Tender-Mindedness	6	32	20.18	3.98	-.280	.428	.32
C1: Competence	10	32	21.37	4.48	-.129	-.227	.54
C2: Order	2	31	18.87	5.01	-.303	-.423	.51
C3: Dutifulness	10	32	24.22	4.36	-.514	-.052	.54
C4: Achievement Striving	2	32	20.47	4.97	-.258	.004	.63
C5: Self-Discipline	3	32	20.58	5.57	-.371	-.167	.69
C6: Deliberation	1	32	18.82	5.86	-.256	-.178	.71
N: Neuroticism	18	163	84.25	22.60	.154	.094	.87
E: Extraversion	38	164	106.66	20.25	-.039	-.059	.83
O: Openness	43	168	103.78	22.11	.078	-.095	.86
A: Agreeableness	48	173	122.60	18.83	-.524	.741	.83
C: Conscientiousness	53	175	124.36	21.69	-.247	-.151	.87

Min: Minimum; Max: Maximum; M: Mean; SD: Standard Deviation; S: Skewness, K: Kurtosis.

Table 3. Correlations between the ZKA-PQ and NEO-PI-R domains.

	AG	AC	EX	NE	SS
N	.424	-.059	-.325	.786	-.023
E	.018	.287	.759	-.278	.461
O	-.014	-.061	.384	-.072	.508
A	-.571	.092	.219	-.046	-.294
C	-.249	.449	.127	-.333	-.362

Correlations larger than +/- .35 are in boldface.

N: Neuroticism; E: Extraversion; O: Openness to Experience; A: Agreeableness; C: Conscientiousness.

SS: Sensation Seeking, AG: Aggressiveness; AC: Activity NE: Neuroticism-; EX: Extraversion.

Table 4. Pearson correlation between ZKA-PQ and NEO-PI-R facets.

	Physical Aggression	Verbal Aggression	Anger	Hostility	Work Compulsion	General Activity	Restlessness	Work Energy	Positive Emotions	Social Warmth	Exhibitionism	Sociability	Anxiety	Depression	Dependence	Low Self-esteem	Thrill and Adventure Seeking	Experience Seeking	Disinhibition	Boredom Susceptibility/Impulsivity
	AG1	AG2	AG3	AG4	AC1	AC2	AC3	AC4	EX1	EX2	EX3	EX4	NE1	NE2	NE3	NE4	SS1	SS2	SS3	SS4
N1: Anxiety	-.06	.16	.37	.28	.07	.01	.18	-.02	-.23	-.06	-.13	-.17	.56	.53	.43	.40	-.23	-.15	-.16	-.03
N2: Angry Hostility	.29	.43	.67	.60	.04	-.01	.21	-.15	-.37	-.29	.10	-.25	.52	.49	.34	.32	.01	.02	.08	.23
N3: Depression	.00	.08	.32	.35	.10	-.08	.05	-.16	-.45	-.22	-.13	-.24	.48	.68	.53	.64	-.17	-.12	-.07	.07
N4: Self-Consciousness	-.02	-.02	.21	.24	.04	-.05	-.01	-.18	-.27	-.21	-.28	-.34	.34	.42	.44	.49	-.12	-.10	-.06	-.01
N5: Impulsiveness	.23	.35	.41	.39	.01	-.12	.20	-.20	-.08	-.03	.21	.01	.39	.32	.28	.25	.12	.16	.30	.36
N6: Vulnerability	-.02	.08	.40	.33	-.10	-.22	-.01	-.28	-.42	-.14	-.16	-.24	.43	.57	.52	.54	-.19	-.10	-.04	.19
E1: Warmth	-.21	-.03	-.24	-.36	.07	.13	.10	.23	.52	.64	.30	.58	-.10	-.22	.03	-.15	.03	.13	.13	-.14
E2: Gregariousness	-.11	.04	-.06	-.12	.02	.10	.04	.08	.28	.26	.25	.61	-.08	-.13	.05	-.08	.10	.14	.31	.08
E3: Assertiveness	.18	.26	.10	.00	.11	.12	.20	.12	.25	.14	.56	.31	-.05	-.25	-.26	-.35	.24	.23	.21	.14
E4: Activity	.06	.21	.12	-.04	.25	.43	.54	.29	.34	.22	.32	.30	.19	-.13	-.12	-.21	.27	.23	.21	.13
E5: Excitement seeking	.21	.30	.09	.11	.02	.08	.17	-.12	.19	.02	.37	.31	.07	-.11	-.10	-.10	.60	.54	.63	.32
E6: Positive emotions	-.07	.10	-.14	-.27	.01	.10	.10	.21	.64	.52	.37	.55	-.19	-.39	-.22	-.40	.17	.28	.27	.00
O1: Fantasy	.10	.14	.08	.04	-.14	-.17	-.01	-.23	.11	.05	.36	.18	.12	.03	-.03	.03	.31	.46	.41	.38
O2: Aesthetics	-.13	-.01	-.08	-.18	-.08	-.04	.04	-.02	.25	.21	.24	.18	.03	-.02	-.08	-.04	.16	.38	.19	.08
O3: Feelings	-.11	.12	.04	-.12	-.05	.07	.18	.06	.32	.29	.23	.32	.15	.00	.04	-.08	.18	.36	.30	.04
O4: Actions	.01	.15	.13	.01	-.12	.07	.15	-.09	.15	.05	.20	.15	.06	-.01	-.04	.00	.35	.54	.41	.33
O5: Ideas	-.04	.12	-.08	-.13	.01	.04	.10	.04	.30	.12	.31	.22	-.03	-.15	-.22	-.17	.32	.44	.24	.02
O6: Values	-.11	.10	-.04	-.13	-.22	-.10	-.06	-.03	.21	.15	.07	.15	-.12	-.14	-.10	-.10	.12	.36	.21	.06
A1: Trust	-.25	-.20	-.31	-.43	.03	.08	.00	.23	.38	.40	.02	.32	-.25	-.25	-.09	-.18	-.05	.03	-.06	-.16
A2: Straightforwardness	-.36	-.25	-.20	-.33	-.06	.06	-.07	.19	.13	.19	-.37	.02	-.05	-.02	.12	.06	-.27	-.23	-.30	-.23
A3: Altruism	-.30	-.18	-.25	-.40	.07	.08	.03	.29	.35	.53	.04	.37	-.06	-.12	.02	-.11	-.13	-.04	-.09	-.28
A4: Compliance	-.48	-.54	-.51	-.46	-.07	-.01	-.16	.07	.12	.24	-.21	.06	-.21	-.08	.04	.01	-.22	-.18	-.19	-.26
A5: Modest	-.30	-.23	-.21	-.25	-.06	.03	-.06	.11	.03	.11	-.39	.03	-.01	.06	.16	.25	-.18	-.11	-.17	-.20
A6: Tender-Mindedness	-.21	-.17	-.16	-.29	.06	.03	-.02	.19	.09	.27	-.12	.12	-.04	-.01	.11	.05	-.16	-.06	-.09	-.22
C1: Competence	-.09	-.06	-.20	-.25	.12	.14	.02	.43	.37	.21	.05	.22	-.25	-.34	-.27	-.45	-.02	-.11	-.15	-.41
C2: Order	-.12	-.09	.03	-.02	.07	.17	.09	.29	.06	-.01	-.18	-.07	-.02	-.05	-.01	-.16	-.18	-.24	-.26	-.28
C3: Dutifulness	-.26	-.16	-.20	-.30	.20	.23	.07	.53	.25	.21	-.16	.08	-.10	-.16	-.10	-.26	-.22	-.21	-.32	-.48
C4: Achievement Striving	-.04	.05	-.05	-.16	.40	.44	.36	.58	.35	.18	.05	.18	.02	-.17	-.13	-.30	.05	-.05	-.09	-.26
C5: Self-Discipline	-.12	-.08	-.14	-.23	.23	.34	.15	.54	.23	.07	-.11	.03	-.18	-.24	-.25	-.37	-.06	-.19	-.26	-.31
C6: Deliberation	-.18	-.25	-.30	-.27	.07	.06	-.20	.24	.10	.00	-.20	-.02	-.27	-.19	-.12	-.19	-.21	-.27	-.33	-.50

Correlations larger than +/- .35 are in boldface.

Table 5. Factorial structure of the ZKA-PQ.

	I	II	III	IV	V
AG1: Physical Aggression	.544	.008	-.233	-.046	.245
AG2: Verbal Aggression	.784	.052	.126	.024	.185
AG3: Anger	.813	.054	-.077	.316	.026
AG4: Hostility	.659	-.062	-.337	.333	.107
AC1: Work Compulsion	.015	.538	-.022	.068	-.052
AC2: General Activity	-.065	.761	.029	-.032	.109
AC3: Restlessness	.264	.585	.161	.099	.147
AC4: Work Energy	-.111	.585	.249	-.239	-.319
EX1: Positive Emotions	-.177	.254	.657	-.381	.041
EX2: Social Warmth	-.193	.037	.750	-.077	-.128
EX3: Exhibitionism	.264	-.001	.448	-.075	.324
EX4: Sociability	-.070	.078	.751	-.150	.223
NE1: Anxiety	.336	.241	-.040	.599	.083
NE2: Depression	.178	-.001	-.237	.776	-.056
NE3: Dependence	.050	.015	.006	.728	-.169
NE4: Low Self-esteem	-.020	-.109	-.261	.787	.060
SS1: Thrill and Adventure Seeking	.096	.158	-.026	-.158	.716
SS2: Experience Seeking	.035	-.008	.186	-.071	.754
SS3: Disinhibition	.128	-.016	.134	.023	.797
SS4: Boredom Susceptibility/Impulsivity	.282	-.123	-.124	.121	.577
Eigenvalue	2.49	1.74	2.23	2.62	2.51
% variance accounted	12.45	8.72	11.16	13.33	12.54

Factorial loadings larger than +/- .40 are in boldface.

Table 6. Factorial structure of the NEO-PI-R.

	I	II	III	IV	V
N1: Anxiety	.745	-.022	.003	.061	.087
N2: Angry Hostility	.638	-.155	.002	-.443	-.064
N3: Depression	.732	-.132	-.078	.075	-.171
N4: Self-Consciousness	.564	-.151	-.095	.104	-.159
N5: Impulsiveness	.422	.195	.106	-.348	-.370
N6: Vulnerability	.667	-.184	-.042	.122	-.366
E1: Warmth	-.131	.769	.169	.248	.029
E2: Gregariousness	-.128	.430	.074	.057	-.103
E3: Assertiveness	-.261	.252	.217	-.494	.160
E4: Activity	.041	.444	.176	-.281	.226
E5: Excitement seeking	-.086	.267	.400	-.377	-.205
E6: Positive emotions	-.277	.591	.291	-.090	.070
O1: Fantasy	.021	.165	.519	-.205	-.316
O2: Aesthetics	.011	.098	.680	.036	-.006
O3: Feelings	.157	.365	.631	-.011	.077
O4: Actions	-.025	.021	.556	-.158	-.114
O5: Ideas	-.166	.048	.692	-.132	.101
O6: Values	-.069	.071	.468	.122	-.082
A1: Trust	-.262	.386	.090	.387	.067
A2: Straightforwardness	.041	.041	-.090	.601	.164
A3: Altruism	-.041	.539	.093	.459	.256
A4: Compliance	-.151	.029	-.053	.615	-.036
A5: Modesty	.143	.038	-.023	.665	.018
A6: Tender-Mindedness	.086	.278	.011	.486	.122
C1: Competence	-.306	.216	.040	.019	.600
C2: Order	.023	-.123	-.120	.027	.502
C3: Dutifulness	-.066	.118	-.049	.321	.673
C4: Achievement Striving	-.018	.278	.048	-.129	.709
C5: Self-Discipline	-.196	.011	-.072	.006	.801
C6: Deliberation	-.259	-.126	-.136	.255	.494
Eigenvalue	3.01	2.46	2.59	2.96	3.17
% variance accounted	10.04	8.20	8.65	9.86	10.58

Factorial loadings larger than +/- .40 are in boldface.

Table 7. Factorial structure of the ZKA-PQ and NEO-PI-R facets.

	1	2	3	4	5
N3: Depression	.762	-.015	-.083	-.144	-.086
NE2: Depression	.761	.054	-.058	-.206	-.066
N6: Vulnerability	.716	-.012	-.063	-.111	-.295
NE4: Low Self-esteem	.705	-.106	.002	-.210	-.257
NE1: Anxiety	.699	.236	.106	-.036	.168
N1: Anxiety	.697	-.014	-.088	-.023	.155
NE3: Dependence	.692	-.076	-.145	.062	-.079
N2: Angry Hostility	.573	.496	.001	-.187	.052
N4: Self-Consciousness	.566	-.095	-.061	-.206	-.091
N5: Impulsiveness	.441	.402	.192	.153	-.186
A4: Compliance	-.070	-.654	-.093	.110	-.115
AG2: Verbal Aggression	.194	.633	.136	.094	.096
AG4: Hostility	.423	.613	-.071	-.287	-.086
AG1: Physical Aggression	.013	.609	.025	-.172	-.047
AG3: Anger	.500	.609	-.020	-.077	.081
A5: Modesty	.207	-.593	-.043	.040	.014
A2: Straightforwardness	.084	-.556	-.171	.083	.107
EX3: Exhibitionism	-.126	.466	.266	.458	-.029
E3: Assertiveness	-.304	.444	.208	.250	.205
A6: Tender-Mindedness	.111	-.427	-.037	.249	.108
SS4: Boredom Susceptibility/Impulsivity	.136	.412	.402	-.093	-.312
C6: Deliberation	-.308	-.316	-.287	-.093	.289
SS2: Experience Seeking	-.088	.142	.808	.054	-.088
SS3: Disinhibition	-.013	.309	.646	.118	-.173
O4: Actions	.013	.079	.622	.010	-.010
E5: Excitement seeking	-.079	.331	.607	.156	-.043
SS1: Thrill and Adventure Seeking	-.171	.291	.605	-.070	.024
O5: Ideas	-.174	.021	.553	.107	.126
O1: Fantasy	.055	.172	.546	.170	-.241
O3: Feelings	.131	-.061	.530	.345	.158
O2: Aesthetics	.010	-.116	.514	.181	.014
O6: Values	-.064	-.132	.396	.128	-.088
E1: Warmth	-.061	-.207	.144	.770	.097
EX2: Social Warmth	-.104	-.234	.025	.742	.090
EX4: Sociability	-.211	.009	.234	.726	.067
E6: Positive emotions	-.295	.057	.290	.607	.123
EX1: Positive Emotions	-.370	-.142	.233	.569	.297
A3: Altruism	-.007	-.420	-.009	.535	.226
E2: Gregariousness	-.058	-.005	.139	.476	-.047
A1: Trust	-.194	-.364	.043	.409	.067
C4: Achievement Striving	-.136	.008	.019	.134	.785
C5: Self-Discipline	-.326	-.123	-.157	-.077	.704
AC4: Work Energy	-.151	-.161	-.138	.225	.670
C3: Dutifulness	-.145	-.359	-.206	.099	.579
AC2: General Activity	-.001	.015	.122	.035	.567
AC3: Restlessness	.216	.253	.202	.133	.484
C1: Competence	-.405	-.093	-.105	.194	.476
E4: Activity	.008	.235	.299	.302	.462
AC1: Work Compulsion	.088	.086	-.065	.030	.443
C2: Order	-.064	-.081	-.235	-.113	.410
Eigenvalue	6.04	5.09	4.55	4.27	4.14
% variance accounted	12.07	10.17	9.11	8.54	8.28

Factorial loadings larger than +/- .40 are in boldface.