

# Depression Anxiety Stress Scales (DASS-21): Psychometric Analysis among Malaysian University Student during COVID-19 Pandemic

## *Skala Kemurungan Kebimbangan Tekanan (DASS-21): Analisis Psikometrik dalam Kalangan Pelajar Universiti Malaysia semasa Pandemik COVID-19*

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*Dihantar: 30 November 2022 / Diterima: 31 Disember 2022*

Received date: 30 November 2022 / Accepted date: 31 December 2022

DOI: <https://doi.org/10.51200/jpks.v6i1.5716>

The aim of this study is to test the psychometric properties of the 21-item Depression Anxiety Stress Scale (DASS-21). The DASS-21 is a set of three self-report scales consisting of 21 items to measure the emotional states of depression, anxiety, and stress. A sample of 380 (256 female, 124 male) university students in Malaysia were randomly selected to participate in this study. The reliability of the DASS-21 was evaluated by measuring the internal consistency (Cronbach's alpha) reliability. The convergent, concurrent, and discriminant properties were examined to evaluate the validity of the scale. Item analysis was also performed through the item-total correlation approach. The reliability of the DASS-21 showed excellent Cronbach's alpha values of .916 and .891 for the subscales of depression and anxiety respectively, while the stress subscale showed low reliability with Cronbach's alpha value of .472. The convergent validity of the DASS-21 was tested by examining the relationship between the dimensions of the scale which have moderate to strong and positive correlations ranging from  $r = .561$  to  $.777$ . The concurrent validity was assessed by examining the relationship between the three subscales of DASS-21 and the score of the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS) which showed negative and significant correlations ranging from  $r = -.377$  to  $-.615$ . The discriminant validity was evaluated by factor analyzing items of DASS-21 and items of World Health Organization Quality of Life, WHOQOL-Bref (Field Trial Version). All items of DASS-21 were loaded in one component while the items of WHOQOL-Bref (Field Trial Version) were loaded in another component, except for 3 items. The item analysis showed that the item-total correlation coefficient for three subscales of DASS-21 exceeded the recommended value of .30, except for item 14. From this study, the DASS-21 showed a high reliability and validity score and can be used to assess and measure mental health states among university students in Malaysia during the COVID-19 pandemic. However, further studies are required to enhance the evidence of reliability and validity for the DASS-21 instrument.

**Keywords:** DASS-21, reliability, validity, psychometric properties.

Kajian ini bertujuan untuk menguji ciri psikometrik Skala Tekanan Kebimbangan Kemurungan 21 item (DASS-21). DASS-21 adalah satu set laporan sendiri tiga skala yang mengandungi 21 item untuk mengukur kemurungan, keseimbangan dan tekanan. Seramai 380 (256 perempuan, 124 lelaki) pelajar universiti di Malaysia yang dipilih secara rawak terlibat dalam kajian ini. Kebolehpercayaan DASS-21 dinilai dengan metod ketekalan dalaman (*Cronbach's Alpha*). Validiti konvergen, serentak dan diskriminasi bagi skala ini turut dikaji. Analisis item juga dijalankan melalui kaedah korelasi item keseluruhan. Kebolehpercayaan DASS-21 menunjukkan nilai *Cronbach's Alpha* yang sangat tinggi iaitu .916 dan .891 untuk skala kemurungan dan keseimbangan, manakala skala tekanan menunjukkan kebolehpercayaan yang rendah dengan nilai *Cronbach's Alpha* = .472. Kesahan konvergen DASS-21 telah diuji dengan mengkaji hubungan antara tiga skala DASS-21. Hasil menunjukkan korelasi positif yang sederhana tinggi iaitu, antara  $r = .561$  hingga  $.777$ . Kesahan serentak dinilai dengan mengkaji hubungan antara tiga skala DASS-21 dengan skor Skala Kesejahteraan Mental Warwick-Edinburgh (WEMWBS). Hasil menunjukkan korelasi negatif dan signifikan antara  $r = -.377$  hingga  $-.615$ . Kesahan diskriminasi dinilai dengan menganalisis faktor semua item DASS-21 dan semua item instrument Kualiti Hidup Pertubuhan Kesihatan Sedunia, WHOQOL-Bref (Versi Percubaan Lapangan). Hasil menunjukkan semua item DASS-21 dimuatkan dalam satu komponen manakala item WHOQOL-Bref (Versi Percubaan Lapangan) dimuatkan dalam komponen lain, kecuali untuk 3 item.

Analisis item menunjukkan bahawa pekali korelasi jumlah item untuk tiga skala DASS-21 adalah melebihi kriteria yang dicadangkan iaitu .30, kecuali untuk item 14. Hasil kajian ini menunjukkan secara keseluruhan DASS-21 mempunyai kebolehpercayaan dan kesahan yang baik serta boleh digunakan untuk mengukur keadaan kesihatan mental dalam kalangan pelajar universiti di Malaysia. Walau bagaimanapun, kajian lanjut masih diperlukan untuk meningkatkan bukti kebolehpercayaan dan kesahan DASS-21.

Kata kunci: DASS-21, reliabiliti, validiti, ciri psikometrik.

The Depression Anxiety and Stress Scale (DASS-21) is the short form of the DASS-42. It is a self-report instrument that measures the negative emotional states of depression, anxiety, and stress. The three scales of the DASS have been shown to have high internal consistency and provide meaningful discrimination. This scale is suitable for both clinical and non-clinical settings. However, the scales should meet the needs of both researchers and clinicians who wish to measure current state or change in state over time if they wish to apply this scale to university students during the COVID-19 pandemic.

After the outbreak of coronavirus in December 2019 (COVID-19), the virus has been spreading rapidly around the world and has infected many people globally. The virus has caused a global pandemic in which most countries have been affected socially and economically. Not to forget also, this viral outbreak has a serious impact on the health of an individual, both in terms of physical health as well as mental health. According to the World Health Organization (WHO), among the most significant effects of COVID-19 on mental health has been its influence in increasing rates of stress and anxiety among the general public, especially those who lived in a restricted movement area. Some subgroups such as the elderly and individuals with specific health conditions are the most affected by these problems (WHO, 2020) including students.

In Malaysia, with the increase in covid cases, Movement Control Order (MCO), physical distancing rules, appropriate use of face masks, movement control in social gatherings, and closure of border have been implemented by the Malaysian government to curb the spread of the virus. Undoubtedly, COVID-19 adversely affects the development of individuals and in turn leads to an inability to carry out daily functions as usual at all levels of society, including students. This is supported by the study conducted by Maya and Dhananjai (2021), in which it was found that student stress levels were above the critical threshold for 25% of the sample with females aged 15-18 years old reported to have severe stress indicators compared to male adolescents. Additionally, the result showed that among the mental health symptoms experienced by 859 of the high school students showed anxiety, depression, PTSD, and suicidal ideation and attempts.

Another study by Cohen et al. (2021) stated that increased anxiety and depression among adolescents who were infected with the coronavirus, while early life stress was high in adolescents. This outcome also aligned with Malaysia-based research conducted by Muhammad Zaki et al. (2021) where it was reported that among 137 respondents from secondary school students in Malaysia, 59.6% of them mostly female are being psychologically impacted by the current pandemic followed by 32.7% of them stated they somehow are being psychologically impacted. In this study, it was found that multiple external stressors of the students led to General Anxiety Disorder,

where 37.6% of the respondents experienced extreme anxiety and 28.8% experienced moderate anxiety.

## Literature Review

Depression, Anxiety, and Stress Scale (DASS) have been translated and validated in different populations. A study conducted by Ramli, Salmiah, and Nurul (2009) aimed to validate the Malays version of Depression Anxiety Stress Scales 21-item (DASS-21) among 153 diabetic patients, indicating that the Malays version of DASS has excellent psychometric properties. The internal consistencies of DASS were .75, .74, and .79 for depression, anxiety, and stress subscales respectively. The Confirmatory Factor Analysis (CFA) results also revealed the items loaded into three primary categories – depression, anxiety, and stress. The factor loadings of all items exceeded .30. The correlations between depression and anxiety, and between depression and stress are .41 and .65 respectively. The correlation between anxiety and stress is .59. The results from this study revealed that the Malays version of DASS-21 has excellent psychometric properties and is appropriate to be used for the Malaysian clinical population.

Le, Tran, Holton, Nguyen, Wolfe, and Fisher (2017) conducted a study to assess the internal consistency, latent structure, and convergent validity of the Depression, Anxiety, and Stress Scale-21 (DASS-21) among adolescents in Vietnam. The study involved 1745 high school students in Hanoi, Vietnam. Confirmatory factor analyses were conducted to evaluate the latent structure of the DASS-21. Cronbach alphas and correlation coefficients between DASS-21 factor scores and the domain scores of the Duke Health Profile Adolescent Vietnamese validated version (ADHP-V) were examined to evaluate the DASS-21 internal consistency and convergent validity respectively. They reported the DASS-21 showed adequate to very good reliability where the internal consistency with Cronbach's alpha of .835 for the depression subscale, .737 for anxiety subscale, and .761 for the stress subscale. A four-factor model was revealed to have the best fit to the data. Items loaded significantly on a common general distress factor, the depression, and the anxiety factors, but less on the stress factor ( $p < .05$ ). The DASS-21 convergent validity was shown to have moderate correlation coefficients (-.47 to -.66) between its factor scores and the ADHP-V mental health-related domains. From these results, it was shown that the DASS-21 is reliable and suitable to be used in assessing symptoms of mental health problems, particularly depression and anxiety, among Vietnamese adolescents.

A psychometric study conducted by Coker, Coker, and Sanni (2018) aimed to determine the Nigerian psychometric properties of the 21-item version of the Depression, Anxiety, and Stress Scale (DASS-21) among a sample of

medical students. A total of 240 medical students from the Lagos State University College of Medicine, Lagos, Nigeria completed the DASS-21 scale, State-Trait Anxiety Inventory (STAI), and Self-Rating Depression Scale (SDS).

The internal consistency method was used to assess the reliability while Spearman's correlation analysis was used to determine the concurrent validity by looking at the relationship between DASS-21 and STAI and between DASS-21 and SDS. In this study, the DASS-21 showed excellent Cronbach's alpha values of .81, .89, and .78 for depression, anxiety, and stress subscales respectively. The inter-correlations between the three domains of DASS-21, SDS, and STAI were found to be moderately strong. The inter-correlation between depression and stress was found to be the highest and statistically significant (.658). The depression domain of DASS-21 correlated positively and significantly with SDS (.701), and the same result is shown between the anxiety subscale of DASS-21 with STAI (.517). These results show that the DASS-21 is reliable and valid to be used by clinicians in order to improve the diagnoses of depression, anxiety, and stress among university students.

Studies examining the psychometric properties of mental health assessment scales and correlates were found to be inadequate despite the serious mental health problems experienced by Hong Kong university students. Thus, Li et al. (2021) conducted a study to validate the Depression, Anxiety, and Stress Scale (DASS) in Hong Kong university students and examine the demographic (gender), time (cohort), and well-being correlates (positive youth development attributes and life satisfaction) of psychological morbidity. Data in this study were collected from students at the Hong Kong Polytechnic University who took a General University Requirements course which is "Tomorrow's Leaders" in 2014/15, 2015/16, 2016/17, 2017/18, and 2018/19 academic sessions. In this study, the DASS-21 demonstrated excellent internal consistency values of .90, .86, and .88 for depression, anxiety, and stress subscales respectively. It was also found that depression, anxiety, and stress correlated closely to each other where the correlation coefficient,  $r = .77$  for depression and anxiety, .80 for depression and stress, and .84 for anxiety and stress. Confirmatory factor analysis (CFA) was employed to examine the factor structure of the DASS. Gender and cohort invariance was further demonstrated by means of a multigroup CFA. The three-factor model of the DASS presented a superior fit and factorial invariance across gender and five different cohorts. The excellent internal consistency and correlation between the domains of DASS-21 in this study revealed that the DASS-21 is reliable and valid to use for the Hong Kong university student population.

Overall, previous studies have shown that the DASS-21 showed moderate to good reliability and validity to be used in assessing the mental conditions of depression, anxiety, and stress in different populations from different countries. However, there is a lack of psychometric study on the DASS-21 for the Malaysian student population, particularly tertiary education students during the Covid-19 pandemic. Therefore, it is important to address the research gap in this particular population and in the state of the pandemic situation. Thus, the purpose of the study was to test the reliability, validity, and item analysis of DASS-21 among university students in one of the public universities in

Malaysia. The study was conducted during the COVID-19 Pandemic.

## Method

### Participants

There were 380 students sampled, including 256 females and 124 males randomly from one of the public universities in Sabah. The age range of the sample was from 16 to 25 years old with a mean of 21.70 years old ( $SD = 0.91$ ). In terms of ethnic background, it consists of 23.2% of Malay, 9.7% of Chinese, 4.7% of Indian, 52.6% Bumiputera Sabah, 7.4% Bumiputera Sarawak, and 2.4% indicated as "Other" (i.e., Punjabi, Philippines, Buton, etc). Regarding the context of religion, 62.4% of respondents were Islam, 8.2% were Buddhism, 4.2% were Hinduism, 24.5% were Christianity, and 0.8% referred as "other" (Paganism, Atheism, and Sikh). In respect of income, 63.9% of the students were from the B40 family with a family monthly income of less than RM4,850 per month, and 32.6% of them were from the M40 family (with a household income of between RM4,850 and RM10,959 per month) and only 3.4% of them were from T20 family (households with a monthly income of RM10,960 and above).

### Instruments

Depression, Anxiety, and Stress Scales (DASS-21) were developed by Lovibond and Lovibond (1995). It contained a three-dimensional self-reporting scale – depression, anxiety, and stress, which was able to assess the presence and intensity of one's mental states (González-Rivera et al., 2020). DASS-21 is a 21 items measure, with seven items per subscale. Items 3, 5, 10, 13, 16, 17, and 21 belong to the depression scale; items 2, 4, 7, 9, 15, 19, and 20 were the anxiety scale; items 1, 6, 8, 11, 12, 14 and 18 were classified under stress scale. Respondents were instructed to complete the measure based on the emotional states that they experienced before the pandemic Covid-19 and during the pandemic Covid-19. Each item was rated based on a 4-point Likert scale: 0 (did not apply to me at all), 1 (applied to me to some degree, or some of the time), 2 (applied to me to a considerable degree, or a good part of the time), and 3 (applied to me very much, or most of the time). The seven items under each scale were added as the total score of that scale. A higher score stands for higher respondent symptomatology (González-Rivera et al., 2020).

Warwick-Edinburgh Mental Well-being Scale (WEMWBS) and World Health Organisation Quality of Life (WHOQOL-BREF) scale were also used in this study for the purpose to test the construct validity of DASS-21. WEMWBS was a 14-item scale of mental well-being that covers subjective well-being and psychological functioning. All items are structured positively and address the components of positive mental health. The scale is assessed by adding responses to each item on a 1 to 5 Likert scale (Stewart-Brown & Janmohamed, 2008). The WHOQOL-BREF was developed in the context of four domains of quality of life which are physical, psychological, social, and environmental (Skevington et al., 2004). The domain ratings were ranked in a positive direction, with higher

scores suggesting a greater quality of life. A five-point Likerscalees was used for all items in this instrument.

## Data Analysis

Data were analyzed using IBM SPSS Statistics Version 28.0. To test the reliability of the scale, Cronbach's Alpha internal consistency method was used. Cronbach's alpha value of .70 indicates good reliability (Taber, 2018). The validity evidence of the scale was determined by convergent evidence, and concurrent validity, and was tested using the factor analysis method. In addition, the item-total correlations analysis was used to measure the discriminating power of DASS-21's items.

## Results

### Reliability of the Depression Anxiety Stress Scale (DASS-21)

The internal consistency Cronbach's alpha technique was used to examine the level of reliability of the DASS-21, with a criterion of .70 indicating that it has good reliability (Taber, 2018). The Internal Consistency of Cronbach's

Alpha for the DASS-21 was shown in Table 1. The Cronbach's alpha value of the depression and anxiety subscale was .916 and .891, which revealed a high level of reliability. However, the subscale of Stress indicated a low level of reliability with Cronbach's Alpha value of .472. We conducted an item analysis to increase our understanding and to identify the problem of this scale.

### Convergent Validity of the DASS-21

The convergent validity of the DASS-21 was tested by examining the relationship among the subscale of DASS-21. We hypothesized that the three dimensions of DASS-21 would be significantly and positively associated between them. This prediction is based on the fore mentioned premise that these dimensions measure the same construct – mental health. The result shown in Table 2 indicated that the three subscales of DASS-21 correlated positively and moderately among them. The correlation coefficient ranged from  $r = .561$  to  $.777$ . The subscale of stress showed a quite low relationship with the depression and anxiety scale. This finding once again showed that the stress scale has problems.

**Table 1**

*Internal Consistency Cronbach's Alphas of the 21-item Depression Anxiety Stress Scale (DASS-21)*

| Subscale   | Items                    | Cronbach's alpha |
|------------|--------------------------|------------------|
| Depression | 3, 5, 10, 13, 16, 17, 21 | 0.916            |
| Anxiety    | 2, 4, 7, 9, 15, 19, 20   | 0.891            |
| Stress     | 1, 6, 8, 11, 12, 14, 18  | 0.472            |

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### Concurrent Validity of the DASS-21

The concurrent validity of the 21-item Depression Anxiety Stress Scale (DASS-21) was assessed by examining the relationship between the score of the subscales of DASS-21 and the score of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS). We expected a significant and negative association between the construct of depression, anxiety, and stress and the construct of well-being. As shown in Table 2, the score of the subscale of DASS-21 was significantly correlated with the WEMWBS score. The correlation coefficient ranged from  $r = -.377$  to  $-.615$ .

### Discriminant Validity of the DASS-21

The discriminant validity of the DASS-21 was tested using the factor analysis technique. This technique was used to test the construct validity of DASS-21 by factor analyzing items of DASS-21 together with items of WHOQOL-Bref and determining if the items of DASS-21 and items of WHOQOL-Bref were loaded in the expected factor. We expected the items of the DASS-21 and items of WHOQOL-Bref which measure two different constructs would be loaded into two different factors. Principal Axis Factoring was conducted by using Varimax. The number of factors to extract was fixed to two and the items were selected for each factor based on the factor pattern matrix that the criteria of a factor loading above .40, the item with factor loading that less than 0.40 would be excluded (Clark & Watson, 1995).

All 21 items of DASS-21 and all 26 items of WHOQOL-Bref measured quality-of-life, were analyzed together for determining the factors. The result of the factor analysis shown in Table 3, revealed that all 21 items of DASS-21 were loaded in one component and all the items for WHOQOL-Bref were loaded in another component, except for the QoL3R, QoL4R, and QoL26R. Moreover, QoL26R even has a negative correlation to component 1, which is DASS-21. Yet, items QoL3R and 4R from WHOQOL-Bref do not achieve the loading criteria of more than 0.40. Thus, some adjustments and improvements of these items were needed. Overall, the results indicated a

good convergent and discriminant validity of these two scales.

**Table 2**

*Matrix correlation between the score of the Depression Anxiety Stress Scale (DASS-21) and the score of the Warwick-Edinburgh Mental Well-being Scale (WEMWBS)*

| Measures   | Depression | Anxiety | Stress  |
|------------|------------|---------|---------|
| Depression |            |         |         |
| Anxiety    | .777**     |         |         |
| Stress     | .561**     | .612**  |         |
| Well-being | -.615**    | -.491** | -.377** |

**Table 3**

*Items, Factor Loading, Eigenvalue, and Percentage of Variance for the Depression Anxiety Stress Scale (DASS-21) and World Health Organization Quality of Life (WHOQOL-Bref)*

| Items  | Factor Loading                                                      |                                                                   |
|--------|---------------------------------------------------------------------|-------------------------------------------------------------------|
|        | (Eigenvalue = 17.27 Percentage of variance = 36.75%)<br>Component 1 | (Eigenvalue = 4.47 Percentage of variance = 9.52%)<br>Component 2 |
| MH11   | .826                                                                |                                                                   |
| MH15   | .812                                                                |                                                                   |
| MH12   | .806                                                                |                                                                   |
| MH20   | .757                                                                |                                                                   |
| MH13   | .740                                                                |                                                                   |
| MH17   | .717                                                                |                                                                   |
| MH4    | .712                                                                |                                                                   |
| MH7    | .708                                                                |                                                                   |
| MH19   | .701                                                                |                                                                   |
| MH8    | .695                                                                |                                                                   |
| MH14   | .684                                                                |                                                                   |
| MH6    | .681                                                                |                                                                   |
| MH9    | .671                                                                |                                                                   |
| MH16   | .662                                                                |                                                                   |
| MH10   | .645                                                                |                                                                   |
| MH3    | .634                                                                |                                                                   |
| MH21   | .617                                                                |                                                                   |
| MH1    | .614                                                                |                                                                   |
| MH5    | .586                                                                |                                                                   |
| MH18   | .585                                                                |                                                                   |
| MH2    | .560                                                                |                                                                   |
| QoL26R | -.423                                                               |                                                                   |
| QoL3R  |                                                                     |                                                                   |
| QoL4R  |                                                                     |                                                                   |
| QoL21  |                                                                     | .775                                                              |
| QoL19  |                                                                     | .765                                                              |
| QoL17  |                                                                     | .729                                                              |
| QoL18  |                                                                     | .698                                                              |
| QoL10  |                                                                     | .695                                                              |
| QoL5   |                                                                     | .688                                                              |
| QoL6   |                                                                     | .672                                                              |
| QoL20  |                                                                     | .660                                                              |
| QoL22  |                                                                     | .656                                                              |
| QoL1   |                                                                     | .655                                                              |
| QoL9   |                                                                     | .639                                                              |
| QoL13  |                                                                     | .607                                                              |
| QoL11  |                                                                     | .605                                                              |
| QoL24  |                                                                     | .601                                                              |

|       |      |
|-------|------|
| QoL2  | .587 |
| QoL7  | .587 |
| QoL25 | .574 |
| QoL23 | .565 |
| QoL16 | .564 |
| QoL8  | .543 |
| QoL15 | .511 |
| QoL14 | .502 |
| QoL12 | .467 |

#### Item Analysis of the 21-item Depression Anxiety Stress Scale (DASS-21)

The item-total correlation technique was used to analyze the items of the 21-item Depression Anxiety Stress Scale (DASS-21), with a criterion of the corrected item-total correlation should be more than .30 indicating an acceptable level of correlation between the items (Jani et al., 2020). The item-total correlation coefficient for the DASS-21 subscale shown in Table 4, indicated that all the

items of DASS-21 achieved the criteria of 0.3 corrected item-total correlation coefficient, exception for one of the items (MH14, coefficient = .169) of the stress subscale. This item has a lower level of reliability of the stress subscale (Cronbach alpha = .472). The analysis showed that if item MH14 was deleted the Cronbach alpha value will be increased to .878. As a result, removing this item should be considered.

**Table 4**  
*Item Analysis for the Depression, Anxiety, and Stress Subscales of DASS-21*

| Scale      | Item | Corrected Item-Total Correlation | Cronbach's alpha if the item deleted |
|------------|------|----------------------------------|--------------------------------------|
| Depression | MH3  | .701                             | .908                                 |
|            | MH5  | .683                             | .911                                 |
|            | MH10 | .790                             | .898                                 |
|            | MH13 | .703                             | .907                                 |
|            | MH16 | .802                             | .897                                 |
|            | MH17 | .806                             | .897                                 |
|            | MH21 | .723                             | .906                                 |
| Anxiety    | MH2  | .564                             | .891                                 |
|            | MH4  | .699                             | .875                                 |
|            | MH7  | .728                             | .871                                 |
|            | MH9  | .636                             | .883                                 |
|            | MH15 | .802                             | .862                                 |
|            | MH19 | .701                             | .874                                 |
|            | MH20 | .709                             | .873                                 |
| Stress     | MH1  | .453                             | .411                                 |
|            | MH6  | .415                             | .417                                 |
|            | MH8  | .490                             | .396                                 |
|            | MH11 | .443                             | .410                                 |
|            | MH12 | .572                             | .391                                 |
|            | MH14 | .169                             | .878                                 |
|            | MH18 | .463                             | .395                                 |

#### Discussion

The purpose of the study was to test the reliability, validity, and item analysis for the 21-item Depression Anxiety Stress Scale (DASS-21) among university students in Malaysia during COVID-19 Pandemic. The result showed that this instrument has good reliability for the

depression, anxiety, and stress subscales of the DASS-21 instruments. For the convergent validity, concurrent validity, and discriminant validity, results had shown good and strong validity evidence, while item analysis results for all items within all three subscales also showed strong item-total correlation except for item 14 in the stress scale. if this item is removed it will increase the reliability of this scale thus removing this item should be considered.

Overall, instrument DASS-21 is reliable and valid for testing mental health status. To provide readers with more insight, the result will be elaborate more and discussed precisely in the following paragraphs.

The finding showed Cronbach's alpha values of .916, .891, and .472 for depression, anxiety, and stress respectively. Taber (2018), defined Cronbach's alpha values ranging from 0.91 - 0.93 as excellent reliability, while a reliable level of (0.84 - 0.90) is a sufficient level of reliability, and a value below .40 is low reliability. A study by Coker et al. (2018), reported Cronbach's alpha values of .81, .89, and .78 for depression, anxiety, and stress scale respectively, Li et al. (2021), reported Cronbach's alpha coefficient of .90, .86, and .88 for these three scales. The findings of this study were not consistent with the previous study because the stress subscale for our study is at slightly low reliability. This case had been found to be caused by the existence of a missing value within the collecting data, which is at item MH14. According to Kayri (2011), missing values will cause a decrease in the Cronbach Alpha internal consistency, and hence it can be indicated that the reliability level of our stress subscale is strongly affected by the missing value. Nevertheless, DASS-21 instruments overall still performed with good reliability.

The convergent validity test shown in our result indicates that the convergent validity between 3 subscales which are depression, anxiety, and stress within the DASS-21 instruments, ranged from .561 to .777 ( $>.50$ ), in which the correlation between depression and anxiety, also between depression and stress is .777 and .561 respectively, while the correlation between anxiety and stress is .612. The convergent validity has been claimed to be suggested above .50 to perform a good level of correlation coefficient (Carlson & Herdman, 2010). Whilst, by comparing the result with a previous study conducted by Li et al. (2021), which showed the correlation between depression and anxiety is .77, between depression and stress is .80, and between anxiety and stress is .84, indicating that it has a positive and strong correlation between subscales and overall show that we both have a consistent result. In summary, the convergent validity between the three scales of DASS-21 in our report shows a positive and strongly correlated relationship, and this indicates that the DASS-21 instrument is valid to be used as the instrument for testing mental health.

According to the Department of Health (2016), mental health can influence well-being since well-being is associated with depression and anxiety and the appearance of both these mental illnesses may bring a low level of well-being. If depression, anxiety, and stress subscales are resulting in high levels, then directly it will cause an appearance of low-level well-being. Hence, regarding the statement, to test concurrent validity for DASS-21 instruments, Warwick-Edinburgh Mental Well-being Scale (WEMWBS) instrument that is used for well-being measurement had been applied for our analysis as the evidence of concurrent validity for DASS-21. The results indicate that there is a significant and negative correlation between the three subscales for DASS-21 and well-being. Regarding the result shown in table 2, three subscales of DASS-21 resulted in a high level (positive value), and well-being resulted in a low level (negative value), and this result matches with the statement above. Hence, this instrument can be defined as valid and suitable to measure the mental health aspect. However, there is a lack of

scientific study on the concurrent validity testing between both of these instruments.

In terms of discriminant validity, the World Health Organization Quality of Life Instrument, WHOQOL-Bref (Field Trial Version) had applied for our analysis as the evidence for discriminant validity on DASS-21. Among all the items for the WHOQOL-Bref (Field Trial Version) component, the QOL26R item appears in a negative correlation to the DASS-21 instrument. After further follow-up, the reason for causing such a case had been detected which is the existence of missing value within the QOL26R item. However, the rest items for DASS-21 and WHOQOL-Bref (Field Trial Version) are performed in a positive value, indicating that both of these instruments performed well in discriminant validity. Lastly, the result of item analysis indicated that all the items within the depression subscale for the DASS-21 instrument showed a good correlation with all items exceeding the standard value of .30, as well as for all the items within the anxiety subscale. However, item MH14 within the stress subscale of DASS-21 had shown a value of .169 which define as a positive but weak correlation, and this case is due to the missing value incident happening within it. If the item is deleted from the subscale, it will directly increase Cronbach's alpha to the value of .878 and show a stronger item-total correlation. Overall, DASS-21 is valid for testing the mental health status although some of the values tested resulted in slightly low because of the missing value in item MH14.

## Conclusion

In conclusion, this result demonstrated that DASS-21 instruments possess a high reliability and validity score and can be used as an efficient instrument to assess and measure mental health states which includes depression, anxiety and stress scales among secondary and university students in Malaysia during COVID-19 Pandemic. Nevertheless, there are some limitations facing this study, the first is the online data collection problem, because respondents will answer the questionnaire in their own environment, hence the data collector is somehow difficult and inconvenient to administer the respondents. The second limitation is the lack of scientific study on concurrent validity testing between the DASS-21 and WEMWBS instruments, directly limiting the evidence to support our result. To strengthen the evidence of the DASS-21 instrument as a good or acceptable instrument to be used in the mental health field, further studies will still need to be conducted

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