VALIDATION OF THE MALAY VERSION OF AFFILIATE STIGMA SCALE AMONG CAREGIVERS OF PATIENTS WITH MENTAL ILLNESS IN HOSPITAL UNIVERSITI SAINS MALAYSIA

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ABSTRAK

KAJIAN VALIDASI SKALA STIGMA *AFFILIATE* VERSI BAHASA MELAYU (ASS-M) DALAM KALANGAN PENJAGA BAGI PESAKIT MENTAL DI MALAYSIA

Latar belakang: Penjaga bagi pesakit mental terdedah kepada stigma. Proses internalisasi stigma dalam kalangan penjaga bagi pesakit mental ini dikenali sebagai stigma *affiliate*. Skala *Affiliate* Stigma berbeza berbanding skala lain yang diguna kerana ia mengukur tindak balas internalisasi terhadap stigma di kalangan penjaga bagi pesakit mental. Walau bagaimanapun, terdapat kekurangan bukti mengenai kajian pengesahan yang lengkap berkaitan skala ini di Malaysia. Maka, objektif kajian ini adalah untuk mengesahkan skala *Affiliate* Stigma versi Bahasa Melayu.

Metodologi: Kajian ini merupakan kajian keratan rentas yang dijalankan antara Mei hingga Disember 2017. Kajian ini melibatkan seramai 372 penjaga bagi pesakit mental di klinik pakar psikiatri hospital Universiti Sains Malaysia. Proses penterjemahan, kesahan muka dan kandungan telah dijalankan oleh sekumpulan pakar, diikuti dengan kajian awalan. Versi terakhir soalan kemudiannya digunakan untuk kajian pengesahan. Analisa data merangkumi penilaian pengesahan konstruk dengan menggunakan analisa faktor pengesahan dan penerokaan serta kebolehpercayaan komposit.

Keputusan: Model ASS-M terakhir mempunyai empat faktor dengan 21 soalan, berbanding model asal iaitu tiga faktor dengan 22 soalan. Hasil kajian mendapati model ini mempunyai kesesuaian model pengukuran yang baik berdasarkan RMSEA (0.065)

dan SRMR (0.055) dan nilai kebolehpercayaan komposit yang memuaskan (Emosi= 0.827, Kognitif = 0.857, Tingkah laku = 0.764, Harga diri = 0.861).

Kesimpulan: Kajian ini menunjukkan bahawa modul Skala Affiliate Stigma versi Melayu (ASS-M) dengan empat faktor dan 21 soalan mempunyai asas psikometri yang baik. Ia adalah sah dan boleh diguna untuk mengukur tahap stigma *affiliate* di kalangan penjaga bagi pesakit mental di Malaysia.

ABSTRACT

VALIDATION OF THE MALAY VERSION OF AFFILIATE STIGMA SCALE AMONG CAREGIVERS OF PATIENT WITH MENTAL ILLNESS IN MALAYSIA

Background: Caregivers of a patient with mental illness are exposed to stigma. The internalization of this self-stigma among caregivers is known as affiliate stigma. Affiliate Stigma Scale was different compared to other tools used to measure the stigma among caregivers as it measures the internalization response related to the perceived stigma from surrounding. Nevertheless, there is lack of information on the psychometric properties of this tool used in the Malaysia context. The objective of this study was to validate the Malay version of Affiliate Stigma Scale.

Methods: A cross-sectional study, involving 372 caregivers of a patient with mental illness, was conducted from May to December 2017, at psychiatry clinic hospital USM. ASS was first translated into Malay language using standard forward and backward translation procedures by a group of experts. Participants then completed the ASS-Malay (ASS-M). The data analyses involve assessment of construct validity by exploratory factor analysis, confirmatory factor analysis and construct reliability.

Results: Our final model of ASS-Malay (ASS-M) consists of four factors with 21 items, as compared to original version with three factors with 22 items. Our finding showed the final model has good model fit based on RMSEA (0.065) and SRMR (0.055) and

satisfactory composite reliability (Affective = 0.827, Cognitive = 0.857, Behaviour = 0.764, Self-Esteem = 0.861).

Conclusion: The study showed that the four-factor model with 21 items of the Malay version of ASS has good psychometric properties. The scale is valid and reliable to measure affiliate stigma among caregivers of a patient with mental illness in Malaysia.

1. INTRODUCTION

The number of cases of mental illness is increasing worldwide. World Health Organization estimated worldwide about 21 million people are diagnosed with schizophrenia, about 350 million people have a unipolar depressive disorder and 60 million of people have a bipolar affective disorder (1). According to the National Health and Morbidity Survey 2015, the prevalence of psychiatric illness in Malaysia increased from a mere 10% to 30% in the last decade (2). Despite more campaign about awareness of mental illness were organized, stigma is still a major challenge faced by the patient with mental illness and their family. Patients and family members experienced a great variety of stigma and discrimination in all areas of life, including health care.

Affiliate stigma is the internalization of these negative experiences by the family members of the stigmatized person (3). It indirectly covers both aspects of the caregiver's self-stigma and the subsequent psychological responses of the associates. Less is known about the internalization of the stigma by the caregivers and how it affects their cognition, affection, and behavior. Family members or caregivers of a patient with mental illness may experience negative feelings and perceive a negative influence on themselves. Affiliate stigma was positively associated with caregiving stress and subjective burden of the caregivers (3), low quality of life (4), social identity and social isolation among family caregivers of psychiatric patients (5), caregivers' depressive symptoms (6) and self-esteem (7). Importantly caregivers' internalized stigma can negatively influence the patients' treatment and rehabilitation process.

One of the most widely used self-report instruments for the assessment of affiliate stigma is the Affiliate Stigma Scale (ASS). The ASS was developed by Mak and Cheung in 2008 to investigate the affiliate stigma among caregivers of a patient with mental illness and intellectual disability (3). ASS contains 22 items and 3 components (cognition, affective, behavior). It has been translated and validated in different studies into many different languages including English and Chinese (3), Urdu (5), Hebrew (8), Hindi (9), Persian (10) and Amharic (11). The affiliate self-scale achieved excellent internal consistencies for caregivers of a patient with mental illness (Cronbach's α=0.94). The item-total correlations of the 22 items were quite high, ranging from 0.38 to 0.75 with factor loadings ranged between 0.51 and 0.81.

Nevertheless, there is lack of evidence on proper validation of this instruments used in the Malaysian context. It is therefore of utmost importance to have a locally accepted version of ASS to measure affiliate stigma among caregivers of a patient with mental illness in Malaysia. Finding from this study would support the importance of valid and reliable screening tool for the use in future.

This dissertation was arranged according to the manuscript-ready format as outlined by Institute of Postgraduate Studies (IPS) office, School of Medical Sciences (12). This dissertation and manuscript presented in this dissertation focused on the assessment of validity and reliability of Malay version of ASS using exploratory and confirmatory factor analysis.

2. LITERATURE REVIEW

2.1 Affiliate stigma and associated factors

The concept of stigma started fifty years ago by Goffman (7) had been studied vastly and currently, it consists various conceptualization which includes public stigma, self-stigma, and stigma by association (13). Since deinstitutionalization was introduced in 1969, caregivers gradually became the main person to care for patient with mental illness (14). In developing countries, more than 60% of mentally ill patients live with their primary caregiver (15-16). This leads to caregivers need to face more stigma as mentally ill patients often thought associated with violence and dangerous (17). This fact supported by studies showed high numbers of caregivers experienced stigma (18-19). Affiliate stigma was the social and psychological impact of the internalization process by caregivers being connected to patient with mental illness (3).

Affiliate stigma is the internalization of negative experiences by the family members of the stigmatized person (3). As similar to the conceptualization of self-stigma, Mak and Cheung suggested that affiliate stigma consists of three closely related components: cognition, affect and behavioral responses. Due to the association with people with mental illness, caregivers can be affected by the public stigma that prevails in the society. As a result, they may experience negative feelings and perceive a negative influence on themselves. The negative influence caused the caregivers to react behaviourally in a negative way.

The affiliate stigma of caregivers was influenced by the diagnosis of the patient as studies showed caregivers of a family member with schizophrenia had a higher level of affiliate stigma

than those of bipolar disorder and major depressive disorder (20-21). Other factors were a shorter duration of being in the caregiver role, younger and female caregivers (22).

Perceived supernatural as one of the causes of mental illness was the only factor associated significantly with caregiver's self-stigma in Ethiopia study (23). Meanwhile, Chinese people believed biological roots, bad thoughts and lack of willpower were the causes of mental illness in their family member (24-25). This cultural belief leads to Chinese caregivers internalized the stigmatization which resulted in affiliate stigma (3). A study in Taiwan also showed caregivers' perception of illness such as disease chronicity (timeline), a disease in control (control), and disease treatability (consequence) significantly associated with negative emotions (26). In addition, caregiver burden and personal psychiatry illness are potential predictors of affiliate stigma (20,27).

Affiliate stigma correlated negatively with the type of relationship between caregivers and patient with mental illness. Caregivers closely related to patient perceived lesser stigma and developed lesser psychological distress (28-29).

2.2 Impact of affiliate stigma

Caregivers unable to get proper help, being avoided by the public and being separated from others at the community level (30). In response to it, caregivers developed affiliate stigma which had implications on their cognitive, affective and behavioral aspects (3).

Affiliate stigma was positively associated with caregiving distress (31), caregivers' depressive symptoms (6,32), lower self-esteem (33), feelings of shame, guilt and worry (34) and higher psychological morbidity (21). This negative emotion and cognitive impact led to low quality of life (4) and social isolation among family caregivers of psychiatric patients (5,35). Avoidance by peers also led to poor relationship quality among peers (35).

Corrigan & Watson (36) described self-stigma and fear of rejection by others caused the victim isolate themselves and lost the opportunities for employment and housing. Many caregivers also tried to conceal their family member's illness (19,37) or hide their relationship with the patient (38-40) in order to avoid stigma. Caregivers also experienced physical symptoms such as insomnia, lethargy and body ache in response to stigma (39). Importantly caregivers' internalized stigma can negatively influence the patients' treatment and rehabilitation process as it accounted for 20% of delay in seeking treatment (41).

2.3 Study of stigma among caregivers of patients with mental illness in Malaysia

Many researches done in Malaysia focused on patient's stigma, however less focused on the caregiver's stigma. Up to date, there was no proper validated structured questionnaire or scale to study affiliate stigma among caregivers of patients with mental illness in Malaysia. Devaluation consumer family scale was used in one of the local studies and it assess the caregivers' belief regarding social devaluation which consist of 'community rejection", "causal attribution", and "uncaring parents' (42). The study showed 31.5% of the caregivers experienced psychological distress mostly due to community rejection. One qualitative research was done in Kelantan to study the impact of stigma in relation to caregivers life course (43).

2.4 Affiliate Stigma Scale

This scale consists of a 22 self-reported item, measured the cognitive, affective and behavioral components of affiliate stigma (3). This scale was developed by Mak & Cheung (3) to study the affiliate stigma among caregivers of people with intellectual disability or mental illness. Each item is rated on a four-point Likert scale from 1 (strongly disagree) to 4 (strongly agree); a higher mean score represents a higher level of self-stigma.

The original version showed excellent internal consistencies for caregivers of a patient with mental illness (Cronbach's α=0.94). The item-total correlations of the 22 items were quite high, ranging from 0.38 to 0.75. The factor loadings ranged between 0.51 and 0.81. Rasch analyses supported the good psychometric properties of ASS with internal consistency ranged from 0.82 to 0.93 (42).

In comparison to other tools to study the caregiver stigma (17, 44, 45), ASS focuses on the internalized response of stigma instead of the experienced stigma and it also cover broader aspects of the impact of affiliate stigma on the caregivers. In addition, ASS was firstly used in Hong Kong and had been used in many Asian studies which probably provide an advantage to identify culturally-specific stigma among Malaysian caregivers. ASS also had good psychometric properties in term of good reliability and predictive as well as construct validity.

It has been of sufficient interest to scholars worldwide to have been translated the ASS into many languages. Published translations exist in English and Chinese (3), Urdu (5), Hebrew (8), Hindi (9), Persian (10) and Amharic (11). However, there was no detail information available

regarding validation study of those translated scale. This scale has been used to measure the affiliate stigma among caregivers of people with mental illness and intellectual disability (3), caregivers of children with developmental disabilities (8) and caregivers of children with physical disabilities (45), caregivers of patient with dementia (46).

2.5 Validity and reliability assessment of a measurement tools

Validity expresses the ability of a measurement to measures what it supposes to measure. It consists of face validity, content validity, constructs validity and criterion validity (48-49). Generally, validity divided into internal and external validity. In the context of establishing or validating a questionnaire, criterion validity is used to checking the internal validity. Criterion validity is the extent to which items on a questionnaire measures the real matters or topics they are intended to measure (50), whereas external validity refers to the accuracy of the final questionnaire or measure to be generalized to external population (51). Content validity should be the priority if new questionnaire to be established. Content validity has defined the ability which items on a questionnaire reflect the variables of the construct in the measure accurately and adequately (52).

Validity evidence based on the internal structure underlies how the study construct of a questionnaire match the hypothesized construct (53). This can be done by factorial analysis which consists exploratory and confirmatory factor analysis (18). Factor analysis is defined as a multivariate statistical analysis to discover the patterns of interrelated variables of a measurement tool in a mathematical way (54).

In exploratory factor analysis (EFA), it deals with the data reduction and exploring the theoretical structure of a measurement tool. It basically determines the number of factors and examines the correlation between variables and factors of a construct (55). Bartlett test of sphericity was used to test further the whole correlation matrix in order to obtain statistical significant correlation among of the variables. Next, the Kaiser–Mayer–Olkin (KMO) measure

of sampling adequacy was utilized to measure the proportion of variance in the variables that might be caused by common variance (56).

In the process to determine the number of factors to be extracted, principal axis factoring was conducted on the 22 variables, then followed by oblique Promax rotated solution. Factors with eigenvalues greater than 1 were considered significant and extracted (57). Scree test was another test can be used to identify an optimum number of factors to be extracted based on the inflection point (57). The correlation between a variable and a factor can be identified based on factor loading. Factor loadings more than 0.3 was acceptable for minimal level for interpretation of structure and result is more than 0.7 specified a well–defined structure (57). All the variables would be arranged specifically under different extracted factors through analysis (58). When a final solution was achieved, appropriate meanings and names were assigned to the factors.

In Confirmatory Factor Analysis (CFA), the predetermined model resulted from EFA phase was assessed for its model validity. Two aspects namely factor loading and model fitness were important to determine the model validity. The standardized loadings were inspected for statistical significance and estimates of 0.40 and above. Items failing to fulfil both criterions were deleted (55). Evaluation of model fitness was then carried out using fitness indices as listed in Table 1 with the accompanying recommended cut-off values. Considered together, they offer a more consistent evaluation of the fit of the model (57).

Fit index	Cut-off points	Comments
Absolute fit index		
• SRMR (standardized root mean square residual)	< 0.08	• In situations where N < 250 and 12 < m < 30, good fit if values < 0.08 with CFI≥ 0.95 (57)
Parsimony correction fit index		
• RMSEA (root mean square error of approximation)	< 0.08	• Lower RMSEA value indicate better fit • In situations where N < 250 and 12 < m < 30, good fit if values < 0.08 with CFI≥ 0.95 (57)
Comparative fit indices		
• CFI (comparative fit index)	≥ 0.95	• In situations where N < 250 and 12 < m < 30, good fit if values ≥ 0.95 (57) • CFI values > 0.90 are indication of acceptable fit (59)
• TLI (Tucker-Lewis index)	≥ 0.95	• In situations where N < 250 and 12 < m < 30, good fit if values ≥ 0.95 (57)

Internal consistency reliability of a measurement tool is the degree to which responses are consistent across the items within a construct (60). It can be assessed by using Cronbach‟s alpha and/or Raykov's rho. Cronbach's alpha coefficient was utilized to test the internal consistency of a construct. A generally acceptable cut off value is 0.7 and above, while 0.6 is acceptable in exploratory studies (57). Raykov's rho was utilized to assess the composite reliability of a factor for a CFA model with a good fit. Composite reliability more than 0.7 is considered as acceptable (61).

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3. OBJECTIVES

3.1 General Objective

The aim of this study is to validate the Malay version of Affiliate Stigma Scale.

3.2 Specific objectives:

1. To translate the Affiliate Stigma Scale to Malay Version Affiliate Stigma Scale
2. To determine the construct validity of Malay Version Affiliate Stigma Scale using EFA
3. To determine the reliability of Malay Version of Affiliate Stigma Scale using cronbach's alpha
4. To determine the construct validity of Malay Version Affiliate Stigma Scale using CFA

4. MANUSCRIPT

4.1 Title:

Validation of the Malay Version of the Affiliate Stigma Scale among Caregivers of Patients with Mental Illness in Hospital Universiti Sains Malaysia

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Abstract

***Background*:** Caregivers of patients with mental illness are exposed to stigma. The internalisation of this stigma among caregivers is known as affiliate stigma and can be measured by the Affiliate Stigma Scale (ASS). The aim of this study was to validate the Malay version of the ASS.

***Methods*:** A cross-sectional study was performed from May to December 2017 with 372 caregivers of patients with mental illness. The ASS was first translated into Malay using standard forward and backward translation procedures. The final version of the ASS-Malay (ASS-M) was completed by participants. The data analyses involved assessment of construct validity by exploratory factor analysis, confirmatory factor analysis and construct reliability.

***Results*:** The final model of the ASS-M consists of four factors with 21 items, as compared to the original version, which has three factors with 22 items. The results showed that the final model has good model fit based on RMSEA (0.065) and SRMR (0.055) and a satisfactory composite reliability (Affective = 0.827, Cognitive = 0.857, Behaviour = 0.764, Self-Esteem = 0.861).

***Conclusion*:** The study showed that the four-factor, 21-item ASS-M model has good psychometric properties. The scale is valid and reliable for measuring affiliate stigma among caregivers of patients with mental illness in Malaysia.

Keywords: *Factor analysis, caregivers of patients with mental illness, affiliate stigma, validity*

Introduction

Stigma is defined as a set of prejudicial attitudes, negative stereotypes, discrimination and biased social structures toward a certain group of people (1). The process of stigma starts with labelling and stereotyping, which lead to separation, status loss, and discrimination (2). There are many ways of looking at stigma. Public stigma focuses on the community's discrediting response on the stigmatized person while the negative attitude or prejudice towards on-self known as self-stigma (3-4). Courtesy stigma is the stigma experienced by the family members or caregivers related to the stigmatized person (5).

Affiliate stigma is the internalization of these negative experiences by the family members of the stigmatized person (6). Affiliate stigma indirectly covers both aspects of the caregiver's self-stigma and the subsequent psychological responses of the associates. The result of this internalization process affects the person's cognitive, affective, behavioural, self-esteem and self-efficacy.

Affiliate Stigma Scale (ASS) consists of a 22-item, measured the cognitive, affective and behavioural components of affiliate stigma (6). This scale was developed to study the affiliate stigma among caregivers of people with intellectual disability or mental illness. It has been shown to have good psychometric properties, and its use has increased over the last few years. Furthermore, the scale has already been translated and validated into different languages including Chinese (6), Urdu (7), Hebrew (8), Hindi (9), Persian (10) and Amharic (11).

While stigma commonly experienced by caregivers of a patient with mental illness around the world including Malaysia, there is a need to use validated measurement scale to assess affiliate stigma among the caregivers in Malaysia. Thus, the aim of this study was to validate the Malay version of the Affiliate Stigma Scale (ASS) among caregivers of a patient with mental illness in Kelantan, Malaysia.

Methodology

Study design and procedures

This cross-sectional study was conducted at the psychiatric clinic, hospital Universiti Sains Malaysia (USM) from May to December 2017. The participants were recruited using non-probability convenience sampling. A total of 372 caregivers, aged 18 and above consented to participate in this study. The caregiver, defined as an individual responsible for the patient's daily activities including basic and instrumental functions and for monitoring patients (12). The caregivers have been taking care of the patients with mental illness (schizophrenia, mood disorder, anxiety disorder and intellectual disability) for at least six months duration. Participants who had major psychiatric illness were excluded from the study. The estimated sample size for EFA and CFA were calculated according to rule of thumb and standard size per domain set by Heir and colleagues (13). Estimation 20 per cent of non-response rate was also included for both EFA and CFA sample size determination.

Ethics Approval

The study protocol was approved by the Human Research Ethics Committee of USM [USM/JEPeM/16120605].

Measures

Socio-demographic questionnaire

Socio-demographic characteristics recorded are age, gender, ethnicity, marital status, education level, occupation, household income and status relationship with the patient.

Affiliate Stigma Scale-Revised (ASS)

ASS is a 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree) (6). It has 22 items assessing three domains of affiliate stigma subscales (affective, cognition and behaviour). The affective subscale consists of 7 items (item 1, 4, 7, 10, 13, 16, and 19); the cognitive subscale also includes 7 items (item 3, 6, 9, 12, 15, 18, and 21); and the behavioural subscale contains of 8 items (item 2, 5, 8, 11, 14, 17, 20, and 21). A higher mean score of the 22 items indicates a higher level of affiliate stigma. ASS has good internal consistency (α= 0.94) for caregivers of mental illness and exploratory factor analysis (6).

Instrument translation

The original English language version of ASS was translated into Malay language using forward and backward translation by bilingual experts of Malay and English (see Figure 1). Two psychiatrist who were competent bilingual speakers, reviewed both backward and forward translation, comparing each item to the corresponding item on the original English version. The expert panels assessed the contents of the questionnaires to be culturally appropriate to the Malaysian population. The final version of Malay language ASS (ASS-M) was pre-tested among 10 caregivers of a patient with mental illness for clarity and comprehension. The participants were asked to answer the questions and comment on the wording and the presentation of the questionnaire. We found the result of the pre-test to be good and no modification was necessary.

[Figure 1]

Statistical analyses

The SPSS version 22.0 software was used to analyse the data for the descriptive statistics of respondent's sociodemographic characteristics, Exploratory Factor Analysis (EFA) and Cronbach's alpha. Factor loading less than 0.3 was considered for removal of the item and factor in eigenvalue > 1.0 accepted (13). The EFA was supported by Confirmatory Factor Analysis (CFA) by Mplus8 software (14).

The fitness of the model can be assessed by the following indices: Root Mean Square Error of Approximation (RMSEA) with an acceptable level of < 0.08, Standardized Root Mean Square Residual (SRMR) with an acceptable level of < 0.08, Tucker-Lewis Fit Index (TLI) with an acceptable level of > 0.95 and finally the Comparative Fit Index (CFI) with an acceptable level of > 0.95 (13).

Construct reliability (CR) of the ASS-M was estimated by Raykov's rho. Raykov's rho of ≥ 0.70 is reliable and acceptable (13). The acceptable cut-off value for Cronbach's alpha coefficient was also similar, which is ≥ 0.70 (13).

Results

Socio-demographic Characteristics of the Respondents

The participants (n = 132 for EFA; n= 240 for CFA) were mostly married (n = 86, 65.2%; n = 169, 70.4%), female (n = 90, 68.2%; n = 160, 66.7%) and the mean age was almost similar between EFA and CFA (43 years (SD=15.3); 44 years (SD=16.2)). Most of them received education up to secondary level (n = 63, 48.5%; n = 130, 54.2%), monthly income less than RM2, 000 (n = 37, 28%; n = 87, 36%). The main caregiver participated in the study were parents of patient with mental illness (n = 52, 39.4%; n = 104, 43.3%) (Table 1).

Exploratory Factor Analysis (EFA)

Principal axis factoring analysis with Promax rotation done resulted a total of four factors with eigenvalues greater than one. The value of Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) test was excellent at 0.92. Bartlett's Test of Sphericity was significant, with x^2 (231) = 2170.164, $p < 0.01$. All items loaded in a single dimension with the value of factor loading higher than 0.30 (Table 2). Item-2 was deleted as its factor loading was lower than 0.3.

All items were arranged based on the factor loading under four factors that extracted in this study (Table 3). Items with cross loading result were rearranged under related factor after discussion with experts from the research team. Item 1 'I feel inferior ……' factor loading was slightly lower for affective factor (0.328) than behaviour factor (0.418). However, the research team decided to put item 1 under affective factor as this item more related to emotion instead of behaviour. Similar to item 1, both item 9 and 21 were put under cognitive factor despite the factor loading for both (0.452; 0.487) was lower than self-esteem (0.456) and behaviour (0.564).

Confirmatory Factor Analysis (CFA)

The four factors model extracted from EFA was tested and each item was allowed to load on its corresponding factor. The result of CFA was shown in Table 4 and 5.

The initial model for ASS-M had a good fit of data as indicated by the two fit indices (Root Mean Square Error of Approximation, RMSEA and Standardized Root Mean Square Residual, SRMR) values being lower than the stipulated value of 0.08. Modification to the model was required to obtain a better fit.