# VALIDATION OF THE MALAY VERSION OF MINI-IPIP AND TIPI AMONG SUBSTANCE USE DISORDER PATIENTS ATTENDING METHADONE CLINICS IN PERAK AND KELANTAN, MALAYSIA

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To my family, I am forever grateful for providing me all the support I need. Above all, to my Lord and Saviour Jesus Christ, without whom I will not be here today.

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**Latar belakang**

Kajian personaliti telah mendapat sambutan yang meningkat dari tahun ke tahun. Disebabkan itu, saringan personaliti yang mempunyai ciri-ciri psikometrik yang bagus adalah diperlukan. Akan tetapi, saringan personaliti sedemikian adalah tidak praktikal kerana isi kandungannya yang panjang. Justeru itu, kajian ini bertujuan untuk menvalidasikan dua saringan personaliti pendek Big Five yang biasa digunakan dalam pelbagai konteks termasuk penyalahgunaan dadah, iaitu Mini-IPIP dan TIPI, tetapi belum lagi divalidasi dan digunakan di Malaysia.

**Metodologi**

Proses penterjemahan dan juga pengesahan muka dan kandungan telah dijalankan ke atas Mini-IPIP dan TIPI. Ini diikuti dengan kajian awal. Versi terakhir seterusnya digunakan dalam kajian validasi yang melibatkan seramai 239 peserta daripada enam klinik-klinik methadone di Perak dan Kelantan. Analysis struktur yang digunakan dalam kajian ini adalah analysis faktor pengesahan dan analisis faktor penerokaan.

**Keputusan**

Keputusan kajian memunjukkan Mini-IPIP mempunyai model pengukuran yang baik dengan penggunaan teknik-teknik ‘item-parcelling’ dan penambahan item-item yang mempunyai kaitan yang unik (CFI/TLI = .949/.831, RMSEA = .094, SRMR = .044).

Untuk TIPI, lima penyelasaian faktor dapat ditunjukkan dan ‘cross-loading’ dapat dilihat antara item-tem di kalangan faktor-faktor di dalamnya.

## Kesimpulan

Kajian ini menyokong bahawa terdapat lima faktor solusi di dalam struktur Mini-IPIP. Walau bagaimanapun, faktor pemuatan untuk item-item di dalam struktur TIPI adalah tidak memuaskan. Penambahbaikan TIPI dalam versi Bahasa Malaysia adalah diperlukan. Kedua-dua ujian saringan personaliti ini boleh digunakan pada keadaan masa suntuk dan sekiranya para penyelidik sanggup berkompromi dengan kesahan muka dan nilai kebolehpercayaannya yang lebih rendah.

## ABSTRACT

## VALIDATION OF THE MALAY VERSION OF MINI-IPIP AND TIPI AMONG SUBSTANCE USE DISORDER PATIENTS ATTENDING METHADONE CLINICS IN PERAK AND KELANTAN, MALAYSIA

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**Background**

There has been an increasing interest in personality study over the years. This has led to the necessity for personality measures with good psychometric properties. However, good personality measures are usually too cumbersome to apply in real practical settings due to their length. This study aims to validate two commonly used short personality measures of the Big Five model in various contexts including substance abuse, i.e. Mini-IPIP and TIPI, but has never been validated and used in Malaysia.

**Methods**

Forward and back translations, content validity, and face validity were carried out on Mini-IPIP and TIPI in which both were then used in the pilot study. Finalised version of the questionnaires were used in the validation study involving 239 participants collected through convenience sampling from six methadone clinics in Perak and Kelantan. The construct validity of the questionnaires was assessed using confirmatory and exploratory factor analyses.

**Results**

Results showed a good model fit for Mini-IPIP when item-parcelling and adding-in correlated uniqueness items were applied (CFI/TLI = .949/.831, RMSEA = .094, SRMR = .044). As for the TIPI, five factor structure was extracted and cross-loadings were observed for the items between the factors.

**Conclusion**

Our study supported the five factor solution for Mini-IPIP. However, there were poor factor loading in the items factor for TIPI. Further revision is needed for the current Malay version of TIPI. Both instruments can be used in time-limited settings and when researchers are willing to compromise the lower validity and reliability aspects of these shorter personality measures.

*Key words:*

*Validation study, Structural analysis, Short personality questionnaire, Mini-IPIP, TIPI*

# INTRODUCTION

Illicit drug use has become a major world problem affecting our society today. Based on the United Nation's World Drug Report 2017, more than 5% of the world population had succumbed to drug abuse at least once in 2015. Overall drug abuse issue has resulted in significant burden on the global health in which 28 million healthy years were lost to drug use and out of those years, 17 million life years were lost due to drug use disorders (United Nations Office on Drugs and Crime, 2017).

Nationally, our statistics did not run far from those seen around the globe. The increasing number of new cases detected every year has been on the rise looking at the statistical figures published by the National Anti-drugs Agency Malaysia (Agensi Anti-dadah Kebangsaan, i.e. AADK). There has been an increase of over 100% in the number of new cases detected just within four years apart, i.e. 10 301 cases in 2012 and 22 923 cases in 2016. This corresponded with the increasing number of incarcerations due to various social problems related to illicit drug use (AADK, 2016).

Due to the significant morbidity and social problems attached to the issue of illicit drug use, it is of importance to further understand its possible causative factors. Some of the causes are biological predisposition, personality traits, poor family support, history of being abused, poor coping skills, peers influence, low level of education, history of anti-social behaviour, and early initiation of drug use. These factors can be generally divided into three groups, namely biological, psychological, and social factors, which can exert their influence on each other.

This study focuses on the psychological aspect of drug use behaviour, more specifically personality aspect per se. The influence of personality on substance abuse has been extensively studied overseas but it is still in its infancy in Malaysia. The study of

personality traits usually require the use of some form of personality measures. There are many established personality measures with good psychometric properties that are suitable for personality assessment. However, only very few have been validated in the Malay language to be used in our local context, for example NEO Personality Inventory-Revised (NEO PI-R) by Mastor, Jin, and Cooper (2000) and NEO Five Factor Inventory (NEO-FFI) by Lim and Melissa (2012). Even so, they are considered cumbersome to apply in practical settings where time is limited due to the number of questions in each personality questionnaire; there are 240 questions in NEO PI-R and 60 questions in NEO-FFI.

This study aims to validate two shorter personality questionnaires commonly used nowadays but have yet to be validated in our local context, i.e. Mini International Personality Item Pool (Mini-IPIP) and Ten Item Personality Inventory (TIPI) which consists only 20 and 10 items, respectively. These shorter questionnaires allow easier administration and better responses from the participants.

The addition of local validated personality questionnaires will enable further progress and advancement in personality research in our country within a wide range of areas in our society including substance abuse which is the area of focus in this study.

This dissertation is arranged according to the new manuscript-ready format as outlined by the Institute of Postgraduate Studies, Universiti Sains Malaysia. The manuscript will represent the whole body of the dissertation entitled, “Validation of the Malay Version of Mini-IPIP and TIPI among Substance Use Disorder Patients Attending Methadone Clinics in Perak and Kelantan, Malaysia”.

## LITERATURE REVIEW

### Personality Traits and Substance Abuse

Personality traits in Big Five or Five Factor Model consists of five personality dimensions that basically influence how we perceive and interact with the world around us. Those personality dimensions are Intellect/Openness to experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. The direct relationships between personality traits and substance abuse have been proven in many studies (Grenkin, Sher, & Wood, 2006). This may be due to the influence of personality traits on the perception of reinforcing stimuli such as drugs and the subsequent choice of behaviour in relation to it (Corr & Matthews, 2009). They may even predict the extent of drug use behaviour years later (Conway, Swendsen, Rounsaville, & Merikangas, 2002).

Personality traits with positive emotionality such as extraversion and agreeableness, and traits with negative emotionality like neuroticism have been found to be associated with substance use disorder in many cases (Conway et al., 2002). Walton and Roberts (2004) reported that individuals who scored lower in conscientiousness and agreeableness tend to be heavier drug users compared to moderate users and abstainers. Turiano, Whiteman, Hampson, Roberts, and Mroczek (2012) found that increase use of drugs are associated with higher neuroticism, extraversion, and openness to experience but lower conscientiousness and agreeableness.

Sufficient understanding about the influence of personality traits in substance abuse is important as it allows the formulation of individualised treatment plan that matches each personality profile (Terracciano, Löckenhoff, Crum, Bienvenu, & Costa Jr., 2008). Fisher and colleagues (1998) reported that conscientiousness and neuroticism are two

personality traits that determine the relapse rate in substance abuse in which low conscientiousness and high neuroticism are associated with highest risk of relapse and vice versa. Hence, personality assessment during the course of treatment is necessary for a more comprehensive management of any individual concerned. The process of personality assessment can be a turn off to many people because of the length of the personality questionnaires administered and the time and effort needed to complete them. Therefore, the use of shorter personality measures have been on the increase over time. The availability of validated short personality measures such as Mini-IPIP and TIPI would be of much help to the future assessment process of personality traits among the local people in which both have yet to be validated in Malaysia.

Mini-IPIP

Mini-IPIP was developed by Donellan, Oswald, Baird, and Lucas (2006) from the 50-item IPIP established by Goldberg (1999). Mini-IPIP has 20 items with five personality dimensions divided equally among them, i.e. Intellect, Conscientiousness, Extraversion, Agreeableness, and Neuroticism. All the dimensions have equal forward and reverse scorings except the intellect dimension where one question is for forward scoring and the remaining three questions for reverse scoring. Each item is measured using a 5-point Likert scale from 1 (Very inaccurate) to 5 (Very accurate). The Cronbach alphas for each of the personality dimensions are 0.82 (Extraversion), 0.77 (Agreeableness), 0.74 (Conscientiousness), 0.78 (Neuroticism), 0.70 (Intellect/Imagination) while its model fit values are CFI = 0.88 and the RMSEA = 0.07 ($p$ close fit < 0.05) (Donellan et al., 2006). Since the establishment of Mini-IPIP, they have been efforts by other researchers to study its psychometric properties or to validate it for their own local use in which they have shown mixed results (Baldasaro, Shanahan, & Bauer, 2013). A test of its psychometric properties using CFA was conducted by

Cooper, Smillie, and Corr (2010) and they found that the model fit was poor to moderate (CFI = .82, RMSEA = .07, SRMR = .06). Laverdiére, Morin, and St Hilaire (2013) found in their initial 5-factor model was suboptimal at first (CFI = .890, TLI = .870, RMSEA = .088) but the model fit improved after items with correlated uniqueness were added in (CFI = .944, TLI = .932, RMSEA = .064).

TIPI

TIPI was developed by Gosling, Rentfrow, and Swann Jr. (2003) in which it has only ten items with two items per factor. Each item is measured using a 7-point Likert scale from 1 (Strongly disagree) to 7 (Strongly agree). Each factor has equal number of forward and reverse scorings. The Cronbach alphas for the personality dimensions measured are .68 (Extraversion), .40 (Agreeableness), .50 (Conscientiousness), .73 (Emotional stability), .45 (Openness to experience) (Gosling et al., 2003). Due to its shorter length, it has been widely used and is the most widely cited brief measure of Five Factor Model (Renal et al., 2013). Ehrhart M, Ehrhart K, Roesch, Chung-Herrera, Nadler, and Bradshaw (2009) in their validation study of TIPI showed that it had acceptable model fit (RMSEA = .08, SRMR = .05) and its inter-item correlations were not significantly different from those in the 50-item IPIP FFM measure which range from .28 to .47.

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## STUDY OBJECTIVES

OBJECTIVES

1) General Objective

This research aims to validate the Malay version of the Mini-IPIP and TIPI among substance abusers attending methadone clinics in Perak and Kelantan, Malaysia.

2) Specific Objectives

a) To translate Mini-IPIP and TIPI into Bahasa Malaysia.

b) To determine the validity and reliability of the Malay version of Mini-IPIP and TIPI among substance use disorder patients attending methadone clinics in Perak and Kelantan.

c) To determine the correlation between the Malay version of Mini-IPIP and the ZKPQ (Malay version).

d) To determine the correlation between the Malay version of TIPI and the ZKPQ (Malay version).

*Note:*

a) The manuscript presented in this dissertation will only report on the validation study of Mini-IPIP. However, the results for the validation of TIPI will be presented as appendices.
b) The reliability analyses for Mini-IPIP will be presented as appendices.

**MANUSCRIPT**

# VALIDATION OF THE MALAY VERSION OF MINI-IPIP AMONG SUBSTANCE USE DISORDER PATIENTS ATTENDING METHADONE CLINICS IN MALAYSIA

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**Abstract**

There has been an increasing interest in personality study over the years. This has led to the necessity for personality measures with good psychometric properties. However, good personality measures are usually too cumbersome to apply in real practical settings due to their length. This study aims to validate a commonly used short personality measure of the Big Five model, i.e. Mini-IPIP (Mini International Personality Item Pool), which has never been validated and used in substance abuse population in the local setting. The participants were 239 individuals attending one of the six methadone clinics in Malaysia. Structural analysis was conducted using confirmatory factor analysis (CFA). Results showed a good model fit for Mini-IPIP when item-parcelling and adding-in correlated uniqueness items were applied (CFI/TLI = .949/.831, RMSEA = .094, SRMR = .044). Our study supported the five factor solution for the Mini-IPIP. It is valid and reliable to be used among individuals with drug abuse in Malaysia.

*Key words:*

*Validation study, Structural analysis, Short personality questionnaire, Mini-IPIP*

## 1. Introduction

According to the diagnostic and statistical manual of mental disorders (DSM-5), personality refers to the " enduring patterns of perceiving, relating to, and thinking about the environment and oneself that are exhibited in a wide range of social and personal contexts" (American Psychiatric Association, 2013, p. 647). Every person differs in his/her personality which in turn makes each of them unique in their own way. The interest for personality study has grown over the years looking at the number of personality-related empirical studies getting published over time. This is no surprise due to the increasing number of discoveries made regarding personality and its influences on human behaviour. Areas which are pertinent and closely related to the subject of personality are general and mental health, education, sports, work performance, and many more.

The Five Factor Model (also known as the Big Five Model) has been accepted as the dominant model to study personality in trait psychology (Donellan, Oswald, Baird, & Lucas, 2006; Block, 1995). This model incorporates the five personality traits or dimensions (i.e. intellect/openness, conscientiousness, extraversion, agreeableness, neuroticism) that are said to contain the facets or the building blocks that make up each trait or dimension. Several measures have been developed with the purpose to study the personality and individual differences among the people. The most established and well-studied personality measure with reported excellent psychometric properties (i.e. validity and reliability) is the Revised NEO Personality Inventory (NEO-PI-R) by Costa and McCrae (1992) which has 240 items covering six facets for each of the five personality dimensions it assesses. Even so, it may be at a disadvantage in terms of its practical application as it takes approximately 45 minutes to complete the assessment. Respondents may get tired, bored, and frustrated at having to complete the long

questionnaire (Donellan et al., 2006; Romero, Villar, Gómez-Fraguela, & López-Romero, 2012) which may lead to their random and inconsistent responding (Renau, Oberst, Gosling, Rusiñol, & Chamarro, 2013) and hence the questionable data quality (Romero et al., 2012). Therefore, many researchers attempted to create a shorter version of personality measure hoping to come up with a concise form of the measure yet retain the excellent psychometric properties of their longer counterparts. Although shorter questionnaires are more practical in many situations such as during large-scale surveys or repeated-measure experiments, researchers using them have to compromise on their weaker psychometric properties (Romero et al., 2012, Baldasaro, Shanahan, & Bauer, 2013) as shorter forms are associated with weaker validity and reliability. However, these shorter questionnaires can be used to assess the Big Five personality factors (Baldasaro et al., 2013).

One of the short Five Factor Model instruments that has been established for many years and will be used for the purpose in this study is the Mini International Personality Item Pool (Mini-IPIP). Mini-IPIP was developed by Donellan and colleagues (2006) with the intention to create a short form of the 50-item IPIP established by Goldberg (1999). Through their five successive studies, a 20-item with four items per factor, the questionnaire was formed and they showed good content coverage, test-retest correlations, validity, and reliability. Other efforts to test its psychometric properties subsequently or to validate it to be used in their local settings have shown mixed results (Baldasaro et al., 2103). For example, Cooper, Smillie, and Corr (2010) tested the psychometric properties of Mini-IPIP using confirmatory factor analysis (CFA) and found that the 5-factor model had "poor to moderate" model fit (CFI = .82, RMSEA = .07, SRMR = .06). Laverdière, Morin, and St-Hilaire (2013) found that the initial CFA for the 5-factor model Mini-IPIP was suboptimal (CFI = .890, TLI = .870,

RMSEA = .088). The model was subsequently modified by adding the items with correlated uniqueness which resulted in improved and satisfactory model fit (CFI = .944, TLI = .932, RMSEA = .064).

The use of Big Five personality measures including Mini-IPIP has been extensive on a variety of contexts including substance abuse which is the focus of this study. Direct relationships between certain personality traits and substance abuse have been proven in many studies (Kotov et al., 2010; Grenkin et al., 2006). For example, those with lower conscientiousness and agreeableness, and higher neuroticism, extraversion, and openness are associated with substance use disorder (Turiano et al., 2012; Walton & Roberts, 2004). The use of Mini-IPIP in the study of substance use disorder has also been established in many studies (Erevik et al., 2017a; Erevik et al., 2017b; Baldasaro et al., 2013).

Personality study in Malaysia is still in its infancy. There are only limited studies in the subject of personality in the area of substance abuse and even fewer studies on psychometric measures on personality in general. Therefore, the objective in this study is to translate and validate Mini-IPIP among substance use disorder population in the local setting. The validation of this questionnaire will provide an impetus for more future research on personality measures with their associated topics especially in the area of substance abuse thus expanding the knowledge on the ever complex human behaviour.

## 2. Materials and Methods

### *2.1 Participants*

A total of 239 participants was involved in the study after obtaining their consent. This number did not include those who had already participated in the pre-testing of the questionnaires earlier. The samples were collected from six methadone clinics in Malaysia. The participants were sampled using the convenience sampling method and would be recruited into the study if they fulfilled the eligibility criteria of the study. Those included in the study were at least 18 years old and able to read and write in Bahasa Malaysia. Those with concurrent active psychiatric illness or deaf and/or blind would be excluded from the study. Samples were collected and the questionnaires checked for their completion solely by the first author and hence any form of discrepancy during the sample collection was reduced to a minimum. The descriptive statistics for the sociodemographic particulars are shown in Table 1. The majority of the participants are male (95.8%) and Malay (91.6%). More than half of them are full-time working adults (61.5%) and had completed secondary level of education (85.4%). Also, the majority (48.1%) was still single at the time of study. Their age range was from 19 to 63 years with the men's mean age of 39.0 years (SD = .61) and the female's mean age of 35.8 years (SD = 2.70).

Table 1

Mean, standard deviation, and frequency (%) for sociodemographic data

| Sociodemographic particulars | Mean (SD) | Frequency (%) |
|---|---|---|
| Age | | |
| Male | 39.0 (.61) | |
| Female | 35.8 (2.70) | |
| Salary | 1020.9 (662.15) | |
| Gender | | |
| Male | | 229 (95.8) |
| Female | | 10 (4.2) |
| Marital status | | |
| Single | | 115 (48.1) |
| Married | | 92 (38.5) |
| Separated/divorced | | 32 (13.4) |
| Race | | |
| Malay | | 219 (91.6) |
| Chinese | | 5 (2.1) |
| Indian | | 15 (6.3) |
| Others | | 0 (0) |
| Occupational status | | |
| Full time | | 147 (61.5) |
| Part-time | | 63 (26.4) |
| Retired | | 5 (2.1) |
| Never worked/unemployed/ housewife | | 24 (10.0) |
| Educational level | | |
| Never been to school | | 0 (0) |
| Primary level | | 11 (4.6) |
| Secondary level | | 204 (85.4) |
| Tertiary level | | 15 (6.3) |
| Others | | 9 (3.8) |

*2.2. Materials*

*2.2.1. Mini-IPIP*

Mini-IPIP by Donellan and colleagues (2006) has 20 items with five subscales, i.e. Intellect, Conscientiousness, Extraversion, Agreeableness, Neuroticism, and each item is measured using a 5-point Likert scale from 1 (Very inaccurate) to 5 (Very Accurate). Each subscale is represented by four questions and they are divided equally into forward

and reverse scorings except the intellect dimension where one question is for forward scoring while the other three are for reverse scoring. The Cronbach alphas for each of the personality dimensions are .82 (Extraversion), .77 (Agreeableness), .74 (Conscientiousness), .78 (Neuroticism), .70 (Intellect/Imagination). As for its validation using CFA, its CFI was .88 and the RMSEA was .07 ($p$ close fit < 0.05) (Donellan et al., 2006).

*2.2.2. ZKPQ*

Zuckerman-Kuhlman Personality Questionnaire Cross-Cultural 50 Items (ZKPQ-50-CC) by Aluja, Rossier, García, Angleitner, Kuhlman, and Zuckerman (2006) was an adaptation of the longer parental measure, i.e. Zuckerman-Kuhlman Personality Questionnaire (ZKPQ) by Zuckerman (2002). The original ZKPQ-50-CC's CFA fit indices were CFI = .78, RMSEA = .04, and SMSR = .01 and the Cronbach alpha values for the English version were .8 (Neuroticism-Anxiety), .72 (Impulsive-Sensation-seeking), .74 (Activity), .74 (Sociability), and .72 (Aggression-Hostility). ZKPQ-50-CC was translated into Malay language and validated locally by Mohammad, Nadiah, and Geshina (2013). In their study, ten items (two from each factor) were removed and the remaining 40 questions in the five factors had Cronbach alpha coefficient values ranging from .76 to .84. Just like the original version of ZKPQ-50-CC, the translated version, i.e. ZKPQ-M-40-CC, has five common factors. Each factor has four items and each item is measured using a 5-point Likert scale. In this study, ZKPQ was used during concurrent validation of Mini-IPIP in view that, to our knowledge, ZKPQ is the shortest available validated Malay personality questionnaire locally to date.

### *2.3. Methods*

#### *2.3.1. Translation of Mini-IPIP*

Mini-IPIP translation was done following the recommended steps from the WHO webpage under the research tools section (http://www.who.int/substance_abuse/research_tools/translation/en/). It first underwent forward translation by an independent mental health professional and a layman. The two questionnaires produced were back-translated by another independent mental health professional and another independent layman to assess the accuracy of the forward translations done earlier. The two forward Bahasa Malaysia translations were merged to produce the first consensus Malay version of Mini-IPIP after revision was done. Then, two mental health experts were involved in its content and face validity in which each item in the questionnaire was examined to ensure its suitability to be used in the Malaysian context. The harmonised version was produced after appropriate amendments were made. It was then used in the pre-testing stage of the study. Necessary adjustments were conducted to the questionnaire to produce the final version of the translated questionnaire.

#### *2.3.2. Data analysis*

##### *2.3.2.1. Confirmatory factor analysis of Mini-IPIP*

The CFA in this study was conducted using the MPlus version 7.4 software program (Muthen & Muthen, 2015). The statistical indices that we used to indicate the model fit were the comparative fit index (CFI), the Tucker Lewis Index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). The value of ≥ .95 is required for CFI and TLI to indicate good model fit whilst for RMSEA and SRMR, the acceptable value is ≤ .08 (Hair, Black, Babin, &

Anderson, 2010; Kline, 2011). While we acknowledged that a *priori* 5-factor model would show the best model fit as proven by many studies, we also tested three other models to determine which one had the best model fit. Besides the 5-factor model, we had tested the 2- and the 3-factor models and the final model in which we performed the aggregate scores for each factor. As Cooper and colleagues (2010) had tested on their 2- and 3-factor models, we had similarly adopted the same factor structures for both our models. The 2-factor structure was based on the factors extracted by Digman (1997) in which neuroticism, agreeableness, and conscientiousness are loaded into alpha-factor while extraversion and intellect are loaded into beta-factor. Based on the values of the model fit indices obtained, we then removed items with poor factor loading (< .3) in stages and then we apply the strategy of adding items with correlated uniqueness. This strategy has been practiced by a few authors, for example Marsh et al. (2010) and Laverdière et al. (2013) and the latter was able to improve their CFA model fit of the Mini-IPIP after the strategy was applied. For the 3-factor structure, neuroticism and extraversion were grouped into one factor, conscientiousness and agreeableness into another factor, and intellect as a stand-alone factor. We then used similar steps and strategies like those for 2-factor model. Note that we also removed items with poor factor loading in stages and using the addition of items with correlated uniqueness in our 5-factor model. In our final model, we aggregated the scores for the items in each factor and then added in the items with correlated uniqueness. No item was removed in the final model and all the items remained as they were in their respective factor. We also perform reliability analysis for all items in the Mini-IPIP.

*2.3.2.2. Concurrent validity of Mini-IPIP and ZKPQ*

We tested the concurrent validity of Mini-IPIP using the ZKPQ as the gold standard. Pearson correlation was used to examine the correlation between the factors within Mini-IPIP and ZKPQ.

## 3. Results

### *3.1 Structural analysis for Mini-IPIP*

Confirmatory factor analysis was performed in which the initial 5-factor model showed very poor model fit (see Table 2; CFI/TLI = .013/-.137, RMSEA = .141, SRMR = .232). Items with poor factor loading (< .3) were then removed in stages with subsequent addition of items with correlated uniqueness (i.e. #15 and #10, #18 and #8, and #12 and #2). However, the final 5-factor model still showed poor model fit (CFI/TLI = .600/.472, RMSEA = .102, SRMR = .132). For the 3-factor model, the initial model showed poor model fit (CFI/TLI = .358/.283, RMSEA = .112, SRMR = .253). Items with poor loading were removed and items with correlated uniqueness were added in. The final model fit for 3-factor model was still poor (CFI/TLI = .285/.116, RMSEA = .136, SRMR = .270). The initial 2-factor model fit was poor with CFI/TLI: .478/.414, RMSEA: .101, and SRMR: .117. Similar steps were applied and the final model turned out to be moderate fit (CFI/TLI = .873/.829, RMSEA = .075, SRMR = .064). In this final 2-factor model, we added correlated items of #14 and #4, and #18 and #4. It can be seen in the table that the overall model fit for 2-factor model was better than the 5-factor or 3-factor models.

In our final model, we had aggregated the scores for each factor and the initial model showed poor model fit (CFI/TLI = .634/.267, RMSEA = .197, SRMR = .132). However, after the addition of factors with correlated uniqueness (i.e. neuroticism and conscientiousness, neuroticism and extraversion), the model fit improved substantially (CFI/TLI = .949/.831, RMSEA = .120, SRMR = .038). In the final model, no items were removed and the items in each factor remained as they were.

Table 2

CFA fit indices of various models tested for Mini-IPIP

| | | Fit indices | |
|---|---|---|---|
| Models tested | CFI/TLI | RMSEA (90% CI) | SRMR |
| a) 5 Factor | | | |
| Initial model | .013/-.137 | .141 (.133- .150) | .232 |
| Last model | .600/.472 | .102 (.088- .116) | .132 |
| b) 3-Factor | | | |
| Initial model | .358/.283 | .112 (.104- .121) | .253 |
| Last model | .285/.116 | .136 (.125- .148) | .27 |
| c) 2-Factor | | | |
| Initial model | .478/.414 | .101 (.093- .111) | .117 |
| Last model | .873/.829 | .075 (.055- .094) | .064 |
| d) Aggregate score of 5 factors | | | |
| Initial model | .634/.267 | .197 (.150- .248) | .074 |
| Last model | .949/.831 | .094 (.030- .166) | .044 |

*3.2 Reliability analysis*

The reliability analysis calculated for the 20 items in Mini-IPIP was .56 which indicates moderate or acceptable reliability (Hinton, Brownlow, McMurray, & Cozens, 2004; Nunnally, 1967).

*3.3. Concurrent validity*

Concurrent validation for Mini-IPIP was done using ZKPQ as the gold standard (see Table 3). There were significant correlations between factors in the Mini-IPIP and the ZKPQ to at least p-value < .01 (unless indicated) except Extraversion with Impulsive-Sensation-seeking, Agreeableness with Activity, Agreeableness with Impulsive-Sensation-seeking, Agreeableness with Aggressiveness-Hostility, and Agreeableness with Neuroticism-Anxiety where there was no significant association between them.

Table 3

Correlations between Mini-IPIP and ZKPQ scales

| | | ZKPQ | | | | |
|---|---|---|---|---|---|---|
| | | Act | ImpSS | Sy | AggHost | NAnx |
| Mini-IPIP | Intellect/Imagination | .175** | -.201** | .283** | -.236** | -.314** |
| | Conscientiousness | .295** | -.308** | .428** | -.412** | -.391** |
| | Extraversion | .290** | -.075 | .423** | -.147** | -.209** |
| | Agreeableness | .125 | -.054 | .210** | -.118 | -.085 |
| | Neuroticism | -.150* | .174** | -.292** | .215** | .332** |

* $p < 0.05$
** $p < 0.01$

## 4. Discussion

There is an increasing need to use a shorter form of the Five Factor Model of personality measure to limit many physical constraints associated with using longer personality measures such as respondents' fatigability and frustration, time constraints, and error in answering the questions which can all lead to measurement error (Romero et al., 2012; Renau et al., 2013). The purpose of this research is to validate a short personality questionnaire commonly used for those researchers who are willing to tolerate lower level of validity and reliability compared to their parent measures. The validation of Mini-IPIP in this study is timely in view that short personality questionnaires are needed in this country for personality assessment in the busy clinical setting for patient groups with problematic cases such as substance abuse so that more comprehensive and effective interventions can be planned and executed for them.

Our initial 5-factor CFA model of Mini-IPIP showed very poor model fit which could be due to "item cross-loadings, item residual correlations, or minor factors" (Baldasaro et al., 2013, p. 81). We did some alterations to the model with the hope to improve the model fit as "creative model re-specification" was needed in previous studies who had attained poor CFA model fit for the Big Five confirmatory analysis (Laverdière et al., 2013, p. 739). The model fit improved a lot albeit still poor after items with poor loading were removed and items with correlated uniqueness added into the model. The same strategies were applied to the 2- and 3-factor models as well but their model fits were not good either. Our final effort involved retaining all the items in each factor in view that each item in the Mini-IPIP was carefully selected from its parent measure to minimize inter-factorial correlations and cross-loadings to give a sharper factor structure (Laverdière et al., 2013). Removing any of them would further compromise the measure as it would be difficult to cover for the facets in the personality factor.

Concurrent application of the strategies of item parcelling and correlated uniqueness to our final model had resulted in a good and stable model fit. Several studies which analysed the factor structure of the 50-item IPIP-FFM using CFA had shown poor model fit initially but its fit became good after the strategy of item parcelling was applied (Guenole & Chernyshenko, 2005; Lim & Ployhart, 2006). On the downside, item parcelling limits our interpretation for each of the item in the structure we study (Cooper et al., 2010). From the practical viewpoint, however, item parcelling allows the items in a factor to work as a group rather than as separate entities when measuring a personality dimension is concerned. This study also pointed out that for Mini-IPIP, cross-loadings do occur looking at the improvement of factor structure upon applying the strategy of correlated uniqueness.

Using CFA to measure a model fit is sometimes argued to be too restrictive due to the potential occurrence of cross-loadings (Baldasaro et al., 2013). The developers for Mini-IPIP (Donellan et al., 2006) also believed that it is unlikely to get a reasonable fit with CFA model for most Big Five inventories due to the strong relationship between the items in at least two factors. Cooper and colleagues (2010) in their studies noted that their Mini-IPIP's model fit improved after freeing items in several factors. Due to the stringent criteria applied when analysing a CFA model fit, many personality inventories failed to obtain a good model fit. Perhaps less emphasis should be placed on CFA in determining whether a model is fit or otherwise and less strict criteria should be used in CFA model fit. This may then allow the retention of items of good content without the need to remove them for the purpose of achieving the anticipated good model fit (Hopwood & Donellan, 2010).

We believe that the limitations in our current study can offset the potential improvement for Mini-IPIP. Our suggestions to further improve on this study could perhaps enhance