Confirmatory Factor Analysis On The Big 5 Personality Test Inventory

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ABSTRACT

This paper is intended to examine the validity of Big 5 Personality test inventory of 44 questions with 5-Likert Scale measurement. Confirmatory factory analysis (CFA) was conducted to determine the good fit indices of the 5 personality types. Those types are 1) extraversion, 2) agreeableness, 3) conscientiousness, 4) openness and 5) neuroticism. The data was collected from a self-reported questionnaire administered to 207 undergraduate students. The results of CFA found the inventory to be a valid and reliable measurement for types of personality except for neuroticism. Also, the measurement found to be applicable across gender.

Keywords: personality, the Big 5, CFA, valid, neuroticism

Introduction

Why do people behave as they do? What accounts for similarities and differences among people? What makes people act in predictable ways? Do people have some choices in shaping their own personality? What is personality actually? These are the questions that were being asked centuries ago by philosophers, theologians and other thinkers. Conversely about 100 years ago, psychology, a new science back then, which is a combination of philosophy and physiology have found the answer (Feist & Feist, 2009). Although psychologists differ among themselves as to the meaning of personality, most agree that the word “personality” originated from the Latin word “persona” which referred to a theatrical mask worn by Roman actors in Greek drama that projects a role of false appearance (Feist & Feist, 2009).
Personality theorists have not agreed on a single definition of personality. Although they have all dealt in some way with what we call personality, each has approached this global concept from a different perspective. However, Feist and Feist (2009) have found the definition that is most acceptable by the personality theorists. Personality was found as a pattern of relatively permanent traits and unique characteristics that give both consistency and individuality to a person’s behaviour. Feist and Feist (2009) further explained that traits contribute to individual differences in behaviour, consistency of behaviour over time and stability of behaviour across situations whereas characteristics are unique qualities of an individual that include such attributes as temperament, physique, and intelligence.

1. THEORETICAL FRAMEWORK

The Big 5 Personality model is currently one of the most accepted classifications for personality traits (Scholte, Lieshout, Cees & Aken, 2005). McCrae and Costa (1983) suggested that personality of a person can be described in 5 factors and most people score near the middle of each trait with only a few people scoring at the extremes. Below is the summary of the Big 5.

Insert Table 1 here

People who score high on extraversion tend to be affectionate, jovial, talkative, joiners, and fun-loving. In contrast, low E scorers are likely to be loner, sober and passive.

People who score high on neuroticism tend to be emotional, easily embarrassed, pessimistic and vulnerable to stress-related disorders, while those who score low on N are usually comfortable, calm and unemotional (Zhang, 2002).

Openness to experience distinguishes people who prefer variety in their lives. They are imaginative, and creative. By contrast, people who score low in openness tend to be conservative; they like routine and are uncreative.

The agreeableness scale distinguishes soft-hearted people from ruthless ones. People who score in the direction of agreeableness tend to be generous, lenient, and good-natured, whereas those who go the opposite direction tend to be stingy, irritable and critical of other people.

Finally, conscientiousness describes people who are ordered, organized, hardworking and ambitious. In contrast, people who score low on C are usually disorganized, lazy, negligent and aimless (Zhang, 2002).

However, limited study was found to validate the construct for each personality type and the researcher has found none done in Malaysia. Therefore the purpose of this research is to validate each construct for each personality type. Specifically, the present study is to sought out whether or not the personality types of respondents were constituted from a valid and reliable construct and its applicability across genders.
2. RESEARCH METHODOLOGY

3.1. Sample

The study was conducted on 207 undergraduate students, 85 males and 122 females from the Faculty of Arts and Social Science, University Tunku Abdul Rahman (UTAR), Kampar. The questionnaires were distributed and collected on the same day.

3.2. Instrument

The established Big 5 Personality inventory developed by McCrae and Costa (1983) was examined to determine its construct validity and reliability. It is a paper-and-pencil inventory with 44 questions of 5 Likert scales. Each personality type was examined separately since they are separate factors that could not be added to get the summated score. Each construct has 8 to 10 observed variables.

Previous research using the Big Five inventory to study perfectionism had internal consistency at: E= .80, A= .75, C= .83, N= .85 and O= .68 (Sherry, Hewitt, Flett, Lee-Baggley & Hall, 2007).

However, despite the internal consistency values taken from other previous research, a reliability analysis was done by the author to the data to determine the internal consistency of each construct based on the samples of the study. A few items were deleted in order to achieve high reliability value. It was found that the Cronbach's alpha for each type are E=.66, N=.59, O= .74, A= .70, and C= .64. Furthermore, a preliminary exploratory investigation using the AMOS (version 16) was also done to obtain the loadings of each construct in order to verify the psychometric properties of the hypothesized measurement model (Kline, 2005), and it was found that E=.90, N=.89, O=.93, A=.90 and C=.87, which indicate that the constructs have adequate construct validity. Thus, there is adequate evidence that the model has convergent validity when the average variance extracted (AVE) for all the five factors were found at the range of 0.638 to .733.

3.3. Data analysis

3.3.1. Confirmatory Factor Analysis (CFA)

The model fitness was evaluated using the Maximum Likelihood (ML) estimation with several other assessment criteria, including the Chi-square Goodness-of-Fit test statistic, degree of freedom, Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). The tool that is used to measure such is AMOS (version 16). Bayesian estimation was also conducted with Convergent Statistics CS and Posterior Predictive p-value (ppp) as the assessment criteria of fit indices.

3.3.2. Invariance analysis

The model was further tested on moderator effect. Gender was observed as the dependent variable to explore whether it moderates the model.

3. RESULTS
4.1. Confirmatory Factor Analysis

Therefore, the construct was examined to measure its validity using Maximum Likelihood estimation. It was then evaluated using confirmatory factor analysis with AMOS (version 16) to assess the factorial validity of the measurement model. The fit statistics showed that the model fit the data as follows:

Insert Figure 1 here

However, negative loading was found on one of the construct. Therefore, the model was revised, that is the neuroticism type of personality was removed from the model.

Insert Figure 2 here

The goodness of fit indices indicated that all the models fit with the data. The factor loadings were substantially acceptable statistically significant (Kline, 2005).

Bayesian estimation of 86, 501 samples have revealed that the CS =1.001 (ps≤1.002) and ppp =.57 (p± .5), indicating that the model appears to provide an adequate fit with the observed data.

4.2. Invariance of Big 5 Personality Test Inventory

The measurement model was further tested for gender-invariant through a three-stage multi group analysis. First, a simultaneous analysis on both the male and female samples was conducted, without constraining the loadings; the results derived a baseline chi-square value. Next, all loadings were constrained to be equal for the male and female groups. The analysis of this constrained model produced another chi-square value, which was finally tested against the baseline value for statistically significant differences.

The invariance test across the male and female groups resulted in a statistically insignificant change in the chi-square value $\chi^2(3) = 2.26, p > .001$; Simply said, the difference in the chi-square values between the unrestricted model and the constrained model did not produce a poorer-fit model (Byrne, 2010). The loadings did not vary significantly across gender. It is justifiable then to conclude that gender did not interact with the underlying traits to influence the staff members’ responses to the indicators of lecturer efficacy; hence, gender is not a moderating variable

4. DISCUSSION AND CONCLUSION

The study was to examine the validity and reliability of the Big 5 Personality inventory. Preliminary analysis for Cronbach’s alpha was done and a few items from the questionnaire were deleted to obtain higher validity value.
The extraversion construct was indicated by items such as talkative, full of energy, generate a lot of enthusiasm and outgoing and sociable.

Furthermore, the neuroticism factor was specified by items such as feelings of depressed or blue, can be tense, worry a lot, can be moody and get nervous easily. For the openness type of personality, more items were found to be the indicators, such as originality (comes up with new ideas), curious about many different things, ingenious; a deep thinker, has an active imagination, inventive, values artistic and aesthetic experiences, and like to reflect; play with ideas.

The agreeableness factor was signified by items such as helpful and unselfish with others, has forgiving nature, generally trusting, considerate and kind to almost everyone, and like to cooperate with others. Finally the conscientiousness construct was indicated by items such as do a thorough job, reliable worker, persevere until the task is finished, do things efficiently and make plans and follow through with them.

The CFA analysis was done on summated score of each personality type as the observed variable. However neuroticism was found to have negative loading which was inadmissible. According to Kline (2005), negative variance estimates or loadings are unacceptable. The model was revised and the good fit indices showed better results.

Neuroticism was found to be unfitting with the model due to the reason that it has negative loadings which indicated that it is negatively related (DiStefano, Zhu & Mîndrilă, 2009) to Big 5 Personality Test Inventory. Indeed, neurotics show greater distress and depressive symptomology following stressful life events, such as unemployment (Creed, Muller, & Machin, 2001). Unlike other constructs which are positively related to Big 5 inventory.

Finally, invariance analysis was done to establish whether gender moderated the model and the results found that there is statistically insignificance difference between genders. Thus, this result concluded that the measurement models are applicable for male and female.

In conclusion, the study has addressed a significant gap of literature in Malaysia, which the researcher has not found any research to have the similar purpose. Furthermore, the validation of each personality construct has made the Big 5 Personality inventory a good measurement tool for personality types. Since the model of this study allows an analysis of independent dimensions of the Big 5 Personality types, this study provides a better understanding of the different personality traits of individual who are keen or not keen to share online entertainment knowledge (Teh, Yong, Chong, & Yew, 2011) because the inventory can be administered online as well. The study however was done to undergraduate students only. It is recommended to administer the study to bigger population to obtain unrestricted generalizability of the inventory. Future study may also examine the relationship of each personality type with motivation and achievement.
REFERENCES


Table 1: McCrae and Costa Five-Factor Model of Personality (adopted from Feist and Feist, 2009)

<table>
<thead>
<tr>
<th>Personality Trait</th>
<th>High Scores</th>
<th>Low Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraversion (E)</td>
<td>Affectionate</td>
<td>Reserved</td>
</tr>
<tr>
<td></td>
<td>Joiner</td>
<td>Loner</td>
</tr>
<tr>
<td></td>
<td>Talkative</td>
<td>Quite</td>
</tr>
<tr>
<td></td>
<td>Fun-loving</td>
<td>Sober</td>
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<tr>
<td></td>
<td>Active</td>
<td>Passive</td>
</tr>
<tr>
<td></td>
<td>Passionate</td>
<td>Unfeeling</td>
</tr>
<tr>
<td>Neuroticism (N)</td>
<td>Anxious</td>
<td>Calm</td>
</tr>
<tr>
<td></td>
<td>Temperamental</td>
<td>Even-tempered</td>
</tr>
<tr>
<td></td>
<td>Self-pitying</td>
<td>Self-satisfied</td>
</tr>
<tr>
<td></td>
<td>Self-conscious</td>
<td>Comfortable</td>
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<tr>
<td></td>
<td>Emotional</td>
<td>Unemotional;</td>
</tr>
<tr>
<td></td>
<td>Vulnerable</td>
<td>Hardy</td>
</tr>
<tr>
<td>Openness (O)</td>
<td>Imaginative</td>
<td>Down-to earth</td>
</tr>
<tr>
<td></td>
<td>Creative</td>
<td>Uncreative</td>
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<tr>
<td></td>
<td>Original</td>
<td>Conventional</td>
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<td></td>
<td>Prefers variety</td>
<td>Prefers routine</td>
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<tr>
<td></td>
<td>Curious</td>
<td>Uncurious</td>
</tr>
<tr>
<td></td>
<td>Liberal</td>
<td>Conservative</td>
</tr>
<tr>
<td>Agreeableness (A)</td>
<td>Soft-hearted</td>
<td>Ruthless</td>
</tr>
<tr>
<td>Conscientiousness (C)</td>
<td>Trusting</td>
<td>Generous</td>
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<tr>
<td></td>
<td>Conscientious</td>
<td>Hardworking</td>
</tr>
</tbody>
</table>

Figure 1: The Model of Big 5 Personality Test Inventory: Goodness of Fit indices of Big 5 Personality Inventory
Figure 2: The Model of Big 5 Personality Test Inventory (Revised Version)