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Functioning styles of personality disorders and five-factor normal personality traits: a correlation study in Chinese students

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Abstract

Background: Previous studies show that both the categorical and dimensional descriptors of personality disorders are correlated with normal personality traits. Recently, a 92-item inventory, the Parker Personality Measure (PERM) was designed as a more efficient and precise first-level assessment of personality disorders. Whether the PERM constructs are correlated with those of the five-factor models of personality needs to be clarified.

Methods: We therefore invited 913 students from poly-technical schools and colleges in China to answer the PERM, the Five-Factor Nonverbal Personality Questionnaire (FFNPQ), and the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ).

Results: Most personality constructs had satisfactory internal alphas. PERM constructs were loaded with FFNPQ and ZKPQ traits clearly on four factors, which can be labelled as Dissocial, Emotional Dysregulation, Inhibition and Compulsivity, as reported previously. FFNPQ Openness to Experience, Conscientiousness and Extraversion formed another Factor, named Experience Hunting, which was not clearly covered by PERM or ZKPQ.

Conclusion: The PERM constructs were loaded in a predictable way on the disordered super-traits, suggesting the PERM might offer assistance measuring personality function in clinical practice.

Background

In clinics, we need the symptom reports to diagnose per-

sonality disorders, while the dimensional/ categorical descriptors such as normal or abnormal personality styles

help us to understand further the phenotypic expression of the disorder [1]. Evidence has shown both normal and abnormal personalities were governed by traits [2]. However, whether the disordered personality traits are the extremes of normal personality variation is unclear up to date [3,4]. On one hand, the five-factor models of normal personality have been criticized for lacking diagnostic utility with regard to the clinical descriptions of personality disorders [5]. On the other hand, both normal and disordered personality traits are dimensional, continuously distributed and overlap with each other [2,6].

Many principal component analyses conducted in the healthy subjects support the five basic traits. One widely used questionnaire of this model is the NEO-PI-R [7], which measures Extraversion, Agreeableness, Conscientiousness, Openness to Experience and Neuroticism. Another alternative model is the Zuckerman-Kuhlman Personality Questionnaire (ZKPQ) [8], which measures Impulsive Sensation Seeking, Neuroticism-Anxiety, Aggression-Hostility, Activity and Sociability. In a clinical sample, investigators analyzed the personality disorder symptoms assessed using the Structured Clinical Interview for DSM-III-R [9], and found four factors which they labeled 'the four A's': Antisocial (impulsive, unstable, dramatic and easily bored), Asocial (socially indifferent and stereotyped interests), Asthenic (anxious, fearful and dependent) and Anankastic (obsessive-compulsive, rigid and excessive perfectionism) [10]. Their findings were supported by a factor analysis using the descriptors of DSM-IV [11] in patients with personality disorders [12]. By analyzing the eighteen lower-order dysfunctional traits described in the Dimensional Assessment of Personality Pathology-Basic Questionnaire (DAPP-BQ) [13] in general and clinical samples, the four super-traits were labelled respectively in a cleaner and clearer way: Dissocial, Inhibition, Emotional Dysregulation and Compulsivity [14].

Moreover, several correlation studies between the five-factor basic traits and disordered personality have been conducted [15-20], with the four disordered super-traits resembling the four out of five normal personality traits [21,22]. For instance, NEO-PI-R Agreeableness (-) and ZKPQ Aggression-Hostility were loaded on DAPP-BQ Dis-

social; NEO-PI-R Extraversion (-) and ZKPQ Sociability (-) were loaded on DAPP-BQ Inhibition; NEO-PI-R Neuroticism and ZKPQ Neuroticism-Anxiety were loaded on DAPP-BQ Emotional Dysregulation; NEO-PI-R Conscientiousness and ZKPQ Activity were loaded on DAPP-BQ Compulsivity [20,23]. However, a factor resembling NEO-PI-R Openness to Experience was not found in the personality dysfunctions [24]. In one study, it was loaded with the lower trait of DAPP-BQ Conduct Problems [20].

Recently, a measurement of disordered personality function, the Parker Personality Measure (PERM), was proposed for the efficient and first-level clinical description of personality disorder styles: Paranoid, Schizoid, Schizotypal, Antisocial, Borderline, Histrionic, Narcissistic, Avoidant, Dependent, Obsessive-Compulsive and Passive-Aggressive types [25]. This refined questionnaire contains 92 items, which were factored into five traits. The question therefore arises whether PERM could cover all the continuously distributed normal and disordered personality dimensions or it is similar to other inventories designed for the disordered personality traits. In order to answer this question, we have tried PERM, ZKPQ and a Five-Factor Nonverbal Personality Questionnaire (FFNPQ) [26] in poly-technical school and college students in China. The nonverbal personality questionnaire has the test items, which do not require translation [27,28]. Up to the present, no correlation study has been done between the nonverbal personality questionnaire and the clinical descriptions of personality disorder.

Since PERM is a clinically oriented questionnaire, we have hypothesized that its constructs might be factored into at least four super-traits with FFNPQ and ZKPQ traits. For instance, PERM Paranoid, Schizoid and Schizotypal (DSM-IV Cluster A) styles would be loaded with FFNPQ Extraversion (-) and ZKPQ Sociability (-); PERM Antisocial, Borderline, Histrionic, Narcissistic (Cluster B) and Passive-Aggressive styles would be loaded with FFNPQ Agreeableness (-) and ZKPQ Aggression-Hostility; PERM Avoidant and Dependent (Cluster C) would be loaded with FFNPQ Neuroticism and ZKPQ Neuroticism-Anxiety; while PERM Obsessive-Compulsive style (Cluster C) would be loaded with FFNPQ Conscientiousness and ZKPQ Activity.

Table 1: Gender and age (in years) distribution in two student samples.

	Gender	Sample size	Age (mean ± SD/ range)
ADULT	Women	370	19.2 ± 1.2/ 18-24
	Men	204	20.0 ± 1.3/ 18-25
CHILD	Women	278	16.4 ± .8/ 13-17
	Men	61	16.1 ± .8/ 14-17

Table 2: Personality constructs, scaling points and internal alphas of three questionnaires in ADULT (n = 574) and CHILD (n = 339) groups.

	Number of Item	Scale point	Alpha	
			ADULT	CHILD
The Parker Personality Measure				
Paranoid	10	1,2,3,4,5	.70	.68
Schizoid	8	1,2,3,4,5	.35	.30
Schizotypal	5	1,2,3,4,5	.62	.58
Antisocial	10	1,2,3,4,5	.68	.68
Borderline	10	1,2,3,4,5	.78	.75
Histrionic	6	1,2,3,4,5	.55	.51
Narcissistic	8	1,2,3,4,5	.70	.73
Avoidant	10	1,2,3,4,5	.75	.69
Dependent	10	1,2,3,4,5	.72	.72
Obsessive-Compulsive	6	1,2,3,4,5	.50	.44
Passive-Aggressive	9	1,2,3,4,5	.68	.66
The Five-Factor Nonverbal Personality Questionnaire				
Extraversion	12	1,2,3,4,5	.75	.68
Agreeableness	12	1,2,3,4,5	.61	.56
Conscientiousness	12	1,2,3,4,5	.60	.61
Openness to Experience	12	1,2,3,4,5	.67	.66
Neuroticism	12	1,2,3,4,5	.69	.68
The Zuckerman-Kuhlman Personality Questionnaire				
Impulsive Sensation Seeking	19	0,1	.67	.70
Neuroticism-Anxiety	19	0,1	.77	.72
Aggression-Hostility	17	0,1	.63	.66
Activity	17	0,1	.66	.64
Sociability	17	0,1	.66	.63

Note: The Likert-type rating scales used in the Parker Personality Measure and the Five-Factor Nonverbal Personality Questionnaire were different from those used in the original designs.

Methods

Subjects

Nine hundred and thirteen healthy students from the poly-technical schools or colleges in China were recruited in the study. Their age and gender distributions were shown in Table 1. All subjects were free from active psychiatric disorder and free from alcohol or drug use at least 72 hours prior to the study. All subjects gave their informed oral consent to be included in the study.

Questionnaires

Subjects completed the Chinese language versions of PERM and ZKPQ, and the pictorial depictions of FFNPQ during evening classes or other quiet rooms. In order to avoid confusion, we used the same Likert-type rating scales for PERM and FFNPQ, which were different from those used in the original designs: 1 – very unlike me, 2 – moderate unlike me, 3 – somewhat like and unlike me, 4 – moderate like me, 5 – very like me. The force-choice

rating scales were used for ZKPQ (0 – No, 1 – Yes) as proposed in the original design (see Table 2).

A. PERM has 92 items with higher loadings, drawn from several descriptor pools for personality disorders (for detail, see ref. [25]). All PERM items were translated into Chinese by the twelve members of the present study group. B. FFNPQ is a 60-item self-report measure five basic normal personality traits: Extraversion, Agreeableness, Conscientiousness, Openness to Experience, Neuroticism. The items consist of pictorial depictions of personality-relevant behaviours being performed in specific situations. Responders rate the likelihood that they would engage in the types of behaviour illustrated. These items have proven to be reliable in six cultures include Chinese (Hong Kong) [27]. C. ZKPQ is an 89-item self-report measure of another five basic normal personality traits: Impulsive Sensation Seeking, Neuroticism-Anxiety, Aggression-Hostility, Activity, and Sociability.

Table 3: MANOVA results of age group, gender and personality constructs.

Effect	F value	df (effect, error)	p-level
Group	5.2	1, 909	< .05
Gender	4.3	1, 909	< .05
Construct	2873.3	20, 18180	< .001
Group X Gender	.2	1, 909	.65
Group X Construct	5.0	20, 18180	< .001
Gender X Construct	13.8	20, 18180	< .001
Group X Gender X Construct	1.0	20, 18180	.48

Table 4: Raw scores (mean \pm S.D.) of personality constructs of three questionnaires referring respectively to gender and age groups.

	Men (n = 265)	Women (n = 648)	ADULT (n = 574)	CHILD (n = 339)
The Parker Personality Measure				
Paranoid	25.2 \pm 5.9	25.8 \pm 5.8	25.5 \pm 5.8	25.9 \pm 5.8
Schizoid	19.9 \pm 4.2	20.2 \pm 4.1	19.9 \pm 4.1	20.6 \pm 4.1
Schizotypal	10.4 \pm 3.7	10.4 \pm 4.2	10.1 \pm 4.3	10.8 \pm 3.6b
Antisocial	20.7 \pm 6.1	20.5 \pm 5.8	20.2 \pm 5.8	21.2 \pm 6.0
Borderline	21.7 \pm 6.8	23.9 \pm 7.0a	22.6 \pm 6.9	24.5 \pm 7.1b
Histrionic	13.3 \pm 3.7	13.0 \pm 3.4	13.2 \pm 3.5	12.8 \pm 3.4
Narcissistic	18.1 \pm 5.3	17.0 \pm 5.0	17.6 \pm 5.0	16.8 \pm 5.2
Avoidant	25.5 \pm 7.1	27.2 \pm 6.6a	26.3 \pm 6.9	27.4 \pm 6.6
Dependent	22.4 \pm 6.0	24.5 \pm 6.7a	22.8 \pm 6.3	25.6 \pm 6.7b
Obsessive-Compulsive	17.6 \pm 4.0	17.9 \pm 3.8	17.8 \pm 4.0	17.9 \pm 3.8
Passive-Aggressive	21.7 \pm 5.6	21.2 \pm 5.5	21.1 \pm 5.5	21.8 \pm 5.5
The Five-Factor Nonverbal Personality Questionnaire				
Extraversion	29.4 \pm 7.6	27.1 \pm 6.7a	28.1 \pm 7.1	27.3 \pm 6.8
Agreeableness	44.5 \pm 5.9	45.6 \pm 6.0	45.3 \pm 6.1	45.3 \pm 6.8
Conscientiousness	37.2 \pm 6.8	38.3 \pm 6.1	38.2 \pm 6.2	37.7 \pm 6.4
Openness to Experience	37.0 \pm 6.6	36.7 \pm 6.8	37.2 \pm 6.6	36.1 \pm 6.4
Neuroticism	26.4 \pm 7.1	31.9 \pm 7.2a	30.0 \pm 7.4	36.1 \pm 6.9b
The Zuckerman-Kuhlman Personality Questionnaire				
Impulsive Sensation Seeking	8.5 \pm 3.3	8.7 \pm 3.4	8.3 \pm 3.3	9.2 \pm 3.5b
Neuroticism-Anxiety	7.4 \pm 3.6	9.1 \pm 3.7a	8.2 \pm 3.8	9.3 \pm 3.6b
Aggression-Hostility	6.6 \pm 2.9	6.9 \pm 3.2	6.6 \pm 3.0	7.1 \pm 3.2
Activity	8.3 \pm 3.0	7.7 \pm 3.2	8.1 \pm 3.2	7.6 \pm 3.1
Sociability	8.9 \pm 3.0	8.4 \pm 3.0	8.3 \pm 3.1	9.0 \pm 2.9b

Note: a, $p < .05$ vs. scores of men; b, $p < .05$ vs. scores of ADULT group. The Likert-type rating scales used in the Parker Personality Measure and the Five-Factor Nonverbal Personality Questionnaire were different from those used in the original designs.

The translation and psychometric properties of the Chinese language version are described in two studies [29,30]. In this questionnaire, ten items of another scale of Dissimulation (Infrequency or Lie) were randomly inserted as a test validity indicator for individuals [8].

Statistics

The relationship among the eleven PERM, five FFNPQ and five ZKPQ constructs was examined by factorial anal-

ysis. A 21×21 matrix of Pearson intercorrelations was computed and subjected to principal component analysis with varimax rotation. Subjects aged larger or equal to 18 years old were grouped into ADULT, those less than 18 into CHILD. Group and gender differences were analyzed by MANOVA, followed by Duncan's multiple range new test. A p value less than .05 was considered as significant.

Table 5: Intercorrelation coefficients of personality constructs of three questionnaires.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. PERM-Par																				
2. PERM-Szd	.20																			
3. PERM-Szt	.41	.39																		
4. PERM-Ant	.43	.14	.35																	
5. PERM-Bor	.53	.26	.56	.44																
6. PERM-His	.46	.08	.33	.58	.48															
7. PERM-Nar	.51	.14	.35	.54	.36	.57														
8. PERM-Avo	.46	.29	.50	.28	.60	.39	.30													
9. PERM-Dep	.39	.19	.44	.39	.59	.45	.34	.63												
10. PERM-OC	.41	.17	.20	.03	.24	.16	.24	.20	.12											
11. PERM-PA	.46	.19	.39	.60	.48	.50	.54	.40	.46	.12										
12. FFPNQ-E	.11	-.10	.02	.26	.08	.24	.26	-.10	.02	.05	.16									
13. FFPNQ-A	-.24	-.06	-.20	-.34	-.24	-.30	-.30	-.15	-.19	.00	-.37	-.16								
14. FFPNQ-C	.12	.07	.04	-.02	.08	.09	.10	.04	.04	.30	-.01	.20	.19							
15. FFPNQ-O	.05	.06	.05	.01	.05	.09	.08	-.05	-.10	.20	-.03	.34	.19	.50						
16. FFPNQ-N	.32	.09	.26	.28	.42	.30	.21	.39	.37	.11	.31	.11	-.15	.21	.11					
17. ZKPQ-ImpSS	.23	.08	.23	.47	.34	.39	.27	.16	.23	.06	.36	.20	-.19	.02	.09	.19				
18. ZKPQ-Nanx	.38	-.17	.42	.22	.58	.31	.22	.60	.54	.17	.31	-.10	-.11	.10	-.02	.43	.21			
19. ZKPQ-AgHst	.34	-.07	.16	.43	.28	.33	.28	.16	.19	.05	.41	.12	-.35	-.07	-.05	.32	.18			
20. ZKPQ-Act	.02	-.10	-.04	-.17	-.09	-.06	-.03	-.20	-.20	.27	-.20	.07	.15	.25	.21	-.20	.00	-.08	-.11	
21. ZKPQ-Sy	-.10	-.30	-.25	.05	-.10	.08	.02	-.17	.03	-.10	.01	.21	.05	.00	-.01	-.03	.06	-.14	.07	.08

Note: Correlations with $|r| \geq .30$ are in bold for clarity; correlations were significant ($p < .05$) at $|r| \geq .06$. Abbreviations: I–II, PERM-Par, Paranoid; Szd, Schizoid; Szt, Schizotypal; Ant, Antisocial; Bor, Borderline; His, Histrionic; Nar, Narcissistic; Avo, Avoidant; Dep, Dependent; OC, Obsessive-Compulsive; PA, Passive-Aggressive. 12–16, FFPNQ-E, Extraversion; A, Agreeableness; C, Conscientiousness; O, Openness to Experience; N, Neuroticism. 17–21, ZKPQ-ImpSS, Impulsive Sensation Seeking; Nanx, Neuroticism-Anxiety; AgHst, Aggression-Hostility; Act, Activity; Sy, Sociability.

Results

Each subject answered the three questionnaires and scored less than three on the lie scale in ZKPQ. The internal reliabilities of the twenty-one constructs were shown in Table 2. There were significant gender and group effects on some of the constructs (Table 3). Men scored significantly lower than women did on PERM Borderline, Avoidant and Dependent, FFPNQ Neuroticism and ZKPQ Neuroticism-Anxiety scales, but higher on FFPNQ Extraversion. ADULT group scored significantly lower than CHILD group on PERM Schizotypal, Borderline and Dependent, FFPNQ Neuroticism, and ZKPQ Impulsive Sensation Seeking, Neuroticism-Anxiety and Sociability scales (Table 4).

The intercorrelations of the 21 personality construct scores are presented in Table 5. Table 6 presents the results of the varimax rotated principal component analysis. In both ADULT and CHILD samples, five factors were extracted with eigenvalues greater than 1.0, which accounted for 62.54% and 61.17% respectively (Table 6). Construct loadings on the five super-factors were also similar in both ADULT and CHILD samples. The factor congruence coefficients between the two samples were: Factor I, .98; II, .94; III, .98; IV, .95; V, .95. Taken as an example, in ADULT, Factor I which clearly describes an antisocial behaviour, was marked by PERM Antisocial (.81), Passive-Aggressive (.72), Histrionic (.67), Narcissistic (.67), Para-

noid (.51), FFPNQ Agreeableness (-.61), and ZKPQ Aggression-Hostility (.64) and Impulsive Sensation Seeking (.59). The factor was therefore called "Dissocial" as per Livesley et al. [14].

Factor II describes an ambition of experience seeking, which was marked by FFPNQ Openness to Experience (.84), Conscientiousness (.75), and Extraversion (.58), without clear counterparts in PERM or ZKPQ. This factor was called "Experience Hunting". Factor III appears to describe psychological distress and clearly resembles the higher-order "Emotional Dysregulation" as described earlier. The factor is defined by PERM Avoidant (.81) and Dependent (.77), Borderline (.68), FFPNQ Neuroticism (.63), and ZKPQ Neuroticism-Anxiety (.82).

Factor IV was named after the higher order factor "Inhibition" being defined by loadings from PERM Schizoid (.78), Schizotypal (in CHILD, .58) and ZKPQ Sociability (-.79). Factor V was labelled "Compulsivity" due to loadings from PERM Obsessive-Compulsive (.73) and ZKPQ Activity (.76).

Discussion

The factorial analysis of the PERM, FFPNQ and ZKPQ scales yielded five factors: Dissocial (Factor I), Experience Hunting (Factor II), Emotional Dysregulation (Factor III), Inhibition (Factor IV), and Compulsivity (Factor V). With

Table 6: Principal component analysis of three questionnaires in two student samples.

	ADULT (n = 574)					CHILD (n = 339)				
	FI	FII	FIII	FIV	FV	FI	FII	FIII	FIV	FV
The Parker Personality Measure										
Paranoid	.51	.03	.47	.18	.40	.50	-.02	.36	.19	.48
Schizoid	.08	.02	.09	.78	-.04	.05	.13	.16	.72	.05
Schizotypal	.30	.08	.34	.47	.22	.31	.08	.35	.58	.08
Antisocial	.81	.08	.18	.04	-.07	.78	.09	.25	.13	-.17
Borderline	.42	.05	.68	.22	.09	.33	.14	.70	.21	.13
Histrionic	.67	.13	.40	-.06	.11	.61	.20	.44	.02	.05
Narcissistic	.67	.09	.23	.08	.27	.73	.10	.21	.15	.15
Avoidant	.12	-.14	.81	.24	.07	.25	-.04	.73	.31	.04
Dependent	.31	-.12	.77	-.02	-.05	.26	.04	.77	.13	-.05
Obsessive-Compulsive	.04	.20	.25	.16	.73	.13	.11	.16	.15	.77
Passive-Aggressive	.72	-.04	.32	.12	-.02	.69	.04	.37	.12	-.07
The Five-Factor Nonverbal Personality Questionnaire										
Extraversion	.47	.58	-.16	-.21	-.01	.38	.65	-.14	-.24	-.14
Agreeableness	-.61	.23	-.02	-.14	.06	-.66	.25	.01	.06	.06
Conscientiousness	-.12	.75	.14	-.01	.26	-.12	.73	.21	.08	.29
Openness to Experience	.02	.84	-.07	.09	.12	-.07	.82	.04	.10	.16
Neuroticism	.19	.38	.63	.02	-.16	.20	.16	.66	-.12	-.14
The Zuckerman-Kuhlman Personality Questionnaire										
Impulsive sensation seeking	.59	.22	.07	.05	-.08	.53	.12	.16	-.06	.04
Neuroticism-Anxiety	.11	.01	.82	.12	.05	.03	-.10	.79	.01	.15
Aggression-Hostility	.64	-.09	.13	-.12	.00	.64	-.19	.08	-.20	.10
Activity	-.07	.13	-.23	-.13	.76	-.16	.22	-.23	-.15	.69
Sociability	.07	.05	-.11	-.79	-.01	.20	.14	.06	-.70	.03
Eigenvalue	6.29	2.32	2.11	1.28	1.13	6.14	2.32	1.27	1.98	1.13
% Total variance	29.9	11.0	10.0	6.1	5.4	29.3	11.0	6.1	9.5	5.4

Note: Loadings ≥ .50 are in bold for clarity.

the exception of Experience Hunting, the remaining four higher-order factors have been found previously. The study thus suggests PERM provides a description of personality disorder styles comparable to the four super-traits found elsewhere [10,12,14,16,31].

The Factor II "Experience Hunting" was unique to FFNPQ, which was highly loaded by Openness to Experience, Conscientiousness and Extraversion. From the definition of NEO-PI-R [7], subjects with higher Openness to Experience are much more willing to consider novel ideas and to try out unusual approaches to problem solving; people with higher Conscientiousness are scrupulous, well organized and disciplined; Extraversion drives people to search for the general experience of positive emotion. However, the emergence of Factor II might be methodological, since FFNPQ is a non-verbal, precisely the visual format of the five-factor model. Indeed, during their exploring of experience such as the Sensation Seeking, subjects would prefer using the visual modality [32]. On the other hand, it is not surprise that no PERM or ZKPQ construct was loaded with FFNPQ Openness to Experience. In clinics, the verbal-format NEO-PI-R Open-

ness to Experience was unrelated to personality disorders at the domain level [24,33], it was also the weakest domain to separate Borderline, Avoidant, Obsessive-Compulsive, or Schizotypal personality disorders [34]. In genetic background, there were the smallest correlations between the DAPP-BQ personality dysfunctions and NEO-PI-R Openness to Experience [16]. In addition, it was the reason that ZKPQ was based on a selection of variables that explicitly excluded Openness to Experience (or "culture") [35].

The internal alphas of the twenty-one personality constructs were generally satisfactory, except those for PERM Schizoid (.35), Histrionic (.55) and Obsessive-Compulsive (.50). These lower alphas were similar to those found in a study of the diagnostic descriptors for DSM-IV criteria in 668 patients with personality disorders [36]. The cultural difference might also contribute to the discrepancy, for instance, the alpha values of some traits and facets of the Chinese version of NEO-PI-R were also lower than those of the English version [37].

Moreover, the group X gender effect in our study showed that younger women scored higher on PERM Borderline, Avoidant and Dependent, FFNPQ Neuroticism and ZKPQ Neuroticism-Anxiety, which supports the previous studies using the clinical structured interview [38,39].

Conclusions

The present analyses indicated that PERM could not cover all the five-factor normal personality traits, but was similar to other measures of disordered personality. As stated elsewhere [20], each instrument is an imperfect measure of personality that shares components of variance with the other while also tapping specific dimensions. However, it is worth to try the PERM to rate the disordered personality functioning in clinics, since it has predictable loadings on the disordered personality super-traits.

List of abbreviations used

ADULT, a group of students whose ages above or equal to 18 years old;

CHILD, a group of students whose ages under 18 years old;

DAPP-BQ, Dimensional Assessment of Personality Pathology – Basic Questionnaire;

FFNPQ, Five-Factor Nonverbal Personality Questionnaire;

PERM, the Parker Personality Measure;

ZKPQ, the Zuckerman-Kuhlman Personality Questionnaire.

Competing interests

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Authors' contributions

W.W., C.H. and J.L. participated in the design and coordination of the study, W.W. drafted the manuscript, all other authors collected the data in students.

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