## Original Article

# VALIDITY AND RELIABILITY OF BIOPSYCHOSOCIAL–RELATED MEASUREMENT SCALES AMONG LOW–INCOME MALAYSIAN SMOKER

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**ABSTRACT**

**Introduction:** Tobacco is the only legal product that kills a large proportion of its consumers when used as intended by its manufacturer. The effect of nicotine as a driving substance on smoking has been established for decades. Still, very little is known on how the biopsychosocial determinants relationship affects levels of nicotine addiction in smokers, especially in the urban low-income population. The study aimed to validate measurement scales related to biopsychosocial factors that will be used in the future study to evaluate biopsychosocial components that influence nicotine addiction among urban poor smokers. **Methods:** Exploratory factor analysis (EFA) using the principal component analysis with varimax rotation and Kaiser normalization was used to assess the factor structure. Then, the confirmatory factor analysis (CFA) was conducted to assess the unidimensionality, validity, and reliability of the latent construct. **Results:** EFA showed extraction of factors according to their original scales with all factor loading and communality's values were above 0.5. During CFA, factor loading less than 0.6 was deleted. Convergent validity verified by computing the Average Variance Extracted (AVE) for every construct range between 0.528 – 0.801. The Fitness Indexes achieved the required level (RMSEA=0.05, CFI=0.937, Chisq/df=1.7). Meanwhile, the Discriminant Validity Index range between 0.75-0.89, which is higher than the correlation coefficient value. Internal consistency assessed from Composite Reliability range between 0.714-0.965. **Conclusion:** The measurement scales are valid and reliable to assess the intended constructs among low-income male smokers in the urban area.

**Keywords:** Biopsychosocial, factor analysis, reliability, smoking, validity.

## Introduction

Tobacco is the only legal product that kills a large proportion of its consumers when used as intended by its manufacturer (WHO, 2013). The World Health Organization (WHO) has estimated that around 6 million people die from tobacco use each year. The number of tobacco-related direct and indirect death is projected to increase to 8 million by 2030 if no strong tobacco control measures are put in place (WHO, 2015). The most commonly used form of tobacco is cigarette smoking (Eriksen, Mackay, Schluger, Islami, & Drope, 2015; WHO, 2020). Currently, around 80% of smokers worldwide live in low- and middle-income countries, and in most countries, tobacco use is more concentrated in the low-income population (US National Cancer Institute & WHO, 2016).

In Malaysia, 40.5% of men age 15 years and above were smokers compared to only 1.2% smokers among women (Institute for Public Health, 2020) which warrants specific and targeted intervention among male smokers. More than half of the low-income group in Malaysia which is also known as category B40 reside in the urban area, living in high-density housing and facing multiple issues including non-conducive living conditions and rising cost of living (Economic Planning Unit, 2017). They are said to be vulnerable to economic shock as the majority of them depended on a single source of income and encounter various health challenges related to non-communicable diseases which smoking becomes one of the important risk factors. The urbanization factor, migration of low-income groups from rural to urban areas, the influx of foreign workers, and the rising costs of living have contributed to the increase of urban poor in Malaysia (Zainal, Kaur, Ahmad, & Khalili, 2012).

The effect of nicotine as a driving substance on smoking has been established for decades (American Psychiatric Association, 1996; Royal College of Physicians, 2000; WHO, 2001). Nicotine which is as addictive as heroin and cocaine acts as a central nervous system stimulant to give a perceived calming effect that may be what nicotine users find reinforcing (Handa, Kour, & Khurana, 2017; Maisto, Galizio, & Connors, 2014). Behavioral components influenced by psychological and socio-environment factors also contribute to the progression and maintenance of an addiction. The available evidence suggests that interaction between biological, psychological, and social factors is the core principle of the biopsychosocial model of addiction (Pfeffer, Wigginton, Gartner, & Morphett, 2017). Therefore, this study aims to validate measurement scales related to biopsychosocial factors that will be used in future research to evaluate biopsychosocial components that influence nicotine addiction among urban poor male smokers.

## Methods

*Study design and participant*

This study was a cross-sectional study design. A purposive sample of hard-to-reach cigarette smokers from the low-income neighborhood was recruited through street outreach and word of mouth from an impoverished neighborhood in one of the randomly selected public housing areas in Kuala Lumpur. The participant must be 1) male, 2) age 18 years old and above, 3) current smoker, 4) B40 group category

as defined for low-income population in Malaysia, and 5) could communicate, read and write in the Malay language independently.

The sample size for factor analysis was calculated based on Gorsuch (1988) who suggested a minimum of 50 observations or the total number of items in the measurement scale is multiplied by five, and the resulting number gives the required sample for the study (Gorsuch, 1988). For reliability testing, Cronbach's alpha formula was used to calculate the sample size (Bonett, 2002). The higher value of the two calculations was taken as the final sample size. The current study required a minimum of 60 sample sizes for factor analysis while for reliability testing, the calculated sample size was 52. Therefore, we recruited 60 participants in the study.

*Measurement Scales*

There are five sets of measurement scales that underwent validation. First, Neighbourhood-level Cohesion and Disorder Scale (NCDS) was developed by Cagney et al. (Cagney et al., 2009) to assess the neighborhood condition. The NCDS is an 8-item scale measuring two dimensions of neighborhood context i) social trust and ii) sign of physical neglect in the neighborhood environment. The items were measures on a 7-point Likert-type scale from 1 'very strongly disagree' to 7 'very strongly agree'. The higher the score indicates higher social cohesion and physical environment care. Second, workplace stress was measured using the Workplace Stress Survey (WSS) (The American Institute of Stress, 2018) developed by The American Institute of Stress as a simple screening measure to identify stressful experiences at the workplace. The WSS has 10-item using a 10-point Likert-type scale from 1 'strongly disagree' to 10 'strongly agree'. Third, financial wellness was measured using Financial Well-Being Scale (FWS) developed by Prawitz et al. (Prawitz et al., 2006). FWS is a brief scale that consists of only eight items measured on a 10-point Likert-type scale arrange as a continuum extending from negative to a positive feeling. Fourth, the perceived stress of the respondents was measured using Perceived Stress Scale 10 (PSS-10), which was adopted from Sheldon Cohen (Cohen, 1988). The PSS-10 assesses perceived stressful experiences or stress response over the previous month using a 5-point Likert-type scale from 0 'never' to 4 'very often'. Individual's scores on the PSS-10 can range from 0 to 40 with higher scores indicating higher perceived stress. Lastly, the work and family balance was measured using the Work-Family Conflict Questionnaire (WFCQ) measurement scale developed by Kelloway et al. (Kelloway, Gottlieb, & Barham, 1999). The original measurement scale consisted of 22-items with a Likert-type answer range from 1 'strongly disagree to 5 'strongly agree'. The measurement scale covers four dimensions: time-based Work-Interfere-Family, strain-based Work-Interfere-Family, time-based Family-Interfere-Work, and strain-based Family-Interfere-Work. To shorten the measurement scale, we adapted two of four dimensions from the measurement scale i.e. strain-based Work-Interfere-Family and strain-based Family-Interfere-Work, which consisted of 12-items.

*Translation process*

Neighborhood-level Cohesion and Disorder Scale (NCDS) and Workplace Stress Survey (WSS) were the only measurement scales that went through the translation process. The English version of the NCDS and WSS was translated into Malay by a postgraduate student who possesses a strong command of English and the Malay language. Then the Malay version was back-translated into the English language by another postgraduate student who does not know the original scale to ensure face validity of the scale. The English back-translated version was compared to the original English version to identify problematic words or phrases. The Malay translated version was read through and checked thoroughly to ensure proper use of words and grammar. These processes were repeated until a final version of the Malay translated version of the Neighbourhood-level Cohesion and Disorder Scale (NCDS-M), and the Malay translated version of Workplace Stress Survey (WSS-M) were derived. The Malay language version of the Financial Well-Being Scale (Kamaluddin et al., 2018), Perceived Stress Scale 10 (Al-Dubai, Alshagga, Rampal, & Sulaiman, 2012) and Work-Family Conflict Questionnaire (Sanaz, Syaqirah, & Khadijah, 2014) were adopted from the existing Malay translated measurement scales

*Data Collection*

The data was collected at a public housing area situated in Kuala Lumpur, Malaysia. The selected participants were informed of the objectives of the current study and relevant information. Written consent was obtained from the participants prior to questionnaire distribution once they agreed to participate. Each participant was given a set of Malay-translated versions of each measurement scale with the sociodemographic section. The average time taken to complete all measurement scales was 10 minutes.

*Analysis*

The data were analyzed using IBM SPSS Statistic version 22 with AMOS Graphic for descriptive statistics, factor, and reliability analyses. The socio-demographic variable of the participants was summarized using descriptive statistics while the preliminary analysis such as Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (≥0.5), and Bartlett's test of sphericity ($p<0.05$) was observed for sample adequacy and appropriateness for factor analysis (Williams, Onsman, & Brown, 2010). Subsequently, exploratory factor analysis (EFA) was conducted. Principal component analysis (PCA) using the rotational method of varimax rotation with Kaiser normalization was used to assess the factor structure. The item with factor loading values >0.50 was considered as indicators of significant factorial contribution (Comrey & Lee, 2013; Hair, Black, Babin, Anderson, & Tatham, 1998).

Then, the confirmatory factor analysis (CFA) was conducted to assess the unidimensionality, validity, and reliability of the latent construct. The CFA processes were done by combining all constructs known as pooled-CFA, and the CFA procedure was executed at once. The CFA for pooled measurement tools is more efficient and highly suggested (Awang, 2015). The CFA test whether the measures of a construct are consistent with the researcher's understanding of the nature of that construct. The CFA

assess the uni-dimensionality, three types of validity (namely convergent, discriminant and construct validity), and reliability of the latent construct (Afthanorhan, Awang, Salleh, Ghazali, & Rashid, 2018; Asnawi, Awang, Afthanorhan, Mohamad, & Karim, 2019; Awang, 2015; Awang, Hui, & Zainudin, 2018).

Uni-dimensionality is achieved when all measuring items have acceptable factor loading of 0.6 or higher for the respective latent construct. Any item with a low factor loading was deleted. The deletion process was made one item at a time with the lowest factor loading item were deleted first.

The three types of validity assessed during CFA are i) Convergent validity, ii) Discriminant validity, and iii) Construct validity (A. Mahfouz, Awang, Muda, & Suriawaty Bahkia, 2020; Aziz, Afthanorhan, & Awang, 2016; Raza & Awang, 2020; Yusof, Awang, Jusoff, & Ibrahim, 2017). Convergent validity is verified by computing Average Variance Extracted (AVE) for every construct. The value of AVE of 0.5 or higher indicates that this validity is achieved (Awang, 2015; Awang et al., 2018). Ensuring discriminant validity indicates that the measurement model of a construct is free from redundant items and multicollinearity problems. A redundant construct occurs when any pair of constructs in the model are highly correlated. The items redundancy in the model were identified through a discrepancy measure called Modification Indices (MI) (>15) and correlation value between exogenous constructs exceeding 0.85 (Awang, 2015; Awang et al., 2018). The Discriminant Validity Index was also developed to determine the discriminant validity. Construct validity in CFA is achieved when the Fitness Indexes for a measurement model reached the required level in all three model fit categories namely absolute fit (Root Mean Square of Error Approximation (RMSEA) <0.08) (Browne & Cudeck, 1993), incremental fit (Comparative Fit Index (CFI) > 0.9) (Bentler, 1990), and parsimonious fit (Chisq/df <3.0) (Marsh & Hocevar, 1985).

Apart from the validity assessment, the reliability of the constructs was also measured during CFA. The evaluation for reliability for the measurement model was made using Composite Reliability (CR) calculated using the formula $CR = (\sum K)^2 / [(\sum K)^2 + (\sum 1\text{-}K^2)]$ where K is factor loading of every item (Awang, 2015). A value of CR ≥ 0.6 is required in order to achieve composite reliability for the construct.

*Ethics Approval*

The study had successfully obtained ethical approval from the Research Ethics Committee of University Kebangsaan Malaysia (Reference Number: UKM PPI/111/8/JEP-2018-671) and registered under the National Medical Research Register (Reference Number: NMRR-18-2318-44070).

**Results**

*Sociodemographic characteristic*

The normality assessment is made by assessing the measure of skewness for every item. The absolute value of skewness was within the range between -1.0 to 1.0 which indicates normally distributed data (Awang, 2015; Awang et al., 2018). Table 1 illustrates the sociodemographic characteristic of the 60 male smokers who participated in the validation study. The mean age of the respondents was 33.80

years old (SD = 10.10). The majority of the respondents were Malay (83.3%), married (55.0%), attained high school education (46.7%), work as a private employee (75.0%), and had mean household monthly income RM 2402.32 (SD = 877.37). The mean year of living in the neighborhood was 10.42 years (SD = 6.97).

**Table 1 Socio-demographic characteristic of the participants**

| Variable | | N (%) | Mean (SD) |
|---|---|---|---|
| **Age (years)** | | | 33.8 (10.10) |
| **Ethnicity** | | | |
| | Malay | 50 (83.3) | |
| | Chinese | 4 (6.7) | |
| | Indian | 6 (10.0) | |
| **Marital Status** | | | |
| | Married | 33 (55.0) | |
| | Single | 22 (36.7) | |
| | Divorced | 5 (8.3) | |
| **Education Level** | | | |
| | Bachelor's degree/ Degree/ PhD | 3 (5.0) | |
| | STPM/ Certificate/ Diploma | 28 (46.7) | |
| | PMR/ SPM | 24 (40.0) | |
| | UPSR | 5 (8.4) | |
| **Working Sector** | | | |
| | Government employee | 15 (25.0) | |
| | Private employee | 45 (75.0) | |
| **Household income (RM)** | | | 2402.32 (877.37) |
| **Duration living in the neighborhood (years)** | | | 10.42 (6.97) |

*Exploratory Factor Analysis (EFA)*

Based on Table.2, the Kaiser-Meyer-Olkin value of the study range between 0.761 to 0.918 (>0.5), which indicates the adequacy of the sample, while all Bartlett's Test of Sphericity was significant ($p<0.001$), suggesting that the items were appropriate for factor analysis. The exploratory factor analysis using the principal component analysis with varimax rotation of the item on each scales result in extraction of one factor (76.4% variance) for Financial Well-being Scale, two factors (69.7% variance) for Perceived Stress Scale-10, two factors (70.7% variance) for Neighbourhood-level Cohesion and Disorder Scale, one factor (75.6% variance) for Workplace Stress Survey, and two factors (68.0% variance) for Work-Family Conflict. All the factor loading values were above 0.5. Table 3 shows communalities values in each measurement scale. All the communality's values were above 0.5.

**Table 2. Factor loading of each measurement scale used in the study.**

| Scale | FWS | PSS10 | | NCDS | | WSS | WFC | |
|---|---|---|---|---|---|---|---|---|
| Item | Fac 1 | Fac 1 | Fac 2 | Fac 1 | Fac 2 | Fac 1 | Fac 1 | Fac 2 |
| H3 | 0.939 | | | | | | | |
| H7 | 0.901 | | | | | | | |
| H2 | 0.894 | | | | | | | |
| H8 | 0.888 | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **H1** | 0.886 | | | | | | | |
| **H4** | 0.878 | | | | | | | |
| **H6** | 0.842 | | | | | | | |
| **H5** | 0.755 | | | | | | | |
| **J3** | | 0.869 | | | | | | |
| **J1** | | 0.793 | | | | | | |
| **J2** | | 0.740 | | | | | | |
| **J9** | | 0.654 | | | | | | |
| **J6** | | 0.653 | | | | | | |
| **J10** | | 0.597 | | | | | | |
| **J4r** | | | 0.826 | | | | | |
| **J5r** | | | 0.822 | | | | | |
| **J7r** | | | 0.755 | | | | | |
| **J8r** | | | 0.738 | | | | | |
| **K7** | | | | 0.851 | | | | |
| **K3** | | | | 0.839 | | | | |
| **K1** | | | | 0.813 | | | | |
| **K5** | | | | 0.799 | | | | |
| **K4** | | | | | 0.922 | | | |
| **K6** | | | | | 0.812 | | | |
| **K8** | | | | | 0.775 | | | |
| **K2** | | | | | 0.736 | | | |
| **M1** | | | | | | 0.908 | | |
| **M4** | | | | | | 0.899 | | |
| **M3** | | | | | | 0.896 | | |
| **M6** | | | | | | 0.894 | | |
| **M2** | | | | | | 0.893 | | |
| **M5** | | | | | | 0.877 | | |
| **M9** | | | | | | 0.863 | | |
| **M10** | | | | | | 0.845 | | |
| **M8** | | | | | | 0.821 | | |
| **M7** | | | | | | 0.789 | | |
| **N11** | | | | | | | 0.869 | |
| **N12** | | | | | | | 0.863 | |
| **N8** | | | | | | | 0.855 | |
| **N9** | | | | | | | 0.840 | |
| **N10** | | | | | | | 0.780 | |
| **N7** | | | | | | | 0.603 | |
| **N1** | | | | | | | | 0.820 |
| **N3** | | | | | | | | 0.796 |
| **N4** | | | | | | | | 0.777 |
| **N2** | | | | | | | | 0.711 |
| **N6** | | | | | | | | 0.623 |
| **N5** | | | | | | | | 0.540 |
| **Variance (%)** | 76.4 | 58.8 | 10.9 | 49.8 | 20.9 | 75.6 | 54.8 | 13.2 |
| **KMO-MSA** | 0.918 | 0.888 | | 0.778 | | 0.761 | 0.833 | |
| **Bartlett's Test $X^2$(df)** | $X^2(28)$ =480.5 | $X^2(45)$ =371.2 | | $X^2(28)$ = 249.4 | | $X^2(45)$ =783.8 | $X^2(66)$ =516.8 | |
| **p-value** | <0.001 | <0.001 | | <0.001 | | <0.001 | <0.001 | |

Note: : Fac: Factor, FWS: Financial Well-being Scale, PSS-10: Perceived Stress Scale 10, NCDS: Neighbourhood-level Cohesion and Disorder Scale, WSS: Workplace Stress Survey, WFC: Work-Family Conflict, KMO-MSA: Kaiser-Meyer-Olkin Measure of Sampling Adequacy

**Table 3 Communalities value for each item in measurement scale**

| Item | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **FWS** | .651 | .735 | .793 | .682 | .540 | .629 | .663 | .760 | | | | |
| **NCDS** | .595 | .640 | .667 | .646 | .702 | .705 | .687 | .593 | | | | |
| **PSS** | .566 | .653 | .712 | .748 | .770 | .610 | .763 | .708 | .634 | .662 | | |
| **WSS** | .728 | .796 | .729 | .819 | .783 | .864 | .768 | .810 | .742 | .794 | | |
| **WFC** | .740 | .703 | .661 | .629 | .670 | .590 | .648 | .740 | .775 | .699 | .766 | .778 |

Note: FWS: Financial Well-being Scale, PSS-10: Perceived Stress Scale 10, NCDS: Neighbourhood-level Cohesion and Disorder Scale, WSS: Workplace Stress Survey, WFC: Work-Family Conflict

*Confirmatory Factor Analysis (CFA)*

a. *Uni-dimensionality*

   Pooled-CFA analysis (Figure 1) showed that item M1, and M3 for Workplace Stress construct and item J4, J5, J7, and J8 for Perceived Stress constructs were deleted for having factor loading less than 0.6. Otherwise, other items show satisfactory factor loading.

b. *Convergent validity*

   The Average Variance extracted (AVE) for all the constructs was computed and presented in Table 4. The results showed that all constructs had an AVE value of at least 0.5. Thus, the convergent validity for the measurement model is achieved.

c. *Discriminant validity*

   The redundant pairs (e6 & e7, e9 & e10, e40 & e26, e45 & e46, e15 & e16) were constraint as 'free parameter estimate' to overcome the high Modification Indices (MI) while correlation values between exogenous constructs does not exceeding 0.85 as shown in Figure 1. Besides, the discriminant validity for all construct is achieved when the Discriminant Validity Index (value in its diagonal) is higher than the correlation coefficient value (value in its row and column) between the pair of the respective construct as shown in Table 5.

d. *Construct validity*

   The Fitness Indexes for the measurement model achieved the required level in all three model fit categories. The Absolute Fit category namely Root Mean Square Error of Approximation (RMSEA) is 0.05 (achieved the threshold of less than 0.08), the Incremental Fit category namely comparative fit index (CFI) is 0.937 (achieved the threshold of greater than 0.90), and the Parsimonious Fit category, namely the ratio of Chisq/df is 1.70 (achieved the threshold of less than 3.0) are as shown in Figure 1.

**Table 4. Internal consistency for each construct**

| Construct | Composite Reliability (CR) | Average Variance Extracted (AVE) |
|---|---|---|
| **Work-Family Conflict** | 0.890 | 0.801 |
| **Work-Family strain** | 0.897 | 0.592 |
| **Family-Work strain** | 0.929 | 0.684 |
| **Neighbor** | 0.714 | 0.556 |
| **Social Cohesion** | 0.829 | 0.549 |
| **Physical Disorder** | 0.817 | 0.528 |
| **Workplace Stress** | 0.965 | 0.773 |
| **Perceived Stress** | 0.882 | 0.556 |
| **Financial Stress** | 0.931 | 0.630 |

**Table 5 The Discriminant Validity Index for the latent construct**

| Construct | Work-Family Conflict | Neighbour | Workplace Stress | Perceived Stress | Financial Wellness |
|---|---|---|---|---|---|
| **Work-Family Conflict** | **0.89** | | | | |
| **Neighbor** | -0.33 | **0.76** | | | |
| **Workplace Stress** | 0.54 | -0.18 | **0.88** | | |
| **Perceived Stress** | 0.65 | -0.61 | 0.26 | **0.75** | |
| **Financial Stress** | -0.45 | 0.37 | -0.19 | -0.61 | **0.79** |

Note: The Discriminant Validity Index value in bold

*Internal Consistency*

Based on Table 4, all the constructs had achieved the minimum requirement (CR ≥ 0.6) for their reliability.

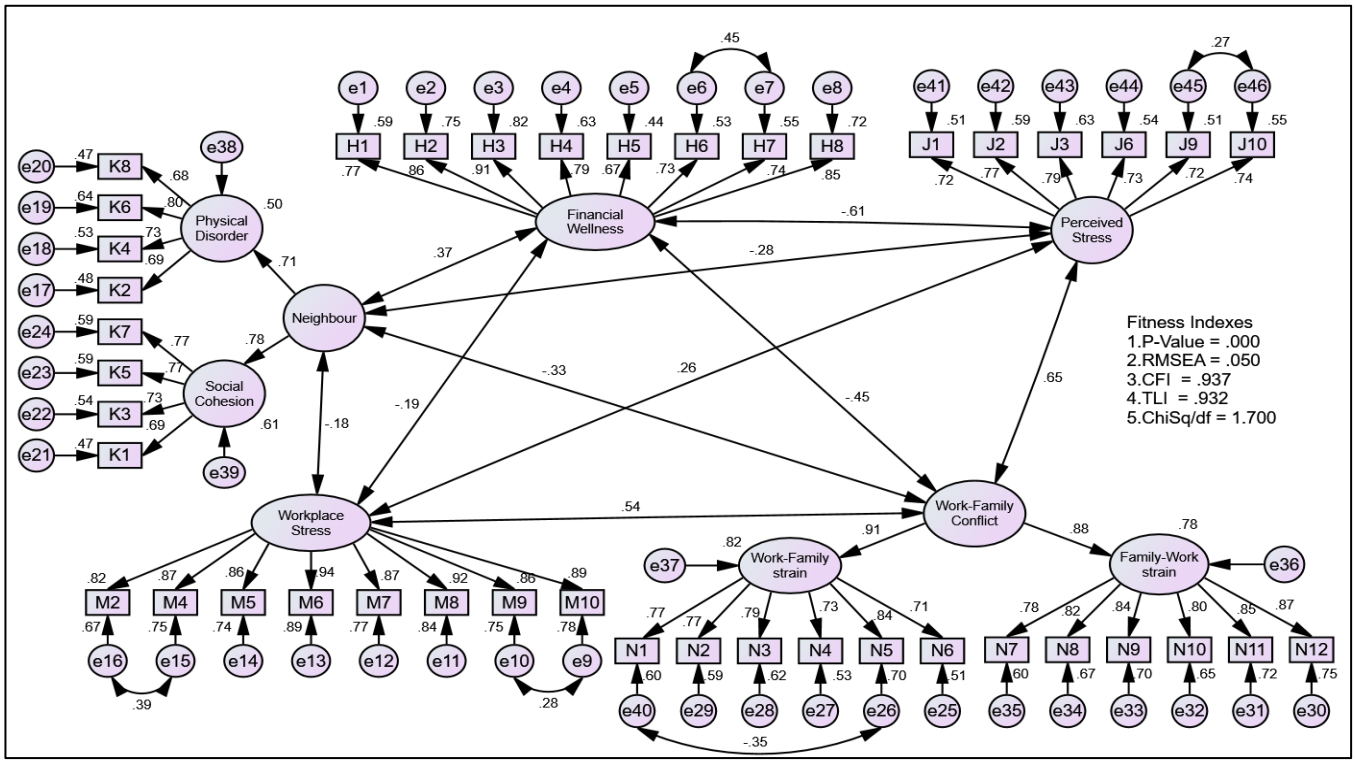


**Figure 1: Pooled confirmatory factor analysis**

## DISCUSSION

Despite using a purposive sampling technique to get hard-to-reach male cigarette smokers respondents from a low-income population, it is still able to provide reliable and robust data even tested against random probability sampling (Campbell, 1955; Karmel & Jain, 1987; Tongco, 2007; Topp, Barker, & Degenhardt, 2004). These demographic epidemiological findings are similar to a study by Abd Rashid et al. who enrolled their participant from a home-to-home survey using a universal sampling method in two public housing areas in Kuala Lumpur (Abd Rashid et al., 2019).

Each of the measurement scales was tested for their validity and reliability in exploratory factor analysis before proceeds with confirmatory factor analysis. Prior to conducting the validity test, three components that need to be assessed to determine the appropriateness of the data for factor analysis including sample size, factorability of the correlation matrix, and the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy or Barlett's Test of Sphericity (BTS).

Regarding sample size, MacCallum et al (1999) suggested that the number of sample sizes should be at least five times the number of variables for factor analysis. Since the highest number of items in the measurement scales that we used was 10, thus we enrolled a total of 60 participants involved in this validation study. Meanwhile, the KMO value of the study for each measurement scale was more than 0.6 (range between 0.761 to 0.918), and all the BTS was significant ($p<0.001$). According to Hair et al (2010), Tabachnick & Fidell (2007), and Pallant (2007), to determine sampling adequacy and factorability of the correlation matrix, they suggested that the KMO value must be greater than 0.6 and

the BTS must be significant at $p<0.05$ (Hair, Black, & Babin, 2010; Pallant, 2000; Tabachnick & Fidell, 2007). In essence; the KMO test and BTS determine whether the sampling was adequate to proceed with factor analysis. Thus, based on these findings, our sampling was sufficient and appropriate for factor analysis.

During exploratory factor analysis using principal component analysis with varimax rotation of the items, each scale results in the extraction of factors similar to the original version of measurement scales. In assessing the factor loading, the recommendation of factor loading cut-off point is different based on sample size and significant level (Guadagnoli & Velicer, 1988; Stevens, 2012). As a general rule, Peter Samuels (2017) suggested that factor loading less than 0.3 should be suppressed while the retained factors should have at least three items with factor loading greater than 0.4 (Samuels, 2017). The current study finding showed that factor loading in each scale was above 0.5, indicating statistically meaningful to retain the factors.

Communalities is the estimated proportion of an item's unique variance to its shared variance in the matrix (Samuels, 2017). Since dimension reduction techniques were to identify items with a shared variance and explain the variance through the common factors, it is suggested that a communality score less than 0.2 (Child, 2006) should be eliminated from the analysis. Thus, we retained all our items in each measurement scale as the communality's values were above 0.5.

Since all factors were valid during EFA, we proceed with our analysis with CFA without eliminating any factors and items in EFA to evaluate whether the chosen factors and items are significant. We combined all measurement scales to form pooled-CFA so that the CFA procedure was executed at once and more efficiently (Awang, 2015). During the uni-dimensional assessment, we deleted some of the items since they had a factor loading less than 0.6 as suggested (Awang, 2015). The minimum requirement for the measurement validity, including convergent validity, construct validity, and discriminant validity was achieved.

In the assessment of reliability, it is adequate for the study to assess the Composite Reliability (CR) since it replaced the traditional method of computing the Cronbach Alpha for analysis using structural equation modeling (SEM) (Awang, 2015; Awang et al., 2018). All the constructs were considered reliable since the CR value ≥ 0.6 (Awang, 2015). All composite reliability values for each measurement scale that measure reliability assessment were above 0.7, which indicates good internal consistency.

**Conclusion**

The finding of this study suggested that the Malay translated version of Neighbourhood-level Cohesion and Disorder Scale (NCDS), Workplace Stress Survey (WSS), Financial Well-Being Scale (FWS), Perceived Stress Scale 10, and Work-Family Conflict Questionnaire (WFCQ) are valid and reliable measurement scales to be used among Malaysian low-income male smokers in the urban area.

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**Conflicts of Interest:**

The authors declare no conflicts of interest.

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