

## The Validity and Reliability of Psychometric Profile for Depression, Anxiety and Stress Scale (DASS21) Instrument among Malaysian Undergraduate Students

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### Abstract

This study aims to investigate the psychometric attributes of DASS21 instrument of depression, anxiety, and stress among Malaysian university undergraduate students, where negative emotional disturbance is evaluated in the respect of frequency and severity. During this study, English and Malay were the languages used for the descriptive investigation on the severity of emotional disturbance and psychometrics analysis. A cross-sectional study was conducted among (N = 390) undergraduate students from Universiti Putra Malaysia, through a simple random exercise. This was followed by collection of data on the final respondents through AMOS for confirmatory factor analysis (CFA) and measurement. An excellent structure of the 21-items in three DASS21 sub-constructs was displayed, with 18 out of 21 items were produced from adequate construct validity. It exhibited a positive factor loading, which amounted to 0.5 and higher. In terms of internal consistency, the alpha values for anxiety ( $\alpha = 0.850$ ), stress ( $\alpha = 0.859$ ), and depression ( $\alpha = 0.910$ ) were shown. A positive consistency of Cronbach's Alpha ( $\alpha = 0.926$ ) could also be seen from the overall score where all items were included. Thus, DASS21 can be utilized as a measurement tool to identify the health condition of students with negative emotional disturbances.

**Keywords:** DASS21, Psychology Instrumentation, Reliability, Validity, Malaysia

### Introduction

Consistent evidence has indicated that mental health condition has been on the alarming stage in terms of emotional disturbance. This can be seen from its significant increase across region over time, cultural, and social background annually (Camacho et al., 2016; Norton et

al., 2004). Furthermore, it has also been implied that young adults are the group of age who face a higher risk of having this disorder (Lawrence et al., 2015; WHO, 2008). Therefore, extensive studies are conducted in order to describe the level of this disorder, which is done by determining the pattern aligned with the conceptual and theoretical perspectives (Aseltine et al., 2000; Rapee, 1991; Reiss, 1987). Apart from that, a number of studies have claimed that psychological distress such as depression, anxiety, and stress, is influenced by prevalent and overlapping emotion disturbance (Ratanasiripong et al., 2015; De Heer et al., 2014; Van Fenema et al., 2012; Den Hollander-Gijsman et al., 2012).

In order to conduct an investigation particularly on this emotional disturbance, robust measurement was used. Therefore, extensive reliability and validity of DASS instrument stability were necessary. This instrument was used in several studies for a comprehension on the emotional disturbance profile of a mixed population of adolescents and young and old adults (Shaw et al., 2017; Goldman-Mellor et al., 2014; Patrick et al., 2010; Szabo, 2010; Lahey et al., 2004). In the recent study, DASS42, with the estimation of estimation weighted least Square, was performed on confirmatory analyses in order to identify the satisfactory internal consistency and good fit in the respective sample (Habibi et al., 2017). However, for a more constant result in both versions, a more detailed investigation on the short version of DASS21 is aimed by this study. This is where confirmatory factor analysis was practiced. It involved SEM-CB for verification on the concurrent reliability and construct validity via confirmatory factory analysis in 3-factor structure model. Another reason of this investigation was that the selection of both groups was conducted in accordance to different backgrounds such as family and social background, and aspects such as needs or intention. Therefore, through these differences, this study has gained the opportunity to investigate on the pooled sample of both groups, and the validity and reliability of instruments were conducted in further detail (Ramli & Rosnani, 2011).

### **Research Background**

Based on reports regarding students' daily lives, high-demand activities, such as the time spent on studying, attending classes, finishing assignments and conducting presentations, final year project, sitting for examinations, financial issues, social life and communication problems, impact their daily lives heavily. Students' emotional disturbance and mental health are the results of these issues, which also put their academic journey at risk. Therefore, sensitivity to these issues is not only required for DASS, it is also important for the assessment on the drawbacks of such negative states in a single measurement. Therefore, DASS is a self-report instrument which is empirically designed for access on the dimension of the aspects unassociated with depression, anxiety, and stress (Norton, 2007).

It is noted that, in the theoretical and conceptualized aspect, stress is a common emotional state among students (Schofield et al., 2016; Beiter et al., 2015; Papier et al., 2015; Elias et al., 2011). It is also highlighted that stress, however, can provide students with positive motivation and vice versa for stability in their lives and their learning process when undertaking tasks, regardless of situations. Additionally, stress is a general tension occurring in an individual's life due to demands which exceed what can be fulfilled by personal and social resources (Lazarus & Folkman, 1989). However, anxiety will be inflicted on individual's emotional state in response to stress due to prolonged and uncontrollable situations, such as threats and harassments (Monroe, 2008). In fact, emotional shock and fear result in the occurrence of anxiety as a coping mechanism safeguarding the safe-safety. It also surfaces from the effect of the hyper-arousal of tension and anxiety (Freud, 1926). Moreover, the

occurrence of chronic stress and anxiety results to symptoms of depression in several situations. Besides, an individual's attitude and their disturbed thoughts, added with a negative outlook on themselves will disrupt them from any activities. This is also resulted from other individuals' negative perceptions, which inflict them physically, mentally, and morally (Mukhtar & Oei, 2011; Beck, 1979). To conclude, all sub-constructs are in accordance to the psychical, emotional, and cognitive fatigue of individuals in both clinical and non-clinical settings.

In regard to the level of emotional disturbance among students, higher level of anxiety was reported in comparison to the level of stress and depression in a number of local contexts (Zafirah et al., 2016; Fuad et al., 2015; Shamsuddin et al., 2013). However, in a study performed in Spanish, investigation was conducted on a group of students from rural area. On the contrary, it was found that the score distribution for all sub-constructs belonged to the normal categories rather than the extreme categories (Camacho et al., 2016). Therefore, a variety was found in the pattern and level distribution between regions where a more detailed explanation was required.

There were indications from previous studies that positive internal consistency, model fit, and convergent validity emerge from psychometric attributes (Habibi et al., 2017; Xavier et al., 2017; Ramli et al., 2012; 2007). It can be gathered that DASS is considered as a reliable and valid instrument in both clinical and non-clinical settings for particular populations (Vignola & Tucci, 2014). For access to the confirmatory factor analysis on the validity and reliability of DASS, different types of statistical tools were used. Subsequently, a constant result with 3-factor structure was obtained (Xavier et al., 2017; Le et al., 2017; Fox, 2017; Silva et al., 2017, Yusoff et al., 2013). It was indicated from the results that the relation between the sub-constructs was significant and inter-related (Camacho et al., 2016). However, failure in displaying the convergence between all sub-constructs was discovered in CFA, hence this study opting to investigate on EFA for ordinal data. Therefore, continuous investigation on CFA is necessary in order to ensure the convergence of particular psychometric attributes. Additionally, the use of DASS12 and DASS9 is recommended by Yusoff et al. (2013) due to the psychometrics values of these two, in comparison to the psychometrics value of DASS21. Besides, an opportunity to perform a consistent study in refining the validity and reliability DASS21 can be seized.

### **Research Methodology**

This research was conducted after approval was given by The Ethics and Research Committee of Universiti Putra Malaysia (UPM). Participants consisted of undergraduate students from 16 different programmes under the university. Apart from that, it was indicated from a previous study that the prevalence of emotional disturbance ranges from moderate to higher (Fuad et al., 2015; Shamsuddin et al., 2013; Yusoff et al., 2013; Elias et al., 2011).

A number of names were selected by random from a list provided by the Academic Center. At the end, a total of 1500 student names were selected. After that, online questionnaires were distributed via google drive to the respective emails where students were required to submit response to the online survey within 3 months. This period started from October until December. A total of 390 respondents, who consisted of 84 (21.5%) males and 306 (78.5%) females, participated in this study. Following that, the demographic ethnic distribution for this study's participants was 302 (77.4%) Malays, 54 (13.8%) Chinese, 12 (3.1%) Indians, and 22 others (5.6%).

Permission of using and adapting DASS was obtained from the original developer of both English and Bahasa Malaysia versions of the questionnaires (Ramli et al., 2007; Lovinbond & Lovinbond, 1995). Ethics approval was also given by University Ethical Committee Meeting before data collection and analysis.

The original set of Depression, Anxiety and Stress Scale, which is in English, is developed by Lovinbond & Lovinbond (1995). Eventually, the Malay version of it was developed by Ramli (2007) with permission obtained. In this study, both versions were used. These instruments are highly popular that they have been translated into more than 100 languages worldwide. Furthermore, they are used normally in clinical and non-clinical setting (Henry & Crawford, 2010; Niewwenhuijsen et al., 2002). Offer of the two versions, namely 42 and 21-items of DASS was made, with the 21-item version comprising of a subset of items originating from the 42-item version of DASS (Norton, 2007). The short version of the 21-item was used for investigation on the negative emotional disturbance, which consists of profile of stress, anxiety, and depression with 7 items per sub-constructs. It is reported that DASS21 owns psychometric properties which are identical to the original version of DASS42 (Anthony et al., 1998).

Assessment on the level of emotional disturbance, which was specified into five levels ranging from normal, mild, moderate, severe to extreme, was performed by this instrument. These levels were displayed on the scoring table in order to describe the patterns and levels of emotional disturbance (Lovinbond & Lovinbond, 1995). Rather than the original scale of 4-scale point, the 7-scale point, which ranges from 0 (*does not apply to me at all*) to 6 (*applies to me significantly or most of the time*), was used. With this, respondents were asked to give rate to their emotional experiences (Lang, 2015). The Cronbach's alpha coefficient obtained in this study was 0.926 in total. This amount consisted of the Cronbach's alpha value for the subscale of stress (0.859), anxiety (0.851), and depression (0.907). Generally, positive factor loading values are displayed by the reliability result. There is also alignment between this result and the result of several studies from the past, in regard to the value of reliability which amounts higher than 0.78 – 0.898 (Fuad et al., 2015; Shamsuddin et al., 2013; Oei et al., 2013; Chan et al., 2012; Ramli et al., 2007). Therefore, the scores of correlation's depiction on the stability of DASS21 profile index of emotional disturbance throughout time have been confirmed.

SPSS version 23 was used in this study for a descriptive analysis on the patterns and levels of emotional disturbance among undergraduate students. This was followed by the process of the reliability and validity which took place in order to obtain access to DASS21 psychometrics attributes. The 20 version of AMOS was used for the measurement model which practices the confirmation factor analysis (CFA) conducted by Structural Equation Model-CB (Arbuckle & Wothke, 1999). A variety of statistical tests were provided by CFA for evaluation of model fit through the display of statistical model's goodness-of-fit (Kline, 2011). The assessment of the goodness-of-fit was conducted through the following statistics: root mean square error of approximation (RMSEA), normal chi-square ( $3 > \chi^2 / df < 2$ ), root mean square residual (RMSR  $< 0.10$ ), comparative fit index (CFI  $> 0.90$ ), non - normal fit index (NNFI  $> 0.90$ ), adjusted goodness-of-fit index (AGFI  $> 0.80$ ), and goodness-of-fit index (GFI  $> 0.85$ ).

## Research Findings

### *Descriptive Analysis*

Based on the findings of this study, it has been found that the overall mean associated with emotional disturbance and stress sub-construct is the most significant ( $M = 2.856$ ,  $SD = 0.885$ ).

This is followed by the association between emotional disturbance and anxiety sub-construct, which is ( $M = 2.467$ ,  $SD = 1.07$ ). On the other hand, the association with the least significance value is the association between emotional disturbance and depression sub-construct ( $M = 1.770$ ,  $SD = 1.07$ ). Furthermore, it has also been revealed from the results that, amongst all items related to emotional disturbance, the item with the higher mean score is the item “*I felt that I am a sensitive person*” ( $M = 3.650$ ,  $SD = 1.515$ ). This represents the group in the sub-construct of stress. Meanwhile, the item with the least mean is the item “*I felt that life was meaningless*” ( $M = 1.100$ ,  $SD = 1.397$ ). Table 1 displays the descriptive analysis on the level of the respective emotional disturbance according to sub-constructs. Based on the table, it can be seen that the high level of stress starts from moderate  $n = 143$  (38%). This is followed by anxiety, which is reported to be on the extreme level of  $n = 158$  (40.5%). Meanwhile, the level of depression is reported to amount to  $n = 16$  (4.1%), which falls under the category of extremely negative emotional disturbance.

Table 1

*Distribution of emotional disturbance level according to sub-constructs (stress, anxiety, and depression, N = 390)*

Item	Normal		Mild		Moderate		Severe		Extremely	
	F	%	f	%	f	%	f	%	f	%
Stress	99	25.4	63	16.2	143	38.7	69	17.7	16	4.1
Anxiety	47	12.1	29	7.4	62	15.9	94	24.1	158	40.5
Depression	164	42.1	66	16.9	89	22.8	55	14.1	16	4.1

#### **Measurement Model: Confirmatory Factor Analysis (CFA)**

Two-stage approach was implemented in order to investigate the measurement model's validation and reliability through Structural Equation Modeling (SEM)-AMOS analysis. Evaluation of the measurement model was conducted through confirmatory factor analysis (CFA). This included analyses on maximum likelihood estimation approach, which was specifically performed through investigation on the goodness-of-fit indices, along with the construct's validity and reliability. Furthermore, this is an approach where whether the loading of the measured (indicator) variables on factors and the number of factors fulfill the expectations is taken into account (Kline, 2004). Analysis on each of the sub-constructs was conducted in a separate measurement model. Evaluation was conducted on unidimensionality in order to determine every underlying factor, which was done by checking the statistical result of the goodness-of-fit indices.

The assessment of CFA model was conducted for emotional disturbance, which consists of three sub-constructs namely the sub-constructs of stress, anxiety, and depression. These sub-constructs were divided into (7) items which performed measurement on the depression, anxiety, and stress sub-constructs separately. Initially, (2) items (PwB7s and PwB8a) were shown from the sub-constructs of stress and anxiety respectively. However, due to the lower value of factor loading, which was below 0.5, these items were removed (Hair et al., 2010). On the other hand, due to high residual variance, the item for depression sub-construct, PwB15d, was removed. Subsequently, the modification indices (MI) fitted the

measurement model, which was  $\chi^2 (128) = 348.918$ ,  $p = 0.00$ ,  $\chi^2/DF = 2.276$ ,  $GFI = 0.914$ ,  $CFI = 0.944$ ;  $IFI = 0.944$ ,  $RMSEA = 0.067$  after the removal of items. This result was due to the identification of the items as a poor measurement of the latent construct (i.e., a correlation value of inter-item which was higher than 0.7; removal of factor loadings with values lower than 0.3 was performed from subsequent model development for parsimony) (Kline, 2005).

After the item removal process, the result of the modification indices (MI) fitted the measurement model, which was  $\chi^2 (177) = 497.109$ ,  $p = 0.00$ ,  $\chi^2/DF = 2.809$ ,  $GFI = 0.888$ ,  $CFI = 0.958$ ;  $IFI = 0.958$ ,  $TLI = 0.950$ ,  $RMSEA = 0.068$ . Upon further data investigation, the value of institutional factor composite (CR) was found to range from 0.883 to 0.949. Meanwhile, the value of AVE was found to range from 0.699 to 0.716. Based on Table 2, the value of all factor loadings for emotional disturbance constructs are reported to be 0.5. Therefore, the value of internal consistency (alpha) for all-constructs is reported to be higher than, 0.7, the cut-off value for study sample (DeVellis, 2012). Subsequently, sufficient amount of reliability can be seen from the constructs within the sample study.

Table 2

*Item loading factor in final fit of measurement model for emotional disturbance*

Construct	Item	Loading Factor		Cronbach Alpha	CR	AVE
		Initial	Modified			
Stress	PwB7s	0.437	del*	0.859	0.857	0.507
	PwB6s	0.597	0.591			
	PwB5s	0.841	0.844			
	PwB4s	0.865	0.874			
	PwB3s	0.573	0.566			
	PwB2s	0.691	0.670			
	PwB1s	0.686	0.671			
Anxiety	PwB14a	0.762	0.781	0.851	0.850	0.490
	PwB13a	0.678	0.686			
	PwB12a	0.796	0.778			
	PwB11a	0.594	0.545			
	PwB10a	0.679	0.671			
	PwB9a	0.709	0.711			
	PwB8a	0.498	del*			
Depression	PwB21d	0.796	0.801	0.907	0.910	0.627
	PwB20d	0.825	0.814			
	PwB19d	0.830	0.839			
	PwB18d	0.827	0.831			
	PwB17d	0.776	0.774			
	PwB16d	0.685	0.683			
	PwB15d	0.633	del**			

Note: ST. – Stress, AX. – Anxiety, DE. – Depression

\*\*del – high residual variance, \*del – lower of factor loading

Based on the table above, a positive fit of pooled samples in this study is shown as a result of the covariate process between deletion and measurement model. Therefore, evaluation on discriminant validity, convergent validity, along with reliability would be the

next procedure in order to assess whether the psychometric properties are sufficient and fulfilled. Meanwhile, discriminant validity was conducted in this study for assessment on the comparison between each construct in terms of AVE's square root against the correlation between the models. Hair et al. (2006) highlight that provided the exceeding AVE's square root beyond the correlation among the constructs, construct will have sufficient discriminant validity. Based on Table 3, it can be seen that the result of AVE's square root for each respective sub-construct is more significant than every correlation between the subscales. For that reason, there is a sufficient amount of discriminant validity for all of the subscales.

Table 3

*Correlation of latent variables and discriminant validity of emotional disturbance*

<b>Constructs</b>	<b>AX.</b>	<b>ST.</b>	<b>DE.</b>
Anxiety	<b>0.700</b>		
Stress	0.692	<b>0.712</b>	
Depression	0.666	0.665	<b>0.792</b>

*Note: ST - Stress, AX - Anxiety, DE - Depression*

*Squared Roots of AVE (on the diagonal)*

*Correlation coefficient (on the off-diagonal)*

### **Measurement Model Analysis: Second 2-order**

The data examination in this study was followed by the final analysis after confirmation was made on the validity and reliability required for the respective instruments to acquire model fitness. The final measurement process was conducted through inspection on the second-order factor from the latent variable. The requirements for a positive fit model are as follows: a high chi-square ( $\chi^2$ ) value, the range of the normal Chi-square value is from 1 to 5, Incremental fit index (IFI), Adjusted goodness of fit index (AGFI), comparative fit index (CFI), the goodness of fit index (GFI), Tucker-Lewis (TLI) values should be higher than 0.9, and the values of root mean square error of approximation (RMSEA) should not be higher than 0.08 (Hair et al., 2010). Subsequently, it is shown from the results that  $\chi^2 (128) = 348.918$ ,  $p = 0.00$ ,  $\chi^2/DF = 2.276$ ,  $GFI = 0.914$ ,  $CFI = 0.944$ ,  $RMSEA = 0.067$ . Moreover, it is also indicated that modification indices (MI) of the goodness-of-fit indices goes beyond the cutoff value at a significant degree. Based on the result, it can be seen that goodness-of-fit indices such RMSEA, TLI, CFI, and GFI and surpass the cutoff value tremendously. For this reason, provided the highest factor loading as displayed in Figure 1 below, emotional disturbance constructs are supported by depression, anxiety, and stress sub-constructs.

Information regarding the improvement in model fit where correlation or covariance is made on particular parameters is presented by AMOS modification indices. With these two variables, a better DASS21's model fit can be seen from the results. Moreover, there is a correlation in one indicator of measurement model error terms. Subsequently, removal needs to be performed on one indicator of from the initial measure model in order to produce a positive model fit. The removal of the indicators is in accordance to the requirement that standardized residual covariance is higher than 0.5 (Bryne, 2013). In addition, it is indicated by medication indexes that high covariance between measurement errors, along with high regression weight between error construct will lead to deletion (Hair, 2010).

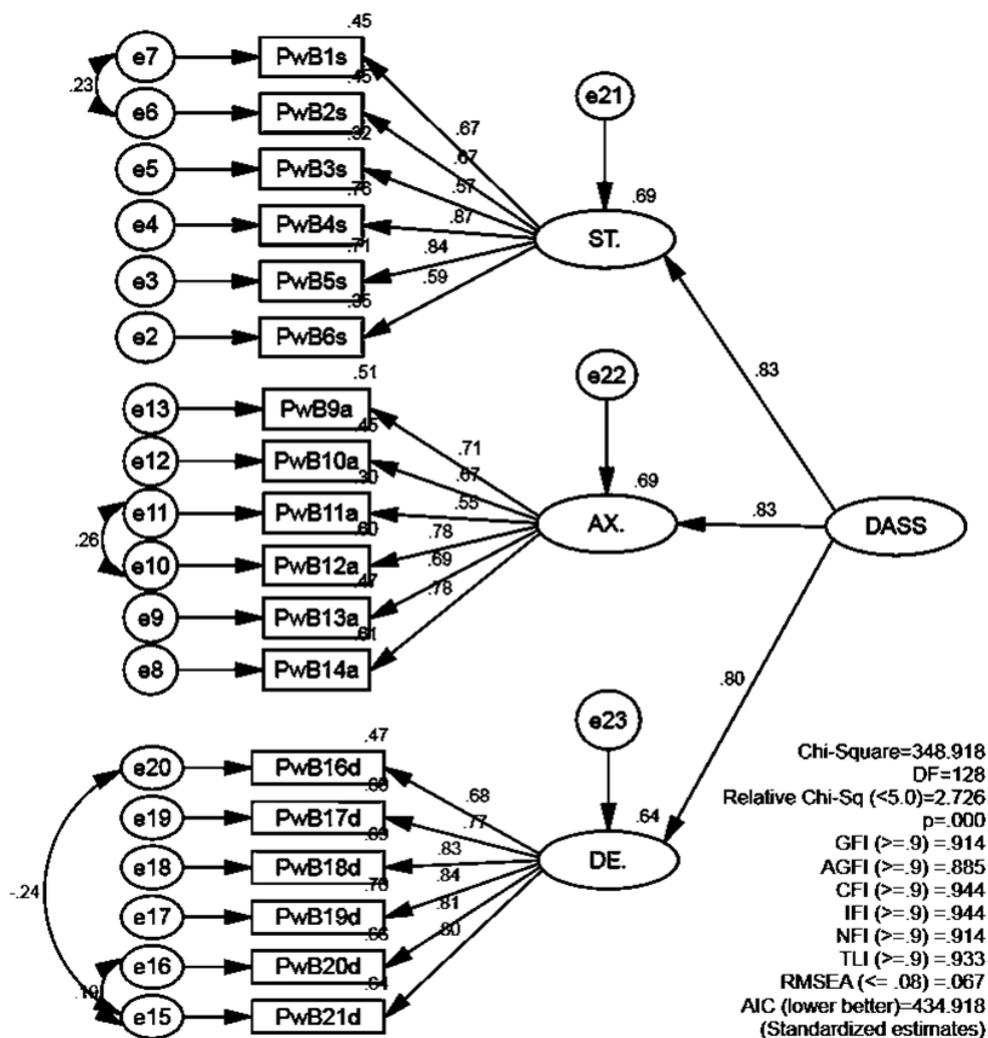


Figure 1: Second order CFA Model for emotional disturbance

## Discussion

This study aimed to profile DASS21 instrument's patterns and levels within undergraduate students. Subsequently, it was found that majority of the students face a high risk of emotional disturbance which ranges from moderate to extreme level. Depression and anxiety are the emotional states which reflect on how the students are carrying out their daily lives with high-demand activities. Examples of such activities are spending time on studying, having assignment and projects done, attending classes, sitting for examinations, internet, lack of exercise, unbalanced diet, financial issues and problems in social life and communication. Daily life, physical and mental health, and learning process of students are heavily impacts by these (Camacho et al., 2016; Beiter et al., 2015; Elias et al., 2011).

This scale was developed for evaluation on mental health problem which emerges from negative emotions. Therefore, due to a report regarding lower psychological well-being by the previous scholar, this research gained the opportunity to evaluate the extent of negative emotional well-being and stress, anxiety, and depression. In addition, measurement on the severity of negative emotional disturbance was also conducted in the form of a scale ranging from low to extreme.

Furthermore, this study intended to investigate the reliability and validity of Depression, Anxiety and Stress Scale (DASS) in grasping the negative emotional disturbance experienced by the students. Therefore, in order to be updated on this issue, analysis on the reliability and validity of an instrument is necessary. Additionally, it was confirmed from this study's analysis that the use of confirmatory factor analysis is to obtain better model goodness fit, as proven in previous studies. However, after several analyses and changes made on the co-variants between items, it was found that due to high amount of residues, removal is required for item1 depression, anxiety, and stress. After conducting convergent/discriminant validity on DASS21 among undergraduate students, confirmation was done.

However, there are few contradictions between this study and the previous study which recommended DASS9 and DASS12. From that study, a better psychometric value was shown in comparison to the psychometric value of DASS-21 (Yusoff et al., 2013). Furthermore, it was proven from the results that DASS18 represents a good model fit among undergraduate students. With these facts, it was proven that DASS is a sound instrument for evaluation of emotional disturbance which comprises of stress, anxiety and depression. This is in the clinical and non-clinical settings, specifically for undergraduate students under the education field (Habibi et al., 2017; Yusoff et al., 2013).

Through confirmatory factor analysis (CFA), which is based on Malaysia's social and cultural background, this study also intended to gain access to the psychometrics profile on validity and reliability. Moreover, it has been suggested that investigation on the similarities or differences in terms of factor loading, and intercept of DASS-21 should be conducted in future research. This should be conducted on various education levels such as pre and post students, full or part time students in identifying the levels and patterns of their emotional disturbance. Apart from that, DASS is where all profiles of emotional disturbance stored may also be used as screening in schools. With this, further access to the profile of emotional disturbance among students can be made for children and adolescent too.

A number of limitations are present in this study. This refers to how improvement can be made on the use of cross-sectional data for data collection. This improvement can be performed through a longitudinal data for examining the test retest analysis and verification of the questionnaire's stability throughout time (Nordin et al., 2017). In addition, in this study, focus was particularly placed on one public university for evaluating the level of emotional disturbance. Therefore, regular examination on the patterns and levels of negative emotional disturbance was suggested on both public and private universities throughout the nation. In reference to the statistical result based on the demographic profile, there are social, surrounding, and cultural factors contributing to psychological distress (Shamsuddin et al., 2013).

Based on this study's result, it can be seen that there is a high rate of emotional disturbance occurring among undergraduate students from faculties and programmes where early intervention services are needed (Radeef, 2014). Additionally, it has been suggested from previous studies that there are a number of intervention approaches which can be applied to curb emotional disturbance among students (Huguelet et al., 2016; Josefsson, 2014; Berto, 2014; Beyer et al., 2014; Rani et al., 2012). These approaches are capable of functioning as the students' coping mechanism for better psychological wellbeing and improvement of their academic performances.

## Conclusion

All in all, findings of this study have proven the validity and reliability of the instruments for evaluation of negative emotional disturbance level among undergraduate students. In identifying sensitive emotional disturbance, the overall conditions for stress, anxiety, and depression have been differentiated with respective subscales. This evaluation was conducted with reference to 18 items out of the original 21 items in shorter version. Therefore, the modified DASS21 can be used for classification of groups with negative or poor emotional state. In other words, to group Malaysian undergraduates with negative or poor emotional state, future researchers are suggested to use the version of DASS21 modified by researchers of this study in order to acquire more contextually accurate finding. Last but not least, a theoretically relevant measurement can also be formed through the modified version of DASS21 from this study.

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