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Psychometric Properties and Validation of Mini-International Personality Item Pool (Mini-IPIP) among Nigerian Population

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Authors' contributions

This work was carried out in collaboration among all authors. Authors JOO and EOA designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors EOA and OIA managed the analyses of the study. Authors JOO, EOA, OIA, JOA, SIB and BCA managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: There is dearth of information on the psychometric of measures of personality on Nigerian population. This study investigates the internal consistencies and validity scores on the Mini-International Personality Item Pool (mini-IPIP) on Nigerian respondents.
Study Design: A cross-sectional survey design was used to validate the scale.
Place of Study: University of Ibadan, Oyo State, South-western Nigeria. Between January and April 2022.
Methodology: A multistage sampling technique was used to select two hundred and nineteen (219) individuals, made up of 113 (51.6%) of males and 106 (48.4%) of females, between the age

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of 35 and 61 years with Mean age = 46.49 ± SD = 6.23. The participants included administrative, technical and junior staff working in the University of Ibadan, Oyo State, and South-western Nigeria. Participants responded to The Big Five Inventory (BFI-10) and Mini-IPIP. The internal consistencies for the Mini-IPIP was calculated and obtained using Cronbach's (α) reliability coefficient. Also, the concurrent validity coefficient was obtained using Pearson's Correlation Analysis, Min-IPIP was correlated with BFI-10 in order to ascertain the concurrent validity. The items total correlations were also obtained to test the relationship between each item and the composite/total item score.

Results: A modest but acceptable internal consistency of Extraversion, α =.80; Agreeableness, α =.79, Conscientiousness, α =.84; Neuroticism, α = .83; and Openness to Experience α =.88 for the factors of mini-IPIP was revealed. Positive concurrent validity coefficient was equally observed between the subsections of Mini-IPIP and the BFI-10 (r = .34, .12, .18, .20, .11 for extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience subscales respectively).

Conclusion: These findings provide evidence for the use of Mini-IPIP scale as screening tool for the assessment of human personality in Nigeria based on the five-factor model.

Keywords: Five-factor model; 20-iem Mini-IPIP validation in Nigeria; reliability; validity; assessment; personality.

1. INTRODUCTION

The Big-Five personality model has been captured in literature as the most widely recognised theory of personality traits [1,2]. The hierarchical model of personality has five distinctive factors that represent personality at the broadest degree of abstraction. The Big five personality traits model includes Extraversion (to be sociable, active), Agreeableness (to be soft-hearted, trusting), Conscientiousness (to be organised, reliable), Emotional Stability (to be calm, relaxed), and Openness (to be curious, creative) [2]. These models are measured using a large pool of items, often presented in a battery of questionnaires to assess the personality of the individuals. This is significant because of the multifaceted and multidimensional nature of a construct like the human personality, requiring extensive inventories. Some of the earliest personality inventories are the 300 items (IPIP-NEO), 240-item Revised NEO Personality Inventory, and 120 items (IPIP NEO 120) [3,4,5].

However, due to the practical limitations of using large batteries of scales, the participants may display a lack of interest and become exhausted and irritated, particularly when attending to repetitive items. This can lead to irregular response rates, dropping out of the study or leaving some items not attended to because they were bored, annoyed, discouraged or frustrated with the length of the scales. The researcher might encounter problems scoring and interpreting such scores [6]. Due to these challenges, the need for a shorter instrument that could provide a satisfactory representation of an individual position on broad constructs like human personality is of significant importance for applied psychological assessment, screening and research, especially in both longitudinal and surveys [7,8]. Despite this need, the development of short scales for measuring the five-factor model of personality traits has its own limitations. Such limitations are concerns for acceptable psychometrics properties, which has brought about the general decline in the use of such scales in favour of large items inventories [7]. Shorter scales are likely to have challenges with content validity [9]. In contrast, studies have also affirmed that shorter inventories are not as worse as assumed if they are of the same construct in terms of criterion validity. Similar evidence regarding the comparable criterion-validity of short versus longer scales has also been presented by other authors [10].

Shorter inventories for measuring human personality, specifically Big Five traits, are widely available and in most parts of the world. Shorter scales that are widely used include the 60-item NEO Five-Factor Inventory [11], the 50-item measure from the International Personality Item Pool (IPIP) [12]. Others include the 44-item Big Five Inventory (BFI-44) [13], the 20-item mini-IPIP measure developed by [14]. Other short measures are a variety of 10-item inventories (e.g., the Ten Item Personality Inventory TIPI) [15]; Big Five Inventory-10 (BFI-10) [16]; and the Big Five Inventory-15 short version by [17].

The 20-item Mini-IPIP personality scale was adapted and developed as a brief form of the 50-item IPIP Five-factor model [10,14]. Inspired by the need for an instrument to measure human personality in critical situations within the shortest time with near or greater psychometric properties compared to other brief five-factor model instruments [15]. The 20 items Mini-IPIP factorial structure was validated in five different studies, the five personality models (Extraversion, Agreeableness, Conscientiousness, Neuroticism and Intellect/Openness to Experience), demonstrated a Cronbach alpha of (0.82 Extraversion, 0.77 Agreeableness, 0.74 Conscientiousness, 0.78 Neuroticism, and 0.70 Intellect/Imagination), however, they reported a poor to moderate overall model fit, based on established cut-off values for the model fit indices [18], CFI = 0.88 and the RMSEA = 0.07 (p close fit < 0.05), across the five studies [14]. The psychometric properties had similar coverage as other long Big Five inventories, the test-retest correlations coefficient was modestly similar to the 50-item IPIP between few weeks and months of assessment. The Mini-IPIP measures revealed a comparable structure of convergent, discriminant, and criterion-related validity coefficients similar to broad IPIP-FFM. This demonstrated that the 20-item Mini-IPIP could measure FFM in case of limited time and consider the urgency of screening [14].

Although the 20-item Mini-IPIP has been widely used for research since 2006, the scale's psychometric properties have not been well evaluated in the literature [19]. Some of the countries that have validated the scales are the USA [20], Malaysia [21], the United Kingdom (UK) [18], Poland [22] and France [23]. Studies on the validation of Mini-IPIP are ongoing in many countries, with a few originating from Africa, especially Nigeria. Validation studies are significant in determining the reliability and validity of short scales [9]. [18] observed an acceptable reliability coefficient (Cronbach's alpha) in their validation study but reported a poor model fit index with five correlated factors, a confirmatory model. [14] reported that the Mini IPIP had a reliable Cronbach's alpha coefficient of .81 for Extraversion, .73 agreeableness, .70 for Conscientiousness, .74 for neuroticism and .69 for Intellect/Openness to Experience. The convergent and discriminant validity coefficient was modestly significant with other Big Five Inventories. Some recent findings also revealed adequate model fit indices and psychometric properties when used with other scales. For instance, [24], the 20-item Mini-IPIP reported a good internal consistency and ρ value (Conscientiousness, α =.65, ρ =.72;Extraversion, α =.71, ρ =.78; Agreeableness, α =.70, ρ =.78;Intellect/Imagination, α = .65, ρ = .75; Neuroticism, α = .62,ρ =.68, respectively). Although the result seems to be on the high side but was in alignment with the reported psychometric properties by the developer. [18] reported that the Mini-IPIP scale demonstrated the same suitability and adequacy as a shorter scale of the FFM with acceptable psychometric properties. Specifically, a Cronbach's alpha of .81, .70, .68, .72 and .70 was reported for Extraversion, Agreeableness, Conscientiousness, Neuroticism and Intellect, respectively. This was similar to those reported in [14]. The Cronbach's alpha for each scale was acceptable, particularly given the relatively small number of items in each scale [25].

The objective of this study was to examine the psychometric properties of 20-items Mini-IPIP in a Nigerian sample. This study's findings will contribute significantly to providing information on the reliability and validity of the instrument among the Nigerian sample, as the electronic search of the literature revealed no information on the internal consistencies of the short scale among this population. Hence, this study will provide information on the psychometric properties of the mini-IPIP on the Nigerian sample. There is no recognized indigenous measures for personality traits in existence for the culturally diverse population like Nigeria, hence the need to validate an existing measure with a local population sample. The need to validate this scale in Nigeria was to achieve socio-cultural fairness as well as provide information on measurement equivalence with regard to large items personality measures. Investigating the reliability and concurrent validity of the Mini-IPIP alongside a similar measure like Big-Five-Inventory-10 (BFI-10) will provide information on the doubt about the use of shorter scale in personality research. Literature argued that shorter scales involves certain risks such as the possibility of reporting lower reliability of instrument [26], increase the risk of error in conclusions concerning the correlation between personality traits and other constructs examined [7]. However, the result of the current study revealed that the Mini-IPIP is a reliable measure and can be a good alternative to the BFI-10 which use two bidirectional items for each big-five personality factor. The Cronbach alpha coefficient of the Mini-IPIP from this study yielded

acceptable values, which ranges from .70 to .88, an alpha of .60 has been considered to represent a satisfactory degree of internal consistencies [27].

2. MATERIALS AND METHODS

2.1 Participants

Two hundred and nineteen (219) individuals, made up of males and females, between the age of 35 and 61 years with M_{age} = 46.49 years, SD = 6.23 participated in the study. The participants included administrative, technical and junior staff working in the University of Ibadan in Oyo State, southwestern Nigeria. Oyo State has ten universities, two public and eight privately-owned; the University of Ibadan (a public-owned university) was selected for the study using a simple random sampling by balloting. After which, the sample was purposively drawn and enrolled for the study. Before starting the study, the researcher approached the human resources head for permission to conduct the study. An informed consent was obtained from the staff after an audience was provided to the researcher to relay the objective of the study to them. Confidentiality of their information was assured. A representative of the staff was then assigned to the researcher to assist in the distribution and collection of the questionnaire to willing and consenting staff within 7-day interval. About 250 copies of the questionnaire printed in English language were distributed with the assistant of the staff representative. Out of the two hundred and fifty (250) questionnaires distributed, only 231 were returned, of which 219 were filled correctly and used for analysis.

2.2 Measure

Two personality inventories were used in this study: first Is the Big Five Inventory (BFI-10), a 10-item brief measure of the five-factor theory developed by [16]. The BFI-10 has five subscales with two bidirectional items for each big-five personality factor Extraversion: 1R, 5; Agreeableness: 2, 7R; Conscientiousness: 3R, 8; Neuroticism: 4R, 9; Openness to Experience: 5R, 10, (R = items are reverse-scored). The items are ranked on a five-point Likert scale wherein the respondents choose from responses ranging from 1 (strongly disagree) to 5 (strongly agree). The Big Five Inventory (BFI) has a test-retest reliability coefficient of 0.85, a reliability coefficient Cronbach alpha of 0.80 and constructs validity of 0.75, respectively. For this study, Extraversion (.61), Agreeableness (.58), Conscientiousness (.61), Neuroticism (60) and Openness (.60) were obtained.

Second is the mini International Personality Item Pool (Mini-IPIP), 20 items developed to measure the Five-factor model by [14]. It comprised of five subscales, i.e., Extraversion, Agreeableness, Conscientiousness, Neuroticism and Intellect/Openness, using a 5-point Likert scale from 1 "Strongly disagree" to 5 'Strongly agree". Each subscale is represented by four questions, items (6,7,8,9,10,15,16,17,18,19,20) are reversely scored, three out of the four items of the intellect/openness subscale are for reverse scoring. As reported in four studies by Donellan et al. (2006), the reliability coefficient (Cronbach's α) of is .81 for Extraversion, .73 for Agreeableness, .70 for Conscientiousness .74) for neuroticism and .69 for Openness. The MINI-IPIP displayed good construct, convergent and discriminant validity with other scales like the BFI-44.

2.3 Statistical Analysis

Data was analysed using the Statistical package for the social sciences (IBM SPSS pack 23). This include the descriptive statistics (frequency count) and inferential statistics (Pearson’s r and reliability analysis).

3. RESULTS

3.1 Social-Demographic Characteristics

The social-demographic characteristics comprised of the social and family-related variables are displayed in Table 1.

Table 1 shows the socio-demographic characteristics of the participants, of which 113 (51.6%) were males, 106 (48.4) were females; 50 (22.8%) were single; 156 (71.2) were married, while 13 (5.9%) were divorced. With regards to family size, 46 (21%) had a small (1-2) members household, 97 (44.3%) had a medium (3-4) members, while 76 (34.7%) are from (5+) members household. About 64 (29.2%) had Secondary to diploma education, and 76 (34.7%) had a first degree, while 72 (32.9%) received a Master's degree and 7 (3.25) had a doctoral degree. Based on the designation, 93 (42.5%) of the participants were senior (administrative) staff, 42 (19.2%) were senior (technical) staff and 84 (38.4) were the junior staff.

Table 1. Social-demographic characteristics of participants

Variable			
Age = M= 46.49 (SD=6.23)			
	Levels	***n.***	***%***
Gender	Male	113	51.6
	Female	106	48.4
Marital status	Single	50	22.8
	Married	156	71.2
	Divorced	13	5.9
Level of Education	SSCE/NCE/ND	64	29.2
	First Degree	76	34.7
	Master's Degree	72	32.9
	PhD	7	3.2
Designation	Senior Administrative Staff	93	42.5
	Senior Technical Staff	42	19.2
	Junior Staff	84	38.4

Table 2. The correlation coefficients of the scale items (N = 219)

Item Statistics			
Items	**Item Mean ± SD**	**Corrected Item-Total Correlation**	**Cronbach's Alpha if Item Deleted**
Extraversion	3.07 ±1.20	.134	.718
Agreeableness	4.24±1.30	.221	.711
Conscientiousness	3.90±1.26	.282	.706
Neuroticism	2.99±1.47	.312	.703
Intellect	3.40±1.34	.379	.697
Extraversion	2.80±1.40	.160	.717
Agreeableness	3.91±1.20	.212	.712
Conscientiousness	3.79±1.45	.290	.705
Neuroticism	3.17±1.49	.392	.695
Intellect	3.50±1.45	.386	.696
Extraversion	2.63±1.33	.151	.717
Agreeableness	4.11±1.06	.249	.709
Conscientiousness	4.07±1.30	.273	.707
Neuroticism	2.92± 1.57	.343	.700
Intellect	3.44±1.41	.361	.699
Extraversion	2.86±1.28	.108	.721
Agreeableness	3.87±1.27	.182	.714
Conscientiousness	4.24±1.47	.454	.693
Neuroticism	3.44±1.36	.326	.702
Intellect	3.68±1.36	.406	.695

Table 2 shows the Mean and Standard Deviation scores of the participants on the Mini-IPIP with the reliability values of the sub-sections of the inventory. Total Cronbach alpha for the scale is .70

Table 3. Cronbach's alpha reliability coefficient and pearson correlation validity coefficient summary on the research instrument (n=219)

Construct A	**Sub-Scales**	**α**	**α**	**Subscales**	**Construct B**
MINI International Personality Item Pool (MINI IPIP)	Extraversion	.80	.61	Extraversion	Big Five Inventory-10 (BFI-10)
	Agreeableness	.79	.64	Agreeableness	
	Conscientiousness	.84	.61	Conscientiousness	
	Neuroticism	.83	.60	Neuroticism	
	Openness to Experience	.88	.60	Openness to Experience	

Table 3 shows the internal consistencies of the Mini-IPIP compared with Big-Five Inventory-10. The two scales measure the five-factor model but with different numbers of items. For the Mini-IPIP, each sub-section, i.e. Extraversion, Agreeableness, Conscientiousness, Neuroticism and Intellect/Openness to experience, were measured with four items each, while the BFI-10 comprised two items each for the sub-sections.

Table 4 shows the concurrent correlation of the Mini IPIP with BFI-10.

4. DISCUSSION

This study aimed to investigate the reliability and concurrent validity of the 20-item Mini IPIP scale in a Nigerian sample. The Mini-IPIP was developed and validated by [14] from the more extended version (50-item Mini-IPIP), which is based on the five-factor model of personality traits [10]. The Mini-IPIP represents an attempt to provide a replacement for large personality scales to avoid the practical difficulties accompanied by the use of long scales. Thus, it is important to subject the short scale to psychometric scrutiny to ensure that the reliability and validity derived from the development phase are substantiated in other countries and cultures.

Consistent with previous studies, this study found acceptable internal consistencies (α) of .80 (Extraversion), .79 (Agreeableness), .84 (Conscientiousness), .83 (Neuroticism), .88 (Openness to Experience), respectively for the Mini-IPIP. Literature have observed the problem of using short items to measure broad constructs like human personality due to lower reliability indices [18,24]. Similarly, the Cronbach alpha coefficient observed in the current study was similar to other studies' indices [14]. The developer [14] observed reliability indices (Cronbach's) of .81 for extraversion, .73 for agreeableness, .70 for Contentiousness, .74 for neuroticism, .69 for Intellect/Openness. The reliability values are smaller than those recorded by Martinez-Molina & Arias [2] in a validation study among Spanish natives, the Mini-IPIP was observed to have a Cronbach's α of .84 .67 .85 .80 .81, respectively. Another study conducted among sample of young adults by [24] reported reliability (α) of .71 (Extraversion), .70 (Agreeableness), .65 (Conscientiousness), .62 (Neuroticism) and .65 (Openness) for the Mini-IPIP, this value was consistent with the current findings and similar to the results of internal consistencies by [18].

The correlation coefficient of the Mini IPIP with BFI-10 was consistent with the findings of previous studies using alternate personality measures [25]. This study showed expected patterns of correlation with another scale that measure five-factor model (i.e. BFI-10). However, as with many shortened scales, the reliability and validity coefficient of the Mini-IPIP scale is lower than what is typically reported for longer personality scales [26]. The correlation coefficients between the related measures of Extraversion, Conscientiousness, and Neuroticism were between .20 and .34. The correlations values of scales measuring Agreeableness and Openness to Experience/Intellect are .11 and .12, respectively. [22] also observed the similar result which was described as a result of the differences in the manner by which the items were worded to represent a certain trait.

Finally, the result of this study established that the 20 items Mini-IPIP has satisfactory internal consistencies and validity coefficient that is well suited to the Nigerian society. The result of this study is expected to facilitate the use of the scale personality assessment and research, especially where the use of longer scale may not be feasible due to time constraints. However, further validation study of short scale of the big five personality trait in Nigeria using exploratory factor analysis and confirmatory factor analysis with large sample size is advised. Thus, caution should be taken when generalising the result of

Table 4. Pearson correlation validity coefficient summary on the research instrument (n=219)

Construct A	Sub-Scales	r	Subscales	Construct B
MINI International Personality Item Pool (MINI IPIP)	Extraversion	.34**	Extraversion	Big Five Inventory-10 (BFI-10)
	Agreeableness	.12*	Agreeableness	
	Conscientiousness	.18**	Conscientiousness	
	Neuroticism	.20**	Neuroticism	
	Openness to Experience	.11*	Openness to Experience	

*** p <.01 level; *p <.05 level*

this study. Also, the Mini-IPIP that was validated in this study was used along with a shorter measure. It should be noted that the psychometric properties of the measures varied in terms of reliability and validity with one another. In spite of this, the use of shorter measure along with longer measures have been observed to contain considerably robust psychometric properties. The use of factor analysis in future validation of the Mini –IPIP in a longitudinal study might describe the patterns of the scale better.

5. CONCLUSIONS AND RECOMMENDATIONS

From series of studies conducted, it appears that the Mini-IPIP-20 possessed a satisfactory internal consistency and validity. The measure has an acceptable psychometric property. Additionally, the values of external correlations with a similar measure of the five-factor personality model, Big Five Inventory -10 (BFI-10) reflect the values of external correlates of the longer scales of BFI [28]. Hence, the Mini-IPIP-20 is a reliable and valid measure of personality traits, especially for research purposes.

However, researchers are encouraged to use the longer measure for more robust psychometric properties. Further validation with large samples is also required among diverse populations across different geographical areas in Nigeria. Thirdly, it is recommended that the validation study in the future can use the measure along with scales of psychological health like psychological wellbeing, satisfaction with life, happiness, alcohol dependence and delinquency.

ETHICAL APPROVAL AND CONSENT

This study involved human subjects; thus, the Helsinki Declaration was employed in the research procedures. The Internal Research Ethics Committee (IREC) of Redeemer's University, Ede, Nigeria scrutinised the research objectives and proposed procedures [REC/30/08/2021/RUN/10]. Informed consent was obtained from participants. All participants and data remain anonymous and confidential.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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