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Will the Big Five Personality Factor Stand-up: An Analysis of NEO Personality Inventory-Revised

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ABSTRACT

The aim of the present study was to examine the factorial invariance of a major instrument i.e., NEO-Personality Inventory-Revised-Form S (NEO PI-R)[1], tapping broad five factor of personality such as: neuroticism, extraversion, openness to experiences, agreeableness, and conscientiousness. It also aimed to study the replication of broad five factors in Indian population. To achieve these objectives, the NEO PI-R was administered on a sample of 375 subjects (age range from 18 yrs to 22 yrs) randomly selected from various academic institutes in Indian. The statistical analysis such as descriptive statistics, reliability analysis, and factor analysis were performed on collected data. The higher mean score on neuroticism in present data indicates a cultural variation across the country. Reliability analysis was confirmed test-retest reliability ranging from 0.70 to 0.78 (n = 108, gap of over 60 days) and strikingly high internal consistency ranging from 0.98 to 0.99 for the big five factor in India. Bivariate correlation analyses demonstrate positive significant correlations among the facets scale of NEO-PI-R and their corresponding factor except few correlations. The significant correlations among the five factors question their independence in the measurement of personality structure. In factor analysis, the three personality dimension such as conscientiousness, neuroticism, and agreeableness were clearly replicates and the other two factors such as extraversion and openness to experience were partially replicate to define the personality structure in Indian population. These findings are in line with existing literature and have strong implications to define the personality structure in Indian population.

Keywords: NEO-PI-R; Five-Factor model; Bivariate correlation; Reliability

1. INTRODUCTION

From the past 70 years, different criteria have emerged to define the personality factor structure and their stability across method, genders, ages, and cultures. In the last quarter of 20th century the personality model like Eysenck's EPI model[2], Guilford and Zimmerman's 14 major dimensions[3], and Cattell's 16 personality factors[4] were frequently used to define the personality structure. But, all these models have suffered with criticism on primitive, poor replication, and their reproducibility[5-6]. In response to the need a new model named as big-five-factor (FFM) emerged which is consider as more stable, general, and reproducible model of personality[7-8]. However, originally it was discovered from a series of overlapping[9] descriptor pools that were assembled[7,10-11]. Big five adequately describe the covariance structure of the trait terms in these descriptor pools[12]. The FFM describes personality in a hierarchical manner and comprehensively in term of universal trait structure such as neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. FFM gained support and claims for its convergent and discriminant validity, and about the replicability of all the five factors[13-14].

However, FFM Model becomes one of the dominant paradigms in trait psychology, but it never received wide general acceptance and have been criticized on several ground. O'Connor[15] argued that FFM model lacking the feature of scientific theory. Block[16] and Zuckerman[17] argued that the interpretation of personality dimension such as openness to experience, agreeableness, and conscientiousness are not clear. Several studies fail to reproduce the popular big five structure. Kamlesh[18] found replicability only for the three dimensions i.e., neuroticism, conscientiousness, and agreeableness. Egan[19] report high reliability for neuroticism, agreeableness, and conscientiousness as compare to the openness and extraversion. Saucier and Goldberg[20] question the construct validity of the FFM. McKenzie[21] object to the naming of Agreeableness, conscientiousness, and openness to experience to define the personality. Quirk[22], *et al.* investigated that primary factors (including the NEO PI-R facet subscales) comparatively measure a significantly greater proportion of variance. Digman and Inoyae[13] investigated that all the five factors show substantial correlations among them and have lack of independence. They found that a smaller number of factors, possibly two, or three would be emerged in second order factor analysis. Laher[23] argued that FFM is not wholly applicable across cultures. Thus, the five-dimensional taxonomy of personality traits has matured with both persuasive advocate and strong critics. The different psychologists have been apprehensive with the

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identification of basic dimensions of personality and there is no evidence of cross-cultural robustness of the positive and negative valence dimensions.

In recent years NEO-PI-R have received the most attention in the measurement of big five dimension of personality. The NEO-PI-R is psychometrically well-developed tool to measure the big five factor of personality[14,24]. The scale translated into several languages and applied in more than 36 cultures across the world satisfactorily[14]. The facets scales of NEO PI-R are also being used to generate a personality profile of the prototypical psychopath through consensus ratings provided by experts[25]. Till date the five factors model, have not been sufficiently utilized in Indian research on personality, with a few exceptions. Thus, in the light of on-going discussion, the present study is an attempt to examine the factorial invariance of a major instrument (NEO PI-R) tapping broad five factors of personality and replicability of five factors in Indian context.

2. METHODOLOGY

2.1 Sample

375 students (mean of age = 20.14) were drawn randomly from various academic institutes in Haryana (India). From the same sample, 108 participants again completed the same scales within a gap of 60 days to estimate the test-retest reliability of scale.

2.2 Tool

The NEO PI-R Form-S[1]. NEO PI-R Form S is a 240 item questionnaire comprises 48 items for each dimension (i.e., 8 items per facet) designed to access the five domains of personality such as neuroticism (N), extraversion (E), openness to experiences (O), agreeableness (A), and conscientiousness (C). Each item is responded on a five-point rating scale with labels of strongly disagree to strongly agree. The alpha coefficients for the individual facet scales ranged from 0.56 to 0.81 and the full scale coefficient alphas ranged from 0.86 to 0.95[26]. Kaplan and Saccuzzo[27] confirmed 0.80s to 0.90s test-retest reliability and 0.80s concurrent predictive validity coefficients for the NEO PI-R.

3. RESULT AND DISCUSSIONS

The results present in Table 1 revealed that the means and SDs scores on NEO PI-R scale in Indian sample are comparable to those of US standardization sample[1,28]. The only difference is that the mean and SDs score for factor Neuroticism are slightly higher side in the present study. This difference is may be attributable to socio-cultural difference between Indian and American population.

The test-retest reliability coefficients and Cron-Bach's Coefficient alpha reliability for all broad five factors are ranging from 0.70 to 0.78 and 0.98 to 0.99 respectively as shown in Table 1. Costa and McCrae[1] also reported the similar range of reliability coefficients (0.75 to 0.83) for the said scale. However, internal consistencies were found slightly higher than the range (0.89 to 0.95) reported for the American normative sample[1,28]. These results conclude that NEO PI-R demonstrates psychometric invariance across cultures.

In the Indian sample, most of the correlation among five factors have been found significant as shown in Table 2 except the correlation between neuroticism and openness (r = 0.10), neuroticism and agreeableness (r = 0.11), and extroversion and agreeableness (r = 0.04). These results suggest that the five factors are not independent to each other and question about the independence of personality factors.

Table 1. Descriptive Statistics for NEO PI-R factors and facets

Broad Factors	**Neuroticism**	**Extraversion**	**Openness**	**Agreeableness**	**Conscientiousness**
Mean	259.1	160.54	155.61	153.6	167.75
SDs	0.70	0.76	0.78	0.72	0.75
Test-Retest	0.98	0.99	0.99	0.99	0.99
Alpha Coeff.	0.39	-0.09	0.36	0.27	-0.23
Facets					
Neuroticism	Anxiety	Angry Hostility	Depression	Self-Consciousness	Impulsiveness	Vulnerability
Mean	23.14	21.93	24.75	22.97	28.52	16.46
SDs	4.34	3.98	4.17	3.6	3.82	3.49
Extraversion	Warmth	Gregariousness	Assertiveness	Activity	Excitement-seeking	Positive emotions
Mean	29.24	27.43	23 .46	25.51	25.56	29.34
SDs	4.86	3 .83	4.02	3.78	4.08	4.89
Openness	Fantasy	Aesthetics	Feelings	Actions	Ideas	Values
Mean	22.4	28.5	26.67	24.1	27.48	26.46
SDs	3.99	3.75	3.29	3.46	4.18	3.51
Agreeableness	Trust	Straightforwardness	Altruism	Compliance	Modesty	Tender-mindedness
Mean	26.48	26.08	28. 26	24.18	22.31	26.3
SDs	3.89	4.63	3.74	4.28	2.99	3.98
Conscientiousness	Competence	Order	Dutifulness	Achievement striving	Self-discipline	Deliberation
Mean	28.99	26.88	29.16	28.01	27.23	27.47
SDs	4.18	3.16	4.16	4.14	4.5	4.4·3

The results in Table 3 indicate that, the range of correlation between the facets and their corresponding scale is 0.37 and 0.68 for extraversion, 0.49 and 0.73 for neuroticism 0.24 and 0.62 for agreeableness, 0.68 to 0.76 for conscientiousness, and 0.40 to 0.54 for openness. The correlation among the facets of N (0.04 to 0.43, mean = 0.26), E (-0.6 to 0.41, mean = 0.18), The results in Table 3 indicate that, the range of correlation between the facets and their corresponding scale is 0.37 and 0.68 for extraversion, 0.49 and 0.73 for neuroticism 0.24 and 0.62 for agreeableness, 0.68 to 0.76 for conscientiousness, and 0.40 to 0.54 for openness. The correlation among the facets of N (0.04 to 0.43, mean = 0.26), E (-0.6 to 0.41, mean = 0.18), O (-0.16 and 0.19, mean = 0.07), A N (0.04 to 0.31, mean =0.12), and C (0.12 to 0.53, mean = 0.32). Except few facets correlation, most of the correlations are significant at 0.01 probability level. The results in Table 3 indicate that none of the facets scale show higher correlation with other factor and their sub scales than the correlation with their corresponding factor and shared factor sub scale. These results suggest that the facets appeared to tapping a common factor and represent their corresponding factor dimension respectively.

In the present study, ten factors extracted by applying principal components and varimax criterion methods of factor rotation[29], which accounted 71.26 per cent variance Table 4. In the factor analysis the personality dimension conscientiousness clearly replicates and it emerges as first principal components in the study. It accounted 13.92 per cent of variance and loads significantly on achievement-striving, dutifulness, deliberation, self-discipline, and competence from conscientiousness dimension and ideas, and altruism, from openness, and agreeableness dimension, respectively. These results are consistence with earlier findings of various studies[1,18,28,30].

In reference to the loading of activity (facets of extraversion) on this factor, Costa and McCrae[1] also confirm the similar results, which suggest that a person who is high on conscientiousness tends to be high in activity. Neuroticism emerged in form of second factor in the present data. It accounted 9.71 per cent of variance and loads significantly on depression, self-consciousness, anxiety, and vulnerability. In their study Caprara[30], *et. al.* also confirmed the clear replication of neuroticism in Indian sample. The low loading of facet impulsiveness for this factor, was also reported by Costa and McCrae's[1] in their study.

The substantially loading of facets such as warmth, gregariousness, and positive-emotion indicated partially replication of extraversion as third factor (accounted for 8.71 % variance). The subscale assertiveness and excitement-seeking have partitioned their variance from extraversion dimension and they loaded substantially on other factors separately. The subscale activity did not show communality with any other of the common factors. Unexpectedly anxiety has yielded significant but low and negative loading on extraversion factor. These results indicate a dual nature of extraversion dimension, which also confirmed by many studies (e.g., 18, 28,30). These study suggest that the dual nature of extraversion, was primarily may be due to sociability and impulsiveness items in the same scale. In the case of excitement-seeking, Eysenck and Eysenck[31] have also noted that sensation seeking is correlated with both Extroversion and psychoticism. Thus, these results suggest some problem with the structure of extraversion dimension in Indian sample.

The facets such as straight forwardness, compliance, tender-mindedness, trust, and altruism, loads substantially on fourth factor (accounted 8.06 % of variance). Seeing the nature of loaded facets, it confirms from the clearly replication of personality dimension agreeableness in Indian sample. None of the facets from other dimension loads significantly on agreeableness. These finding are confirmed the factor structure reported by Kamlesh[18]. The fifth factor (variance = 5.49 %) loads significantly three facets such as fantasy, values, and feelings, which confirm the partial replication of personality dimension openness to experiences in Indian sample. These results also confirm the finding of the several studies[18,32] that also not confirm the clear replication of openness dimension of personality.

A perusal of rotated factor matrix reveals that factors VI to XI accounted for a very meager amount of variance ranging from 3.76 to 4.67. None of these factors have more than two significant loading; hence, they do not contribute much in the understanding of the nature of the factor structure of NEO PI-R. Factor-6 loads substantially excitement-seeking and aesthetics, seventh factor loads significantly assertiveness and feelings. Theoretically, these two measures of personality don't appear to be going together. Their loadings on a common factor may partly be due to communality in unaccounted variance. Factor 8 brings together two scales of neuroticism i.e., angry-hostility, and impulsiveness. Since angry-hostility did not share its variance with main factor of neuroticism, it appears on a separate factor and shared its variance with impulsiveness. Ninth component of structural analysis accounts for significant proportion of variance in modesty, and aesthetics. Again,

Table 2. Correlations matrix and reliability coefficients for broad five dimension of personality

Correlation matrix for broad dimension						**Reliability coefficients**	
Variable	**Neuroticism**	**Extraversion**	**Openness**	**Agreeableness**	**Conscientiousness**	**Test-Retest**	**Alpha Coeff.**
Neuroticism	-	-0.35	-0.1	-0.11	-0.39	0.701	0.98
Extraversion		-	0.24	0.04	0.15	0.757	0.99
Openness			-	0.12	0.32	0.776	0.99
Agreeableness				-	0.32	0.723	0.99
Conscientiousness					-	0.751	0.99

Table 3. Correlation matrix for facets scale

	Anxiety	Angry-Hostility	Depression	Self-Consciousness	Impulsiveness	Vulnerability	Warmth	Gregariousness	Assertiveness	Activity	Excitement-seeking	Positive emotions	Fantasy	Aesthetics	Feelings	Actions	Ideas	Values	Trust	Straightforwardness	Altruism	Compliance	Modesty	Tender-mindedness	Competence	Order	Dutifulness	Achievement-striving	Self-discipline	Deliberation	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Anxiety	-																																		
Angry-Hostility	13	-																																	
Depression	34	16	-																																
Self-Consciousness	35	4	43	-																															
Impulsiveness	8	28	34	26	-																														
Vulnerability	36	7	39	36	33	-																													
Warmth	-34	-26	-16	-17	-10	-28	-																												
Gregariousness	-10	-10	5	-2	2	-19	41	-																											
Assertiveness	-8	-3	-26	-14	8	-18	15	-6	-																										
Activity	-19	-5	-19	-17	2	-19	24	11	19	-																									
Excitement-seeking	-10	-4	-6	-2	13	-6	2	25	-5	21	-																								
Positive emotions	-35	-15	-32	-28	14	-28	37	41	6	25	14	-																							
Fantasy	9	22	17	10	9	3	-7	-3	0	1	8	-6	-																						
Aesthetics	-3	-11	4	7	-12	1	17	18	-15	15	16	11	-14	-																					
Feelings	21	-2	8	5	6	-3	72	8	23	16	13	13	11	6	-																				
Actions	3	3	-2	-19	-10	4	7	-9	-6	-4	-3	-19	6	-12	-12	-																			
Ideas	-5	-16	-32	-15	-13	-16	-5	-3	15	20	4	35	-7	19	19	-16	-																		
Values	-5	-28	1	-9	-1	-18	9	15	-3	10	-2	10	1	11	15	-13	12	-																	
Trust	-15	-7	-11	-11	-15	-19	21	16	-1	-4	-12	16	-2	-19	-6	25	-13	-15	-																
Straightforwardness	7	-21	-10	-5	-12	1	-6	-16	-9	-3	-30	16	13	12	25	20	-1	-11	23	11	-														
Altruism	-8	-21	-7	-12	-15	-26	30	22	-7	25	-10	35	1	-1	20	-4	-11	12	14	22	-														
Compliance	14	-19	5	-3	-17	8	-6	1	-21	-10	-21	1	-11	-5	-7	-14	0	-12	15	31	11	-													
Modesty	16	5	16	19	1	9	-4	-11	-23	-27	-10	-29	2	12	22	10	-9	-1	3	0	-4	-2	-												
Tender-mindedness	1	1	19	8	11	5	20	15	-22	-2	10	26	10	13	22	7	3	4	10	13	29	22	3	-											
Competence	-19	-17	-29	-24	-24	-36	24	21	15	30	10	40	-17	-2	-25	-29	-7	-2	15	2	26	3	-22	7	-										
Order	3	-14	-6	-2	-4	-7	-3	6	-13	20	9	12	12	16	22	16	15	16	-8	20	18	9	0	13	12	-									
Dutifulness	16	-11	-13	-9	-12	-30	32	18	6	44	1	40	24	-1	18	24	19	13	19	21	52	11	9	28	50	13	-								
Achievement-striving	-11	-6	-12	-13	-6	-25	7	14	2	29	1	34	-1	-16	-22	-8	-20	-11	-4	13	34	10	-1	24	40	13	5	-							
Self-discipline	-21	-13	-34	-31	-14	-41	8	8	24	38	-10	39	20	-6	34	38	42	31	13	25	30	13	-22	1	38	15	51	51	-						
Deliberation	-19	-17	-19	-23	-14	-33	21	30	4	25	-4	34	15	26	19	17	31	26	9	9	36	10	-18	11	35	21	45	50	53	-					
Neuroticism	63	49	73	65	61	58	-29	-17	-23	-19	5	-30	20	-7	11	-7	-26	-15	-20	-12	-22	-4	18	12	-38	-7	-22	-17	-39	53	-				
Extraversion	-40	-12	-18	-23	-5	-38	68	62	37	57	43	49	-3	18	25	-10	14	18	12	-7	33	-16	30	36	2	9	21	26	22	23	-				
Openness	7	-13	-6	-8	-9	-12	10	10	5	25	14	20	40	44	50	18	54	45	5	5	30	0	-4	3	20	6	18	23	32	29	19	-			
Agreeableness	4	-21	2	-3	-16	-7	17	8	-26	-5	-13	30	-20	29	7	-16	14	18	49	62	55	60	24	57	11	18	38	24	22	19	75	-			
Conscientiousness	-21	-19	-28	-26	-18	-43	32	24	10	45	1	23	-20	23	24	-19	41	32	11	21	48	13	18	18	68	37	76	75	77	32	25	39	-		

Note: Decimal Point have been removed, r=12 is significant at .05, and r=.15 is significant at .01 probability level

Table 4. Rotated Factor Matrix

Facets/Factor	1	2	3	4	5	6	7	8	9	10	11	h2 Communality
Anxiety		.64	-.41									.57
Angry-Hostility								0.81				.74
Depression		.76										.56
Self-Consciousness		.67										.53
Impulsiveness								.46				.59
Vulnerability		.51										.58
Warmth			.77									.72
Gregariousness			.72									.62
Assertiveness							.72					.70
Activity												.64
Excitement-seeking						.77						.69
Positive emotions			.51									.65
Fantasy					.72							.73
Aesthetics									.46			.52
Feelings							.48					.70
Actions											-.87	.82
Ideas	.49											.76
Values					.51							.53
Trust				.44								.58
Straightforwardness				.70								.56
Altruism	.42			.41								.54
Compliance				.64								.57
Modesty									.78			.69
Tender-mindedness				.52								.59
Competence	.58											.56
Order												.74
Dutifulness	.70											.71
Achievement-striving												.76
Self-discipline	.68											.70
Deliberation	.70					-.10						.56
Variance	13.92	9.71	8.71	8.06	5.49	4.67	4.56	4.52	4.09	3.79	3.76	71.26
Eigen value	7.55	3.36	2.77	2.24	1076	1.46	1.32	1.23	1.16	1.07	1.03	

*Less than .40 loadings were deleted from the table

these loadings are due to unaccounted variance of these two subscales. Factor ten and eleven loads only one facet each, so they merit no interpretation.

4. CONCLUSIONS

The major aim of the study was to examine the factorial invariance of a major instrument tapping broad five factors of personality in Indian context. The structural analysis of NEO PI-R provides evidence for stability and replication of three of the five broad dimensions of personality in Indian sample. However, two of the dimensions receive weak support in the present data. The results of the study points to the need of more studies including more sample in order to establish the general-liability of the five-factor model in Indian population.

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