



DEVELOPMENT AND STANDARDIZATION OF THE BIG FIVE FACTOR PERSONALITY SCALE FOR POST-GRADUATE STUDENTS

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RESEARCH ARTICLE



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Abstract

The study was undertaken because there were many personality inventories available in the Western cultural context, but no standardized scale had been developed that is culturally and linguistically suitable for the Post-graduate students in West Bengal. So, the researchers felt a need to develop and standardize a Big-Five Personality test among Post-graduate in West Bengal. The prime objective of the study is to develop a reliable and valid Big-Five Personality Scale to assess the Big-Five traits for Post-graduate in West Bengal. The descriptive survey research design has been adopted and the sample size was 215. After pilot survey data was analyzed and descriptive statistics revealed that respondents' agreement with the personality statements was moderate to high. The Kaiser-Meyer-Olkin Measure of sampling adequacy was 0.784, indicating good sampling adequacy, and the construct validity of the scale is 0.784. Exploratory Factor Analysis was conducted using Principal Component Analysis with Varimax rotation. It was observed that construct validity was strongly supported, as the vast majority of items exceeded the standard factor loading threshold of 0.40. Furthermore, the reliability analysis proved that the instrument maintains acceptable internal consistency. Specifically, the Cronbach's alpha coefficient of 0.790 aligns with standard psychometric benchmarks for newly developed scales.

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Introduction

Personality is a non-cognitive factor that is shaped by the interaction among biological, environmental and social factors, and a person acquires traits through his own way of adaptation. Scientific research on personality has a long history that is rooted in the ancient Greek ideas. Especially, modern personality psychology research became popular in the early twentieth century. Personality trait research has gradually turned into a dominant center of attraction for psychologists. Gordon Allport, Cattell, Eysenck, Goldberg and Costa & McCrae are the prominent figures who emphasized on trait psychology. But now the Big Five Factor Model is the most acceptable approach for personality trait psychology, which categorizes five core traits: openness, conscientiousness, extraversion, agreeableness and neuroticism (Halama et al., 2020a; R. McCrae, 2020). Initial language-based research and factor analysis consistently identified five personality factors, which proved the structural integrity of the model (Goldberg, 1990, 1992). This framework originated from lexical questionnaire-based methodologies, proving that human personality naturally crystalizes five identical elements across diverse populations and sampling techniques (R. R. McCrae & Costa, 1985; Thalmayer & Saucier, 2014). It is scientifically established that standardized trait measures make comparisons across observers, tools and cultures, which is essential for cumulative research (Costa & McCrae, 1992a; R. R. McCrae & Costa, 1987). Previous studies showed strong support for the adaptation of the cross-cultural Big Five tools, which were validated versions in languages like Slovak, Serbian, Korean, Bangla and Amharic (Amente & Zeleke, 2024; Choi et al., 2026a; Halama et al., 2020b; Siraji et al., 2025a; Smederevac et al., 2024).

The Big Five model has profound implications in scientific research and societal applications. Personality assessment has immense value because it predicts broad life outcomes such as academic achievement, self-regulation, career success, workplace achievement, relationship satisfaction, psychological well-being and longevity (Haehner et al., 2025; Hirsh & Peterson, 2008; Ozer & Benet-Martínez, 2006; Soto, 2019). This framework also helps in counselling, career guidance and the personnel selection process by providing standardized scores for better comparative analysis and smarter choices (Costa et al., 1995;

McCrae & Costa, 1991; Salgado et al., 2003). Hence, appropriate and cross-cultural personality assessments are needed for scientific and practical implementation.

Related Studies

Previous research has empirically established several standardized instruments for measuring the Big Five personality traits, which include the NEO Personality Inventory, the Big Five Inventory, the International Personality Item Pool and the Big Five Inventory-2 (Costa & McCrae, 1992b; Goldberg et al., 2006; John & Srivastava, 1999; Soto & John, 2017). These tools have demonstrated psychometrically sound and suitable for diverse populations. A study (R. R. McCrae & Costa, 1987) was initiated to measure the Big-five and used two type of data collection technique, one was peer ratings, and the other was self-reports by adults. The NEO Personality Inventory was developed for clinical practice (Costa & McCrae, 1992c). Paul T. Costa & Robert R. McCrae (2014) established the NEO Five Factor Inventory-3 which includes a 60-item questionnaire on the Big Five and used a five-point Likert scale ranging from strongly agree to strongly disagree to record the responses. Another study (R. R. McCrae & Costa, 1997) was conducted to assess general acceptability in cross-cultural situations by using the six translated versions (German, Hebrew, Portuguese, Japanese, Korean & Chinese) of the NEO-P-I-R (Costa & McCrae, 1992c) to compare with the American factor personality structure. Slovak adaptation of BFI-2 (Halama et al., 2020c) confirmed the conceptual structure by using exploratory and confirmatory factor analyses and showed a satisfactory convergent and discriminant validity. The Chinese BFI-2 indicated good reliability, structural and criterion validity within four diverse samples, whereas the Korean and Bengali versions showed good psychometric properties (Choi et al., 2026b; Siraji et al., 2025b; Zhang et al., 2022a). A latest meta-analytic study (Husain et al., 2025) represented the first reliability generalization analysis of BFI-2 and showed good reliability in both the 44-item and 60-item versions.

Need for the Study

Although the Big Five model is recognizable across diverse cultures, but cross-cultural evidence is inconsistent. Because people from different cultures respond differently and empirical data fails to establish complete metric or scalar invariance (Minkov et al., 2019; Thalmayer & Saucier, 2014). A study (Ndofirepi & Steyn, 2023) on South African samples failed to replicate the BFI-10 structure, and the framework fell short even among westernized subgroups. Results indicated the lack of consistency in the cross-cultural settings. Many studies found item, facet and linguistic challenges. Zhang et al. (2022b) found that highly educated persons respond better in the Chinese adoption of BFI-2 facets and negative items. Siraji et al. (2025c) indicated that due to linguistic problems, the Bangla version of the BFI-2 showed weak invariance. Husain et al. (2025) pointed out that BFI and BFI-2 cannot be reused without measuring their local reliability because there exists heterogeneity in languages and contexts. There are many personality inventories and scales, such as the NEO Personality Inventory, the Big-Five and IPIP scales available, but these are specially developed and standardized for Western populations. But studies indicated that these inventories and scales cannot be directly applied on Indian as well as West Bengal Post-graduate students because of diverse cultural contexts and language issues. So, there is a need to develop a culturally appropriate tool for Indian settings. Therefore, researchers felt the need to develop and standardize a full Big-Five Personality scale for West Bengal Post-graduate students, which moves beyond simple translation of previous personality scales. Where the facets were the Big-Five traits, namely, Openness, Conscientiousness, Extraversion, Agreeableness and Neuroticism.

Objectives of the Study

The study aimed to develop and standardize the Big-Five Personality Scale for Post-graduate students in West Bengal. So, the objectives of the study is to present the construction and standardization procedure of the scale as well as empirically establish the validity and reliability of the scale.

Research Question

Based on the objectives, research questions can be formulated as follows:

- Can a culturally appropriate standardize Big Five Personality Scale be developed for Post-graduate students in West Bengal?
- Will the newly developed scale demonstrate validity and reliability?

Method:

- **Research Design:** The study has adopted a descriptive survey design for the development and standardization of the Big-Five Personality Scale.
- **Item Generation:** For the development of the item, at first, the researcher extensively reviewed the related literature on personality theories, the Big-Five personality model and empirical studies. Then, the Big Five traits were considered as the facets (dimensions) of the study, and each dimension contained 15 items. So, the total items of the scale in the developmental phase were 75, where in each dimension 10 items were positively worded, and 5 items were negatively worded in the Bengali language only. After that, the scale was sent to the subject expert for relevance, clarity, language modification and cultural appropriateness. After expert judgement, recommendations and review, items with ambiguity were removed and modified from the preliminary scale (Halder et al., 2014). The questionnaire was administered for each statement, following a five-point Likert scale response based on agreement. For positive items, it was for strongly agree: 5, agree: 4, undecided:3, disagree: 2 and strongly disagree: 1 and conversely, negative items were reverse-coded from strongly agree: 1 to strongly disagree: 5.

- **Sample:** The researcher selected 215 sample from the arts stream of post-graduate students from University of North Bengal, Darjeeling, West Bengal, using the convenient sampling technique.
- **Procedure:** After expert review, a pilot survey was conducted among selected sample size, and the respondents were asked to give their own responses. After data collection and data analysis, 40 items were retained for the final scale.

Results

• Descriptive Statistics

Descriptive statistics revealed that the mean score of the 40 items spanned from 2.60 to 4.33, indicating that respondents' agreement with the personality statements was moderate to high. Standard deviation ranged between 0.734 to 1.402, indicating adequate variability in responses. Total scale mean was 146.53, variance = 200.970 and standard deviation= 14.176, indicating that the spread of scores was reasonable.

Table 1: Scale Statistics

<i>Scale Statistics</i>			
Mean	Variance	Std. Deviation	N of Items
146.53	200.970	14.176	40

• Suitability of the Data for Factor Analysis:

The Kaiser-Meyer-Olkin Measure of sampling adequacy was 0.784, which is above 0.70, indicating good sampling adequacy. So, it can be said that the construct validity of the scale is 0.784. Bartlett's Test of Sphericity was statistically significant where $\chi^2=2695.569$, $df=780$ and $p<.001$ indicated that the correlation matrix was appropriate for factor analysis.

Table 2: KMO and Bartlett's Test

<i>KMO and Bartlett's Test</i>		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.784
Bartlett's Test of Sphericity	Approx. Chi-Square	2695.569
	df	780
	Sig.	.000

• Exploratory Factor Analysis

Exploratory Factor Analysis was conducted using Principal Component Analysis with Varimax rotation. The analysis extracted five factors, dimension 1 to dimension 5, corresponding to the theoretical structure of the Big Five Personality model. A Principal Component Analysis using Varimax rotation with Kaiser Normalization converged in six iterations, supporting a clean five-factor model for the 40-item scale. Factor 1, Openness (D-1), consists of 9 items with factor loadings ranging from 0.511 to 0.764. Factor 2, Conscientiousness (D-2), includes 8 items with factor loadings in between 0.388 to 0.727. Factor 3, Extraversion (D-3), consists of 8 items with factor loadings ranging between 0.410 to 0.801. Factor 4, Agreeableness (D-4), comprise of 8 items with factor loadings ranging from 0.412 to 0.747. Factor 5, Neuroticism, includes 7 items with factor loadings ranging from 0.336 to 0.796. It was observed that construct validity was strongly supported, as the vast majority of items exceeded the standard factor loading threshold of 0.40. Weak factor loadings were observed for only three items, such as item no 65 (0.388), 21 (0.385) and 23 (0.336). However, the rotated component matrix demonstrated meaningful factor loadings. The communalities range from 0.383 to 0.719, indicating that the extracted factors explained a substantial proportion of variance in the items.

Table 3: Factor Structure of Big Five Personality Scale (N=215)

<i>Rotated Component Matrix^a</i>					
	Component				
	D-1	D-2	D-3	D-4	D-5
P_I_20	0.764				
P_I_17	0.752				
P_I_14	0.704				
P_I_44	0.626				
P_I_53	0.599				
P_I_49	0.545				
P_I_51	0.537				
P_I_38	0.532				

P_I_32	0.511				
P_I_15		0.727			
P_I_43		0.672			
P_I_67		0.670			
P_I_69		0.565			
P_I_28		0.545			
P_I_35		0.490			
P_I_63		0.428			
P_I_65		0.388			
P_I_47			0.801		
P_I_22			0.781		
P_I_29			0.669		
P_I_31			0.662		
P_I_37			0.557		
P_I_41			0.553		
P_I_4			0.546		
P_I_8			0.410		
P_I_56				0.747	
P_I_66				0.637	
P_I_74				0.609	
P_I_64				0.591	
P_I_68				0.525	
P_I_72				0.486	
P_I_52				0.440	
P_I_54				0.412	
P_I_3					0.796
P_I_33					0.734
P_I_13					0.435
P_I_9					0.409
P_I_7					0.403
P_I_21					0.385
P_I_23					0.336

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 6 iterations.

The final scale consisted of 40 items under five dimensions or factors with 30 positive statements and 10 negative statements (Table 4).

Table 4: Scale Overview

Dimensions/Factors(OCEAN)	Total item	Item Sl. No.	Example of Items
D-1: Openness to Experience (O)	Positive (7)	1,6,11,16,22,27,32	6. সকলের সাথে বিশ্বাসযোগ্যতা রেখে আমি কাজ করি।
	Negative (2)	20,40	20. কঠিন কাজগুলো আমি এড়িয়ে যাই।
D-2: Conscientiousness (C)	Positive (6)	12,17,23,28,33,37	23. যেকোন কাজ আমি দায়িত্ব সহকারে করি।
	Negative (2)	2,7	7. আমি গুলিয়ে কাজ করতে পারি না।
D-3: Extraversion (E)	Positive (6)	3,8,24,29,34,38	24. আমি গল্প করতে ভালবাসি।
	Negative (2)	13,18	18. নিজের অনুভূতিগুলি আমি প্রকাশ করতে পারি না।

D-4: Agreeableness(A)	Positive (6)	9,14,19,30,35,39	19. আমি অন্যের উপকার করি।
	Negative (2)	4,25	25. কেউ আঘাত করলে আমি সহজে তাকে ক্ষমা করিনা।
D-5: Neuroticism (N)	Positive (5)	5,21,26,31,36	31. কোন কাজে ব্যর্থ হলে আমি খুব দুশ্চিন্তাগ্রস্ত হই।
	Negative (2)	10,15	15. আমি মানসিক চাপ নিই না।

• Reliability Analysis

To estimate the internal consistency of the newly developed 40-item Big-Five Personality Scale, Cronbach's Alpha coefficient was calculated. The analysis revealed satisfactory internal reliability, with Cronbach's Alpha 0.790 and Standardized Cronbach's Alpha 0.803. These values indicate a high degree of item homogeneity and consistency in assessing the underlying personality dimensions. The Item-Total Statistics revealed satisfactory internal consistency of the scale. Corrected item-total correlations ranged from 0.113 to 0.502, with most items showing acceptable relationships with the overall scale. Cronbach's alpha if an item was deleted ranged from 0.776 to 0.790, indicating that removing any individual item did not significantly improve reliability. Therefore, all 40 items were retained in the final version of the scale.

Table 4: Reliability Statistics

<i>Reliability Statistics</i>		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.790	.803	40

• ANOVA with Tukey's Test for Nonadditivity

The ANOVA with Tukey's Test for Nonadditivity demonstrated a significant between-items effect, $F(39,8346) = 1611.690$, $p < 0.001$, indicating that the 40 items differed significantly in their mean scores. Tukey's test revealed a small but significant nonadditivity effect, $F(1,8345)=8.349$, $p=0.004$, suggesting a slight deviation from perfect additivity. The grand mean was 3.66, and Kendall's coefficient of concordance ($W=0.175$) indicated low agreement, consistent with the multidimensional nature of the personality scale.

Table 5: ANOVA with Tukey's Test for Nonadditivity

<i>ANOVA with Tukey's Test for Nonadditivity</i>						
		Sum of Squares	df	Mean Square	F	Sig
Between People		1075.187	214	5.024		
Within People	Between Items		2097.653 ^a	39	53.786	1611.690
	Residual	Nonadditivity	8.811 ^b	1	8.811	8.349
		Balance	8806.811	8345	1.055	
		Total	8815.622	8346	1.056	
	Total		10913.275	8385	1.302	
Total		11988.462	8599	1.394		
Grand Mean = 3.66						
a. Kendall's coefficient of concordance $W = .175$.						
b. Tukey's estimate of power to which observations must be raised to achieve additivity = 1.671.						

Discussion

The main objectives of the study was to develop and standardized the Big-Five Personality scale for the Post-graduate students in West Bengal. For this purpose, researchers developed a test with 75 items and after pilot survey data were analysed and 40 item retained in the final scale. The findings provide empirical evidence supporting both the reliability and construct validity of the scale. The KMO value and significant Bartlett's Test confirmed that the sample was appropriate for factor analysis. The extraction of five interpretable factors that personality is a multidimensional construct, demonstrating that the inventory effectively captures its complexity. Furthermore, the reliability analysis proved that the instrument maintains acceptable internal consistency. Specifically, the Cronbach's alpha coefficient of 0.790 aligns with standard psychometric benchmarks for newly developed scales. Findings of the study are consistent with prior personality development scale studies showing that Exploratory Factor Analysis commonly supports a clear multi-factor structure, reliability coefficients are typically in the acceptable to good range, and validated short forms can retain adequate construct validity (Donnellan et al., 2006; Kang et al., 2024; Soto & John, 2017). Ultimately, these findings indicate that the Big-Five Personality Scale is a reliable and valid tool for assessing personality traits in both educational and psychological contexts.

Conclusion

The researchers developed a standardized Big-Five Personality Scale which is valid psychometrically sound and valid and reliable for measuring the Big-Five traits of post-graduate students in West Bengal. Though it has some limitations such as it was conducted among only post-graduate students, Confirmatory Factor Analysis, Eigenvalues and, percentage of variance explained by each factor, test-retest validity were not examined. But the developed scale may be contributed in personality assessment among post-graduate students in culturally appropriate settings, research on personality and academic achievement and university student development programmes. Future studies should be conducted among under graduate and research scholars, estimate test-retest reliability and examine CFA using larger samples.

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