

Principal Factor and Reliability Analysis of the Malay Version of DASS21, CBI and Brief COPE Questionnaire Among Malaysian OSH Competent Person

Hafizah Pasi^{1*}, Raemy Md. Zein², Muhamad Ariff Ibrahim³, Fauzah Rahimah Mohd Ali¹, Ruzita Mohd Shariff², Khong Chooi Yee², Nur Alyani Fahmi Salihen²

¹Kulliyyah of Medicine, International Islamic University Malaysia, 25200 Kuantan, Pahang, Malaysia

²National Institute of Occupational Safety and Health (NIOSH), 43650 Bandar Baru Bangi, Selangor, Malaysia

³Kulliyyah of Allied Health Sciences, International Islamic University Malaysia, 25200 Kuantan, Pahang, Malaysia

Corresponding author: drhafizah@iium.edu.my

Received: 13th March 2025

Accepted: 23rd Sept 2025

Published: 31st October 2025

Abstract

Background: Questionnaire has long been one of the acceptable forms of data collection tools for medical and health sciences. It is convenient and reliable when used and psychometrically tested for the intended populations. This study aims to evaluate the principal factor and reliability analysis of the Malay versions of DASS21, CBI and Brief-COPE questionnaire among Malaysian OSH competent persons. Methods: A total of 40 OSH competent persons participated in the study. IBM SPSS Statistics for Windows, Version 26.0 software was used for statistical analysis. Principal Factor Analysis was computed to assess factor analysis, while Cronbach's alpha and the intraclass correlation coefficient for individual items were used to measure the internal consistency and reliability of the questionnaires. Results: Principal Factor Analysis revealed that the number of components and items in each questionnaire aligned with the original versions, and the Kaiser's criterion, along with Cattell's rule, supported the appropriate number of factors to be retained for each questionnaire. Reliability testing indicated that all questionnaires demonstrated high internal consistency and exhibited good to excellent reliability, with Cronbach's alpha values ranging from 0.900 to 0.951 and intraclass correlation coefficient values ranging from 0.895 to 0.946. Conclusion: This study showed that the Malay versions of DASS21, CBI and Brief-COPE questionnaires are validated tools for use among Malaysian OSH competent persons.

Keywords: validation, DASS21, CBI, COPE, OSH

Introduction

Questionnaires are widely accepted as reliable data collection tools in medical and health sciences when properly adapted and validated. In the context of occupational safety and health (OSH), competent persons play a vital role as they are legally appointed, trained, and certified by the Department of Occupational Safety and Health (DOSH) Malaysia to oversee workplace safety and health compliance. According to DOSH, more than 68,000 individuals are registered as OSH competent persons, reflecting the importance of this professional group in ensuring safe work environments.^{1,2} However, despite their critical responsibilities, little is known about the psychosocial and mental health burden among this population. OSH competent persons are exposed to high-stress situations, including accident investigations, enforcement of safety regulations, and managing workers' welfare, which may increase their vulnerability to depression, anxiety, stress, burnout, and maladaptive coping. This justifies the need to validate psychometric instruments specifically for this group, rather than general workers or healthcare professionals. By focusing on OSH competent persons, this study addresses a knowledge gap and provides evidence for the reliable use of validated Malay questionnaires in assessing their psychological well-being.³

Moving on to the questionnaire, the 21-item Depression Anxiety Stress Scale (DASS21) is a self-report questionnaire comprising 21 items divided into three subscales, with seven items in each subscale, designed to assess depression, anxiety, and stress over the past week. This originally 42-item questionnaire was developed by Lovibond & Lovibond in 1995, before it was revised and made shorter into a 21-item questionnaire.⁴ Higher scores indicate greater severity of depression, anxiety, or stress disorder among respondents. The widely used Malay version was the one translated by Musa et al.⁵ with a Cronbach alpha value of 0.84, .074 and 0.79, respectively and items' factor loadings of more than 0.4. Other than that, the Malay version has also been tested by other authors among different populations in Malaysia, including the working population.^{6,7,8,9,10,11}

Focusing on the Copenhagen Burnout Inventory, CBI; this questionnaire was designed by Kristensen et. al¹² to address some of the limitations of the then questionnaire of choice in the measurement of burnout, the Maslach Burnout Inventory, MBI. CBI has 18 items and is categorized into three main burnout domains, which are personal burnout, work-related burnout, and client-related burnout. The initial Malay version of the original questionnaire was translated by Andrew Chin et al.¹³, in 2017 with a good Cronbach alpha value ranging between 0.83 to 0.87, and good levels of goodness-of-fit indices. Another Malay version, which was tested among Malaysians by Ahmad Sabki et. al¹⁴ during the pandemic COVID-19, also revealed a good reliability analysis value of more than 0.8. Additionally, the same questionnaire was also tested in other countries and populations, and the analysis showed a good psychometric property.^{15,16,17,18,19}

Lastly, for the Coping Orientation to Problems Experienced Inventory questionnaire (COPE), the questionnaire was initially developed as a 60-item questionnaire by Carver et al.,²⁰ before it was subsequently developed into a 28-item version, the Brief COPE, which was tested in this current study.²¹ It was a 28-item self-report questionnaire and was rated on the four-point Likert scale. In total, there were 14 dimensions covered by this scale, with every dimension having two items, thus bringing a total of 28 items altogether. This Malay version of the questionnaire was translated and locally validated with good validity and reliability by Yusoff et al. in 2009.²²

Therefore, the current study aims to evaluate the principal factor and reliability analysis of the Malay version of the 21-item Depression Anxiety Stress Scale, DASS21; the 18-item Malay Copenhagen Burnout Inventory, CBI and the 28-item Malay Brief Coping Orientation to Problems Experienced, Brief-COPE questionnaire among Malaysian OSH competent persons.

Methods

This study adopted a cross-sectional validation design conducted between June and September 2023. Data were collected through an online survey distributed to OSH competent persons registered under the Department of Occupational Safety and Health (DOSH) Malaysia. Potential participants were approached via professional WhatsApp groups, email lists, and networks facilitated by NIOSH training alumni.

For sampling, the convenience sampling method was applied, where all eligible and consenting participants were invited until the required sample size was achieved. Additionally, eligibility criteria include participants had to be (i) registered and certified as OSH competent persons by DOSH, (ii) aged 18 years or older, and (iii) able to read and respond in Malay.

21-item Depression Anxiety Stress questionnaire, DASS21

As stated above, the depression, anxiety and stress symptoms questionnaire to be tested in this current study was the Malay version of the Depression Anxiety Stress Scale (DASS)-21. The DASS-21 is a self-report questionnaire composed of 21 items divided into three subscales, with seven items per subscale, assessing depression, anxiety, and stress over the past week. Each item presents a statement with four response options, scored on an ordinal scale from 0 (Did not apply to me at all) to 3 (Applied to me very much, or most of the time). The scores for each set of seven items are summed to provide a subscale score, which is interpreted as 'normal,' 'mild,' 'moderate,' 'severe,' or 'extremely severe' based on predefined criteria. To compare with the full DASS-42, subscale scores are multiplied by two, with higher scores indicating greater severity of depression, anxiety, or stress.⁵

Copenhagen Burnout Inventory, CBI

The next questionnaire used to measure the burnout symptoms was the Copenhagen Burnout Inventory (CBI). The Copenhagen Burnout Inventory used in this study is an 18-item Malay version of the original questionnaire.¹³ There are three main burnout domains measured by this questionnaire which were personal burnout, work-related burnout, and client-related burnout. In terms of scoring, it is rated by a five-point Likert scale, ranging from "0" to "4", with high scores indicating high levels of burnout. There are two sets of ratings used for this questionnaire. For item 1(a-f) under domain personal burnout, item 2 (d-f) under work-related and 3 (e-f) under client-related, the scales range from "always, often, sometimes, seldom to never/almost never" ("0" to "4"). On the other hand, the other set of ratings used was "to a very high degree, to a high degree, somewhat, to a low degree and to a very low degree (score "0" to "4"). These are specifically for items under work-related, 2 (a-c), and client-related, 3 (a-d).^{12,13}

Coping Orientation to Problems Experienced Inventory questionnaire, COPE

The last questionnaire to be tested in this current study was the Malay version Brief-COPE questionnaire. It was a 28-item self-report questionnaire and was rated by the four-point Likert scale, ranging from "I haven't been doing this at all" (score one) to "I have been doing this a lot" (score four). In total, 14 dimensions were covered by this scale. These are self-distraction, active coping, denial, substance use, use of emotional support, use of instrumental support, behavioural disengagement, venting, positive reframing, planning, humour, acceptance, religion and self-blame. Every dimension has two items, thus bringing a total of 28 items altogether. Interpretation-wise, a higher total score represents greater coping strategies used by the respondents. The questionnaire version tested in this study was the locally validated Malay version with good validity and reliability.²²

The questionnaires were pretested on a group of fifteen OSH competent persons who were not part of the main study participants. They were asked to highlight and elaborate on any confusing or unclear terms, either by marking them on the questionnaire, providing verbal feedback, or sending messages to the researchers. This

step was taken to ensure the clarity and readability of the questionnaires. Following the evaluation and incorporation of feedback from this pretest, data collection commenced. The study received approval from the National Institute of Safety and Health (NIOHS), Malaysia's ethical and research committee (Project ID: 03.16/03/PSYCHOLOGICAL (1)/ 2022/01). The first section of the questionnaire included a general description of the study along with an informed consent form. Participants were assured that all information provided would remain confidential. In addition, each respondent is required to digitally sign the informed consent form before participating in the study. Additionally, a brief description of the study and the reasons for their selection as participants was provided. Furthermore, respondents were informed of their right to withdraw at any time and how their data would be used. Throughout the research, the researchers are expected to adhere to the principles outlined in the Declaration of Helsinki and the Malaysian Good Clinical Practice Guidelines. The respondents' demographic variables were analyzed using IBM SPSS Statistics for Windows, Version 26.0. Principal Factor Analysis (PFA) was used to evaluate all three questionnaires—the Malay version of DASS21, CBI, and the brief COPE—while Cronbach's alpha and total item correlation were computed to assess the internal consistency and reliability of the questionnaires.

Results

All 40 OSH competent persons participated and completed the online questionnaire. The majority were Malay (90.0%), male (87.5%), with a mean age of 30.2 ± 8.6 years old. Additionally, the majority were married (90.0%) with a mean number of children of 3 ± 2 , attained the highest education up to diploma (40.0%), and median household income of RM 8000 (~ USD 1700) with an interquartile range of RM 5000 to 10 000 (~ USD 1055 to 2100) per month.

Principal Factor Analysis

The adequacy of the items in each questionnaire for this study was evaluated using Principal Factor Analysis (PFA). For the Malay version of DASS21, the results showed the three best components with eigenvalues greater than one and a total variance explained of over 43%, which is consistent with the original version of the questionnaire. In total, the first component contained seven items, the second component also had seven items, and the third component included seven items. The scree plot (Figure 1) indicated that retaining at least three factors is appropriate. The Varimax-rotated component matrix revealed that all factor loadings exceeded 0.5, except for item 13, which had a factor loading of 0.306. The remaining items had factor loadings ranging from 0.575 to 0.887 (Table 1). Additionally, the Kaiser-Meyer-Olkin (KMO) value was 0.815, and Bartlett's test of sphericity was significant with a p-value of less than 0.05.

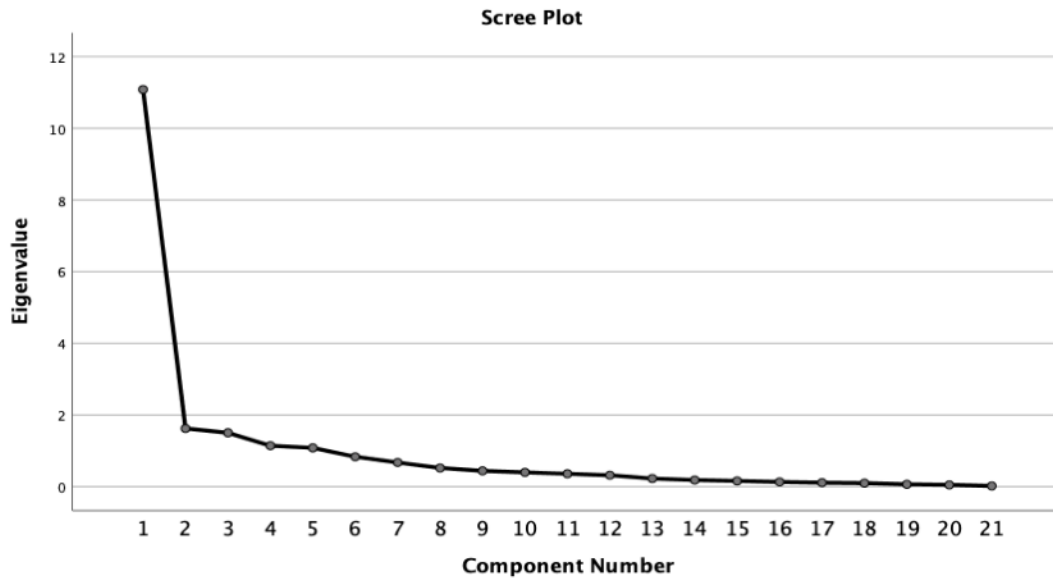


Figure 1: Scree Plot: Malay version of Depression Anxiety and Stress Scale 21 (DASS-21)

Table 1: Factor and reliability analysis of the Malay version of the Depression Anxiety and Stress Scale 21 (DASS-21) (N=40)

Question items	Factor (DASS-21)	Factor Loading	Cronbach's alpha	Total Cronbach's alpha	Intraclass Correlation Coefficient	Total Intraclass Correlation Coefficient
Q3	1 (Depression)	.633	0.931	0.951	0.875	0.925
Q5		.660				
Q10		.812				
Q13		.306				
Q16		.693				
Q17		.790				
Q21		.887				
Q2		.715				
Q4	.575	0.844	0.824		0.925	
Q7	.703					
Q9	.615					
Q15	.742					
Q19	.623					
Q20	.768					
Q1	.722					
Q6	.542					
Q8	.674					
Q11	.637					
Q12	.606					
Q14	.592					
Q18	.680					

Shifting the focus to the next questionnaire, the Malay version of CBI, just like DASS21, analysis showed that there were three best components with eigenvalues of more than one and weightage of over 43%, much like the original versions. There were six items within each of the components, following the three domains of the questionnaire: the personal-burnout, work-related burnout, and client-related burnout. The scree plot (Figure 2) showed a similar pattern to that of DASS21, indicating that retaining at least three factors was appropriate. In the rotated component matrix using Varimax rotation, all items demonstrated strong factor loadings, with the lowest being item 10 at 0.593 and the highest being item 14 at 0.910 (Table 2). Furthermore, the Kaiser-Meyer-Olkin (KMO) value was 0.843, and Bartlett's test of sphericity yielded a significant p-value of less than 0.05.

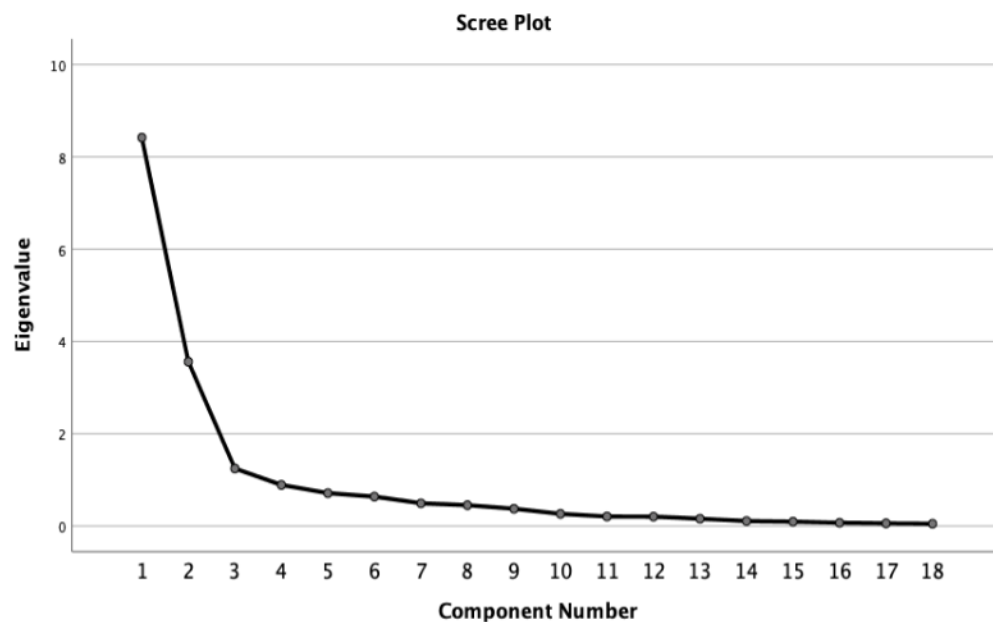


Figure 2: Scree Plot Malay Copenhagen Burnout Inventory (CBI)

Table 2: Factor and reliability analysis of the Malay Copenhagen Burnout Inventory (CBI) (N=40)

Question items	Factor (CBI)	Factor Loading	Cronbach's alpha	Total Cronbach's alpha	Intraclass Correlation Coefficient	Total Intraclass Correlation Coefficient
Q1	1 (Personal burn-out)	.903	0.919	0.932	0.910	0.946
Q2		.886				
Q3		.708				
Q4		.619				
Q5		.851				
Q6		.581				
Q7	2 (Work-related burnout)	.826	0.876		0.917	
Q8		.780				
Q9		.696				
Q10		.593				

Q11		.676		
Q12		.695		
Q13		.879		
Q14		.910		
Q15	3 (Client-	.901	0.950	0.941
Q16	related	.825		
Q17	burnout)	.881		
Q18		.856		

Addressing the third questionnaire, the Malay version brief COPE, results showed that were fourteen best components with eigenvalues more than one and weightage of over 43% found during the analysis (Figure 3), maintaining the same dimensions as the original versions; self-distraction, active coping, denial, substance abuse, use of emotional support, use of instrumental support, behavioral disengagement, venting, positive reinterpretation, planning, humor, acceptance, religion and self-blame. Moreover, results of the rotated component matrix with varimax rotation analysis showed that all items have a good factor loading ranging between 0.543 and 0.916 (Table 3). Despite that, the Kaiser-Meyer-Olkin value of this questionnaire in the current study was only 0.423, albeit the Bartlett's test of sphericity showed a significant p-value <0.05.

Additionally, for all the questionnaires, no substantial cross-loadings were observed that would compromise factor structure. The percentage of variance explained was 43% for DASS-21, 46% for CBI, and 41% for Brief-COPE.

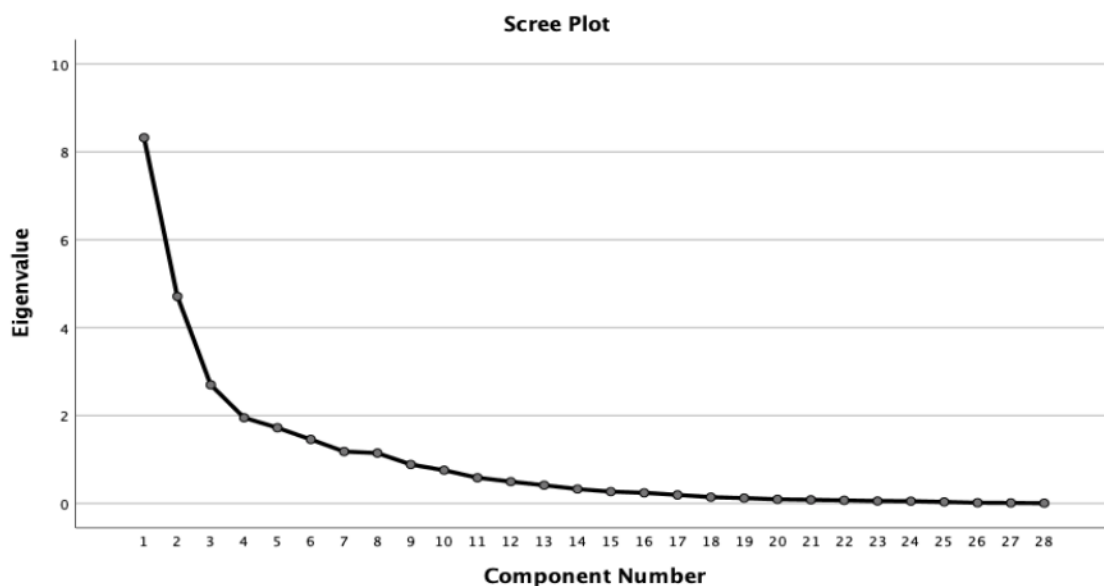


Figure 3: Scree Plot Malay Brief Coping Orientation to Problems Experienced Inventory (Brief-COPE)

Table 3. Factor and reliability analysis of the Malay Brief Coping Orientation to Problems Experienced Inventory (Brief-COPE) (N=40)

Question items	Factor (Brief-COPE)	Factor Loading	Cronbach's alpha	Total Cronbach's alpha	Intraclass Correlation Coefficient	Total Intraclass Correlation Coefficient
Q1A	1 (Self-distraction)	.543	0.57		0.823	
Q2A		.705				
Q3B		.694				
Q4B	2 (Active Coping)	.696	0.80		0.825	
Q5C		.784				
Q6C	3 (Denial)	.438	0.70		0.753	
Q7D		.913				
Q8D	4 (Substance Abuse)	.939	0.94		0.859	
Q9E		.788				
Q10E	5 (Use of emotional support)	.729	0.92		0.942	
Q11F		.876				
Q12F	6 (Use of instrumental support)	.817	0.86		0.848	
Q13G		.908				
Q14G	7 (Behavioural Disengagement)	.916	0.95	0.90	0.942	0.895
Q15H		.836				
Q16H	8 (Venting)	.861	0.28		0.623	
Q17I		.584				
Q18I	9 (Positive Reinterpretation)	.835	0.74		0.926	
Q19J		.790				
Q20J	10 (Planning)	.885	0.92		0.902	
Q21K		.778				
Q22K	11 (Humour)	.821	0.79		0.766	
Q23L		.692				
Q24L	12 (Acceptance)	.663	0.79		0.810	
Q25M		.788				
Q26M	13 (Religion)	.831	0.96		0.797	
Q27N		.903				
Q28N	14 (Self-blame)	.908	0.93		0.812	

Internal consistency reliability analysis

The overall Cronbach's α coefficient of the Malay version of all three of these questionnaires was found to be good, with values of 0.951 for DASS21, 0.932 for CBI-M and 0.900 for M-COPE. Detailing on each questionnaire, for DASS21, results of the analysis showed that eight items showed high internal consistency with Cronbach's alpha values of more than 0.7, while the rest of the items showed an acceptable internal consistency with Cronbach's alpha values of more than 0.5. Apart from that, the Cronbach's alpha values for each of the domains' depression, anxiety, and stress also showed a good internal consistency with values of 0.931, 0.844 and 0.848, respectively. Likewise, the intraclass correlation coefficient, ICC, also showed an excellent reliability with a value of 0.925 (ICC for domains ranges between 0.806 to 0.875) (Table 1).

Zeroing in on CBI-M, it was found that twelve of the items within the questionnaire showed high internal consistency with Cronbach's alpha values of between 0.708 to 0.910, while the rest of the items showed an acceptable value of between 0.593 to 0.696. Additionally, with overall Cronbach's alpha values of 0.932, each domain also showed high internal consistencies with Cronbach's alpha values of 0.919 for the personal burnout domain, 0.876 for work-related burnout and 0.950 for client-related burnout. In line with that, just as DASS21, the ICC of CBI-M showed an excellent reliability with a value of 0.946 (domains range between 0.910 to 0.941) (Table 2).

Lastly, for the M-COPE questionnaire, all the questionnaire dimensions have high internal consistencies with Cronbach's alpha values of between 0.70 to 0.96, except for two dimensions, namely the self-distraction, which has an acceptable Cronbach's alpha value of 0.57 and the venting dimension, which has a low Cronbach's alpha value of 0.28. Nonetheless, the overall Cronbach's alpha value of the questionnaire was high, with a value of 0.90. Following the same trend, the ICC of M-COPE also showed a good reliability with a value of 0.895 (domains range between 0.623 to 0.942) (Table 3).

Discussion

Validation in OSH competent persons may yield distinct psychometric findings compared to healthcare workers or general populations. Unlike healthcare professionals whose stressors arise from patient care, OSH professionals experience stress linked to accident investigations, enforcement of safety regulations, and ensuring compliance with legislation.³³ These stressors may influence coping patterns, such as lower reliance on venting and higher use of problem-focused coping. The occupational context, therefore, underscores the importance of validating psychometric instruments in this specific population rather than assuming equivalence with other worker groups.³⁴

The current study was conducted to validate the three commonly used questionnaires among workers, and in the case of this current study, the OSH competent persons, through principal factor analysis and reliability analysis. The three mentioned questionnaires were the Malay version of DASS21, CBI and Brief COPE. Principal Factor Analysis performed on all three of the questionnaires showed that the number of components and items within each questionnaire was in concordance with the original version of the questionnaires.^{5,13,22} Additionally, the Kaiser's criterion and Cattell's rule to obtain all factors with eigenvalues equal to or more than 1 and to pick all factors prior to where the plot levels off^{24,25} were also supported in this study, as scree plots plotted for each questionnaire supported the findings on the number of factors suitable to be retained. Therefore, these findings bring forth the evidence that all three of these questionnaires have a good construct validity and can be used as valid tools for measuring depression, anxiety and stress, burnout symptoms and coping orientation among the intended populations.

Moving on to the reliability testing of the questionnaires, once again, analyses showed that all three questionnaires have high internal consistencies with Cronbach's alpha values ranging between 0.900 to 0.951. The Venting subscale of the Brief-COPE, however, demonstrated poor reliability ($\alpha = 0.28$), likely due to cultural factors that discourage overt frustration in Malaysian workplaces, the instability of two-item subscales, and the small sample size.^{35,36} This subscale should therefore be interpreted with caution, and future research may refine or expand its items. Nevertheless, the intraclass correlation coefficient showed values ranging between 0.895 to 0.946, which further support the good to excellent reliability analysis findings and good internal consistencies of all the questionnaires. Thus, by way of conclusion, it can be said that all three of these questionnaires are reliable instruments to be used among OSH competent persons in Malaysia.

Comparing these findings with the previous studies that were testing the psychometric properties of these questionnaire among group of workers, the results of a study by Edimansyah et al.²⁶ among 184 automotive assembly workers in two major plants in Pahang, Malaysia showed that just as the current study, results of the exploratory factor analysis performed showed three suitable factors which confirmed the three theoretical constructs of the instruments as the original versions. Additionally, the reliability analysis, albeit lower than the current study, resulted in an alpha Cronbach value of between 0.88 to 0.91, which indicated satisfactory internal consistency. Moving on to another study conducted to test the psychometric property of Malay DASS21, a study by Azma et.al.⁹ among nurses at a private hospital in Klang Valley, Malaysia, showed a similar pattern of good factor and reliability analysis as the current study. However, although the trend was the same, the analysis of the then study showed slightly lower Cronbach alpha values of between 0.76 to 0.81 versus 0.84 to 0.91, respectively. The same was seen for the factor analysis, whereby the factor loading for the items in the then study was between .52 to .80 as compared to the current study, which was between .54 to .92.

Continuing with the second questionnaire, the Malay version CBI, previous published studies on psychometric testing of the Malay version of this questionnaire among other groups of workers were not as plentiful as DASS21. These studies were conducted to measure the burden of occupational burnout among a specific group of workers, such as medical therapist²⁷ or other groups of the population, such as caregivers of a patient,^{28,29} rather than to measure its psychometric properties. Additionally, psychometric testing of the questionnaire was conducted for the translated version to other languages, namely Serbian,¹⁷ Brazilian, and Portugese¹⁵ were also showing a good validity and reliability status of the translated questionnaire. Nevertheless, comparing the current study with the original version of the translated Malay questionnaire by Andrew Chin et al¹³ showed equally good psychometric properties of the questionnaires.

Focusing on the last questionnaire, just like the Malay version of the CBI questionnaire, previous published studies on psychometric testing of the Malay version of the M-COPE questionnaire were not as vast as DASS21, and even so, among a group of workers. One of the published articles on the M-COPE was conducted among adolescents in secondary schools, while the other one was a multicenter study among medical students.^{22,30} Just as the original version and the current study, both of these studies showed good psychometric values. For a published article on psychometric testing of the questionnaire translated to other languages, a study conducted in Saudi Arabia for an Arabic version³¹ showed it to be a valid and reliable tool to be used among the Saudi population. Additionally, another study was conducted in Saudi Arabia to test the psychometric properties of the questionnaire among specific healthcare workers, namely nurses, using the original English version of the Brief COPE.³² However, the result of the said study demonstrated inconsistent results and concluded that it could be influenced by the different cultures, generations, types of stressors, and populations. The author subsequently suggested further studies that will take into account all these factors, as was done by the earlier discussed and this current study.

It is important to put forward several limitations faced by this current study. Firstly, the OSH competent person is predominantly male profession in Malaysia. Thus, as the study population of this current study, this could potentially introduce a gender bias in respondent selection within the study. Secondly, the utilization of self-filled questionnaires as the data collection method may introduce information bias, which needs to be taken into account. Thirdly, the relatively small sample size (n=40) is a limitation, particularly for multi-item scales such as Brief-COPE. Psychometric guidelines generally recommend 5–10 participants per item, which would require >100 respondents for adequate power. Therefore, this study should be considered a pilot validation, with results interpreted cautiously and requiring replication in larger OSH populations. And lastly, one of the important considerations in validating translated questionnaires is the possibility of semantic discrepancies

between English and Malay terms. Certain words in Bahasa Malaysia may carry slightly different connotations, which could affect how respondents interpret and answer items. For example:

Stress item: *"I found it hard to wind down"* (English) vs. *"Saya sukar untuk bertenang"* (Malay). The Malay version emphasizes difficulty in calming down, which may be perceived more as irritability than stress.

Burnout item: *"How often do you feel tired?"* (English) vs. *"Sejauh mana anda berasa letih?"* (Malay). The Malay phrase *"sejauh mana"* may be interpreted as intensity rather than frequency, altering the intended meaning.

Coping item: *"I've been blaming myself for things that happened"* (English) vs. *"Saya menyalahkan diri saya atas perkara yang berlaku"* (Malay). While both capture self-blame, the Malay version may be interpreted more harshly, suggesting guilt rather than reflective self-attribution. These subtle variations highlight the challenges of ensuring conceptual equivalence across languages. Although the overall psychometric properties of the Malay versions remain strong, future studies should consider conducting cognitive debriefing interviews or back-translation reviews to refine the items further among various worker populations.

Conclusions

In conclusion, the present study provides evidence that the Malay versions of the DASS-21, CBI, and Brief-COPE are valid and reliable instruments for assessing psychological distress, burnout, and coping strategies among Malaysian OSH competent persons. Despite the limitations of a relatively small sample size, the findings contribute to addressing an important gap by extending psychometric validation to this occupationally specific group, whose work context is uniquely associated with compliance enforcement and safety responsibilities. These results support the use of these instruments for future research and workplace interventions targeting OSH personnel, while also highlighting the need for larger-scale studies to confirm the robustness of the psychometric properties and to refine subscales.

Funding

The grant to finance the conduct of this study was under NIOSH Malaysia Research Grant 2022 (Project ID: 03.16/03/PSYCHOLOGICAL (1)/ 2022/01), which was approved in April 2022.

Conflict of Interest Statement

There was no conflict of interest between the authors of this paper.

References

1. Jones TL, Baxter MA, Khanduja V. A quick guide to survey research. *Ann R Coll Surg Engl.* 2013;95(1):5-7.
2. Aithal A, Aithal S. Development and validation of survey questionnaire and experimental data: a systematical review-based statistical approach. *Int J Manag Technol Soc Sci.* 2020;5(2):233-251.
3. Department of Occupational Safety and Health Malaysia. Competent person. Malaysia: *DOSH*; 2023.
4. Lovibond PF, Lovibond SH. The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behav Res Ther.* 1995;33(3):335-343.
5. Musa R, Fadzil MA, Zain Z. Translation, validation and psychometric properties of Bahasa Malaysia version of the Depression Anxiety and Stress Scales (DASS). *ASEAN J Psychiatry.* 2007;8:82-89.
6. Abidin E, Nordin R, Naing L. Translation and validation of the Malay version of the short-form Depression Anxiety Stress Scale (DASS-21) for the epidemiology survey of working population in Malaysia. *Ind Health.* 2007;45(3):437-448.
7. Ramli M, Salmiah M. Validation and psychometric properties of Bahasa Malaysia version of the Depression Anxiety and Stress Scales (DASS) among diabetic patients. *Malays J Psychiatry.* 2009;18(2).

8. Musa R, Ramli R, Abdullah K, Sarkarsi R. Concurrent validity of the depression and anxiety components in the Bahasa Malaysia version of the Depression Anxiety and Stress Scales (DASS). *ASEAN J Psychiatry*. 2011;12(1):93-95.
9. Azma NB, Rusli B, Quek K, Noah R, Health P. Psychometric properties of the Malay version of the Depression Anxiety Stress Scale-21 (M-DASS21) among nurses in public hospitals in the Klang Valley. *Int J Collab Res Intern Med Public Health*. 2014;6(5):109.
10. Nordin RB, Kaur A, Soni T, Por LK, Miranda S. Construct validity and internal consistency reliability of the Malay version of the 21-item Depression Anxiety Stress Scale (Malay-DASS-21) among male outpatient clinic attendees in Johor. *Med J Malaysia*. 2017;72(5):265.
11. Musa R, Maskat R. Psychometric properties of Depression Anxiety Stress Scale 21-item (DASS-21) Malay version among a big sample population. *Mediterr J Clin Psychol*. 2020;8(1):1-11.
12. Kristensen TS, Borritz M, Villadsen E, Christensen KB. The Copenhagen Burnout Inventory: a new tool for the assessment of burnout. *Work Stress*. 2005;19(3):192-207.
13. Chin RWA, Chua YY, Chu MN, et al. Investigating validity evidence of the Malay translation of the Copenhagen Burnout Inventory. *J Taibah Univ Med Sci*. 2017;13(1):1-9.
14. Ahmad Sabki Z, Kim LH, Danaee M, et al. Assessment of psychometric properties of the Malay version of the Brief Resilience Scale (BRS-M) among non-academic staff working from home during COVID-19 in Malaysia. *Healthcare (Basel)*. 2023;11(8):1146.
15. Campos JADB, Carlotto MS, Marôco J. Copenhagen Burnout Inventory–student version: adaptation and transcultural validation for Portugal and Brazil. *Psicol Reflex Crit*. 2013;26(1):87-95.
16. Bolatov AK, Seisembekov TZ, Askarova AZ, et al. Psychometric properties of the Copenhagen Burnout Inventory in a sample of medical students in Kazakhstan. *Psychol Russ*. 2021;14(2):15-24.
17. Piperac P, Todorovic J, Terzic-Supic Z, et al. The validity and reliability of the Copenhagen Burnout Inventory for examination of burnout among preschool teachers in Serbia. *Int J Environ Res Public Health*. 2021;18(13):6805.
18. Todorovic J, Terzic-Supic Z, Divjak J, et al. Validation of the Study Burnout Inventory and the Copenhagen Burnout Inventory for the use among medical students. *Int J Occup Med Environ Health*. 2021;34(6):737-745.
19. Ogunsuji O, Ogundipe H, Adebayo O, et al. Internal reliability and validity of Copenhagen Burnout Inventory and Oldenburg Burnout Inventory compared with Maslach Burnout Inventory among Nigerian resident doctors: a pilot study. *Dubai Med J*. 2022;5(2):89-95.
20. Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. *J Pers Soc Psychol*. 1989;56(2):267-283.
21. Carver CS. You want to measure coping but your protocol's too long: consider the Brief COPE. *Int J Behav Med*. 1997;4(1):92-100.
22. Yusoff N, Low WY, Yip CH. Reliability and validity of the Malay version of Brief COPE scale: a study on Malaysian women treated with adjuvant chemotherapy for breast cancer. *Malays J Psychiatry*. 2009;18(1):27-35.
23. Johanson G, Brooks G. Initial scale development: sample size for pilot studies. *Educ Psychol Meas*. 2010;70(3):394-400.
24. Kaiser HF. The varimax criterion for analytic rotation in factor analysis. *Psychometrika*. 1958;23(3):187-200.
25. Cattell RB. The scree plot test for the number of factors. *Multivar Behav Res*. 1966;1(2):140-161.
26. Edimansyah BA, Rusli BN, Naing L. Reliability and construct validity of the Malay version of the Depression Anxiety Stress Scales (DASS) in automotive assembly workers in Malaysia. *Malays J Public Health Med*. 2007;7:25-30.

27. Mohd Poot EF, Lingok K. Prevalence and risk factors associated with burnout among occupational therapists. *Healthscope J.* 2022;5(2):19-23.
28. Abdullah SA, Ab Razak S, Yusoff MSB, et al. Burnout and stressor-related factors among caretakers of children with chronic neurological illness. *Malays J Paediatr Child Health.* 2021;27(2):7-18.
29. Mohamad N, Ilias MI, Ab Hamid SA, Othman Tan EES, Hazlan SNH. Burnout among caretakers of paediatric patients with chronic kidney disease. *Malays J Med Health Sci.* 2022;18(4):89-95
30. Yusoff MSB. The validity of the Malay Brief COPE in identifying coping strategies among adolescents in secondary school. *Int Med J.* 2011;18:29-33.
31. Alghamdi M. Cross-cultural validation and psychometric properties of the Arabic Brief COPE in Saudi population. *Med J Malaysia.* 2020;75(5):502-509.
32. Abdul Rahman H, Bani Issa W, Naing L. Psychometric properties of Brief-COPE Inventory among nurses. *BMC Nurs.* 2021;20(1):73.
33. Madarsara TJ. Assessment and evaluation of occupational stress among employees. *Asian Pac J Environ Cancer.* 2019;2(2):13-19. doi:10.31557/apjec.2019.2.2.13-19
34. Lu C, Yu D, Luo Q, Xu C. A study of the effects of job stress on the psychosocial safety behavior of construction workers: the mediating role of psychological resilience. *Buildings.* 2023;13(8):1930. doi:10.3390/buildings13081930
35. Eisinga R, Grotenhuis MT, Pelzer B. The reliability of a two-item scale: Pearson, Cronbach or Spearman-Brown? *Int J Public Health.* 2013;58(4):637-642. doi:10.1007/s00038-012-0416-3
36. Morgado FFR, Meireles JFF, Neves CM, Amaral ACS, Ferreira MEC. Scale development: ten main limitations and recommendations to improve future research practices. *Psicol Reflex Crit.* 2018;30:3. doi:10.1186/s41155-016-0057-1