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VALIDITY AND RELIABILITY OF THE PATIENT HEALTH QUESTIONNAIRE (PHQ-9) INSTRUMENT AMONG SCHOOL STUDENTS

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ABSTRACT

This study aims to assess the validity and reliability coefficients of the Malay version of the Patient Health Questionnaire-9 (PHQ-9) instrument among school students. The instrument was translated from the PHQ-9, developed by Kroenke et al. (2001). PHQ-9 is used to measure depression symptoms according to the criteria in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV-TR). The validity and reliability testing was conducted on the PHQ-9 instrument because no prior study has examined how suitable the Malay version of PHQ-9 is for use among school students in Malaysia. Content validity needed to be re-evaluated as the sentence structure in each item required refinement to ensure that every item was fully understood by respondents. The instrument was first evaluated by seven expert panels before being distributed to the study respondents. A pilot study involving 327 students aged 16 and 17 from two states in Malaysia, Negeri Sembilan and Selangor, was conducted to obtain the reliability value of the instrument using the Statistical Package for Social Sciences (SPSS) version 26.0. The results showed that PHQ-9 had a high content validity index (CVI) of 0.87, based on expert panel ratings. The findings also indicated that PHQ-9 had a high reliability value, with a Cronbach's Alpha of α=0.84. In conclusion, the Malay version of the PHQ-9 instrument can be used to identify the level of depression among school students, as it has proven to have high validity and reliability. Students diagnosed with high levels of depression should be given early treatment to prevent more serious mental health issues.

Keywords: PHQ-9, Depression, student, validity, reliability

INTRODUCTION

Recently, an average of one in eight people worldwide suffers from mental health disorders, with anxiety and depression being the most common issues (World Health Organization, 2022). Current statistics indicate that depression is the second most prevalent mental disorder globally, affecting 280 million people, equivalent to 3.8% of the world population. More concerning is the fact that 700,000 individuals who suffer from depression commit suicide each year, with the majority being aged 15 to 29 (National Health and Morbidity SurveY, 2023).

In Malaysia, statistics on suicide among adolescents are also on the rise. The National Health and Morbidity Survey (2022) found that one in eight adolescents had thought about committing suicide, with 13.1% reporting such thoughts. Additionally, 9.5% of adolescents have attempted suicide. Findings from the PHQ-9 screening in this study revealed that 1 in 4 adolescents experienced depression, with 36.1% being affected, and 17.7% involving male adolescents (Institut Kesihatan Umum, 2022). To address the increasing statistics on suicide, the primary focus must be on

interventions targeting depression to prevent the issue from escalating. This is because suicide often stems from untreated depression at its early stages (Abdul Aziz & Ab Razak, 2021).

Recognizing the growing concern of mental health issues among adolescents, the Ministry of Education Malaysia has taken proactive measures through an official circular, KPM.600-17/1/22 JLD.6 (34), dated October 16, 2022. The circular mandates that all educational institutions under the Ministry of Education Malaysia must conduct mental health screenings using instruments such as the emotional needs checklist, the Patient Health Questionnaire (PHQ-9), and the General Anxiety Disorder (GAD-7) (Ministry of Education Malaysia, 2022). These screenings aim to identify students experiencing emotional, psychological, and mental issues post-COVID-19 pandemic and enable them to receive early assistance from school counselors (Ministry of Education Malaysia, 2022).

One of the questionnaires used in the "Saringan Minda Sihat" (Mental Health Screening) distributed by the Ministry of Education Malaysia is the Patient Health Questionnaire (PHQ-9) (Ministry of Education Malaysia, 2022). The PHQ-9 is an instrument developed to identify depression levels according to the symptoms outlined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) (Kroenke et al., 2001). A validation study of the PHQ-9 was conducted on 6,000 patients across 8 health clinics and 7 obstetrics and gynecology clinics. The study found that the PHQ-9 had a high validity value of 0.88 and a reliability value of Cronbach's Alpha α=0.89 among patients receiving treatment at health clinics.

Moreover, PHQ-9 is a highly popular questionnaire in the field of mental health due to its brief yet comprehensive nature, covering all symptoms of depression according to DSM-IV. The PHQ-9 has been translated into various languages worldwide, including Bolivia (Bazo-Alvarez et al., 2024), China (Liang et al., 2023; Peng et al., 2020; Sun et al., 2022), Peru (Lingán-Huamán et al., 2023), Italy (Stefana et al., 2023), Korea (M. Kim et al., 2023; S. Kim et al., 2021; Lee, 2021), Kenya (Odero et al., 2023), Iraq (Policastro et al., 2023), Africa (Makhubela & Khumalo, 2023; Marlow et al., 2023a), Spain (Gómez-Gómez et al., 2023), Iran (Ghazisaeedi et al., 2022), Argentina (Matrángolo et al., 2022), Lithuania (Pranckeviciene et al., 2022), Peru (Smith et al., 2022), Bangladesh (Rahman et al., 2022), Norway (Brattmyr et al., 2022a), Scotland (Beswick et al., 2022), United States (Lynch et al., 2021; Miller et al., 2021; Pavlov et al., 2022), Singapore (Pilunthanakul et al., 2021), Thailand (Jiraniramai et al., 2021), and Finland (Suni et al., 2021).

PROBLEM STATEMENT

In Malaysia, previous studies have successfully translated the PHQ-9 into the Malay language. For instance, the Malay version of the PHQ-9 has been used on adult patients treated at health clinics (Azah et al., 2005), as well as women receiving treatment at health clinics (Sherina et al., 2012). However, researchers found that there are no studies in Malaysia that have used the PHQ-9 to identify depression levels among school students. According to Omarsdottir et al. (2023), when there is a change in the study population, it becomes necessary to revalidate the validity and reliability of a questionnaire. This is because any changes in words or phrases in the items must be reassessed for validity by expert panels, and cognitive interviews should be conducted to ensure that students fully understand the meaning of each item presented. In line with this, this study is essential to measure the validity and reliability of the Malay version of the PHQ-9 for use among school students in Malaysia.

OBJECTIVE

The purpose of this study has been following specific research objectives, which are:

1. Examine the content validity of the Malay version of the Patient Health Questionnaire (PHQ-9) in assessing depression based on expert panel evaluations
2. Examine the reliability of the Patient Health Questionnaire (PHQ-9) in assessing anxiety among school students.

METHODOLOGY

Participation

In this research, Participation 327 secondary school students from Negeri Sembilan and Selangor, Malaysia, were randomly selected as part of a case study. According to In (2017), a pilot study with 30 samples is sufficient, but it is recommended to include at least 50 subjects to avoid dropout issues. Data were collected using the PHQ-9 questionnaire, which was distributed face-to-face at their respective schools. Data collection took place on January 5, 2024, in Negeri Sembilan, and on January 17, 2024, in Selangor.

Instrumen

The Patient Health Questionnaire (PHQ-9) was developed by Kroenke et al. (2001). The PHQ-9 contains nine items that refer to symptoms of anxiety, following the criteria listed in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) (Kroenke et al., 2001).

Table 1.1: Items in the Patient Health Questionnaire (PHQ-9)

Item	Item PHQ-9	Criteria depression based on DSM-IV
1	Hilang minat melakukan sesuatu perkara yang sebelum ini anda rasa suka	Loss of interest
2	Rasa murung, kemurungan atau rasa berputus asa	Feeling hopeless and depressed
3	Sukar untuk tidur, sering kali terjaga atau tidur terlebih banyak	Difficulty sleeping
4	Cepat letih atau tidak bermaya	Feeling easily fatigued
5	Kurang selera makan atau terlebih makan	Loss of appetite
6	Rasa diri ini tidak berguna atau rasa telah gagal atau rasa telah mengecewakan diri dan keluarga	Feeling worthless
7	Sukar untuk fokus terhadap aktiviti harian	Difficulty concentrating
8	Bercakap atau bergerak lebih cepat atau lebih perlahan daripada biasa	Speaking or moving slower or faster than usual
9	Ada terfikir untuk mencederakan diri atau ingin membunuh diri	Thoughts of suicide

Table 1.1 shows the items in the PHQ-9. The items developed in the PHQ-9 refer to several criteria in the DSM-IV manual, namely: 1) lack of interest, 2) feelings of hopelessness and depression, 3) difficulty sleeping, 4) fatigue, 5) loss of appetite, 6) feeling worthless, 7) difficulty focusing, 8) moving or speaking slower or faster than usual, and 9) thoughts of suicide. Subjects are asked how often

they have been bothered by each of the nine depression symptoms over the past two weeks (Lingán-Huamán et al., 2023; Makhubela & Khumalo, 2023).

Table 1.2: 4-point likert scale scoring system

Statement	Score
Very low depression	0-4
Low depression	5-9
Moderate depression	10-14
Severe depression	15-19
Very severe depression	20-36

Table 1.2 presents the 4-point likert scale scoring system used. This questionnaire uses a four-point Likert scale: 0, 1, 2, and 3. There are four categories represented by each score: 0: never, score 1: several days, score 3: more than a week, and score 4: almost every day (Gómez-Gómez et al., 2023; Marlow et al., 2023)

Table 1.3: Stage of depression depends on score

Statement	Score
Never	0
Several days	1
More than a week	2
Almost every day	3

Table 1.3 shows the depression levels based on the overall total score. The overall score is calculated by adding up all the scores for each answered item. The score range is from 0 to 36. Scores can be categorized into four levels: 0-4 (very low depression), 5-9 (low depression), 10-14 (moderate depression), score 15-19 (severe depression), and score 20-36 (very severe depression) (Degefa et al., 2020).

Ethics

Before distributing the questionnaire, the researcher attended the Human Research Ethics Online Workshop (RMIC) Series 3/2023 organized by Universiti Pendidikan Sultan Idris on September 19, 2023, for four hours. The researcher then obtained permission from the Malaysian Ministry of Education through the Educational Research Application System (ERAS) on the website https://eras.moe.gov.my before distributing the questionnaire to school students. The online application form was submitted on September 27, 2023, and conditional approval to conduct the study was granted on October 10, 2023, via a reference letter [Ref: KPM.600-3/2/3-eras (17685)].

Statistical Testing

Descriptive statistics will be presented as percentages, mean ±, and standard deviation. The researcher used IBM Statistical Package for the Social Sciences (SPSS, Version 26) to perform Cronbach's Alpha data analysis.

PHQ-9 Validity

The content validity of the PHQ-9 will be assessed by seven expert panelists, consisting of academics with over 10 years of experience in mental health, experts in psychometric instrument development, and exemplary teachers in counseling and guidance (Guru Cemerlang). Based on their suggestions and feedback, several words in each item were refined and modified to match the cognitive level of school

students, as the PHQ-9 was originally developed to assess depression among adults aged 18 to 95. This content validation process ensures that subjects fully understand each item in the PHQ-9 instrument.

PHQ-9 Reliability

The reliability coefficient of the items in the PHQ-9 will be evaluated using Cronbach's Alpha. A value of ≥ 0.7 is considered acceptable, while a value below ≤ 0.5 indicates an unacceptable correlation level.

STUDY FINDINGS

Instrument Validity

The content validity of the questionnaire was assessed by seven expert panelists. According to Muhamad Saiful Bahri (2019), for obtaining content validity from expert panels, the suggested number of panelists is typically seven. The selected panelists should have experience in the relevant field, ranging from six to 10 members but not exceeding 10. In this study, seven panelists with over 10 years of experience were appointed, including a lecturer in mental health from Universiti Pendidikan Sultan Idris (UPSI), an exemplary lecturer in counseling from Institut Aminuddin Baki (IAB), a psychologist from the Psychology and Counseling Division (BPSK) of the Malaysian Ministry of Education, and four exemplary teachers (Guidance and Counseling). The purpose of selecting expert panelists was to evaluate the suitability of the items in the instrument in terms of language, content, and format. The researcher then modified the items based on the expert panelists' suggestions and the supervisor's evaluation. Long sentences were shortened, and outdated examples were updated while retaining the original meaning. All seven items were kept the same as the original items.

To determine the validity score from the expert panelists, the Content Validation Index (CVI) formula was used, taking into account the average expert ratings. There are two phases to calculate the CVI value. First, the Item Content Validation Index (I-CVI) formula was used, followed by the overall CVI formula. Each panelist was given a complete set of questionnaires containing the questionnaire background, study objectives, and a content validity evaluation form. Panelists were asked to rate each item using a 10-point Likert scale, from 1 (very low) to 10 (very high). The rating score for each item was summed and divided by the total possible score to obtain the I-CVI value. Then, the total I-CVI obtained from each expert panelist was summed and divided by the number of appointed experts. Below is the formula for calculating the CVI value (Polit & Beck, 2006):

$$\text{Item Content Validation (I-CVI)} = \frac{\text{The number of experts who give of relevant for specific item}}{\text{Total number of experts}}$$

$$\text{Content Validation Indeks (CVI)} = \frac{\text{The sum of all I-CVI value of each item}}{\text{The total number of items being assessed}}$$

Table 1.4: Stage of depression depend on score shows the content validity scores of the PHQ-9 instrument from each expert panelist.

Item	Panel 1	Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 7
PHQ 1	9	8	9	9	8	8	9
PHQ 2	9	8	9	9	10	10	9
PHQ 3	10	8	10	8	8	9	7
PHQ 4	10	8	9	9	10	8	8
PHQ 5	10	8	9	8	8	8	8
PHQ 6	8	8	9	9	8	8	9
PHQ 7	9	8	10	9	8	9	9
PHQ 8	7	8	9	8	8	8	9
PHQ 9	9	8	10	8	8	6	9
Score	81	72	84	77	76	74	78
Real score	90	90	90	90	90	90	90
I-CVI Value	.90	.80	.93	.86	.84	.82	.87

Table 1.4 show the content validity scores of the PHQ-9 instrument from each expert panelist. Based on the evaluations from each expert, the I-CVI was calculated by dividing the total score of each expert by the actual total score. According to Table 5, the highest overall score was given by Panelist 3, with a score of 0.93, followed by Panelist 1 (0.90), Panelist 7 (0.87), Panelist 4 (0.86), Panelist 6 (0.84), and the lowest score from Panelist 2 (0.80).

Table 1.5: Average Content Validation Index (I-CVI) for the PHQ-9

	n	***I-CVI***							
PHQ-9	7	1	2	3	4	5	6	7	*CVI*
		.90	.80	.93	.86	.84	.82	.87	.87

Table 1.5 shows the average Content Validation Index (I-CVI) for the PHQ-9 instrument is 0.87. According to Muhamad Saiful Bahri (2019), a content validity value is considered good if it is at least 0.83 when involving six to eight expert panelists. Thus, it can be concluded that the Malay version of the PHQ-9 instrument has very good validity and is suitable for measuring depression levels among school students.

Instrument Reliability

According to Ramlee et al. (2021), reliability refers to the consistency of responses or scores provided by an instrument, even when used multiple times. To ensure that an instrument is stable, predictive, and produces accurate and reliable results, reliability analysis should be conducted (Hamidah et al., 2014). In this study, the researcher used the Statistical Package for Social Science (SPSS) Version 26.0 to measure the reliability of the items using Cronbach's Alpha. Cronbach's Alpha can be interpreted as a correlation coefficient, with a numerical range from zero (0) to one (1) (Zuriani Hanim & Muhammad Izzat, 2021). The findings from this pilot study can then be compared to the Table of Reliability Values.

Table 1.6: Table of Reliability Coefficient and levels of Reliability

Reliability Coefficient	Levels of Reliability
.90 dan ke atas	Excellent reliability
.80-.89	Good reliability
.60-.79	Acceptable reliability
.40-.59	Questionable
.00-.39	Rejected

Table 1.6 shows the reliability scores and levels of reliability for the PHQ-9 instrument. According to Sidek (2005), a reliability coefficient value of more than 0.60 is considered acceptable, while a higher reliability coefficient value of 0.90 is considered excellent. In this study, reliability will be evaluated using Cronbach's Alpha. According to Ramlee et al. (2021), a minimum value of 0.65 is sufficient, but a Cronbach's Alpha value greater than 0.7 is preferable.

Table 1.7 Reliability Test Analysis and Correlation Coefficient Values Between PHQ-9 Items

Item	Item	The correlation coefficient between items	Alfa Cronbach
1	Lack of interest	.480-.246	.829
2	Feelings of hopelessness and depression	.658-.533	.811
3	Difficulty sleeping	.560-.348	.823
4	Feeling easily tired	.650-.451	.811
5	Loss of appetite	.527-.315	.825
6	Feeling worthless	.552-.427	.822
7	Difficulty concentrating	.555-.352	.822
8	Talking or moving slower or faster than usual	.489-.270	.829
9	Thoughts of suicide	.522-.365	.827
	Patient Health Questionnaire-9 (PHQ-9)	.	.839

Table 1.7 shows that the overall Cronbach's Alpha reliability coefficient for PHQ-9 is 0.839. The highest reliability coefficient among the individual items is for the "lack of interest" and "speaking or moving faster," which stands at 0.829, followed by "thoughts of suicide" at 0.827, "loss of appetite" at 0.827, "difficulty sleeping" at 0.823, "feeling worthless" and "difficulty concentrating" at 0.822, and the lowest is "feeling hopeless" and "feeling tired easily," which is 0.811. These findings clearly indicate that the Cronbach's Alpha coefficient for each item in this research instrument is good and has high reliability, exceeding $\alpha \geq 0.70$.

Additionally, the researchers also examined the correlation coefficient between items in PHQ-9. According to Ramlee et al. (2021), items with a correlation value below 0.3 should be removed because they do not show good correlation with the overall scale value. However, if the correlation value between items is greater than 0.3, the item can be retained as it meets validity criteria. Table 7 shows that the correlation coefficient between items overall ranges from 0.480 to 0.658. This proves that the correlation values between items are strong as they exceed 0.3, indicating that the items in the Malay version of PHQ-9 should be retained because they demonstrate strong relationships with each other.

DISCUSSION

Research Questions 1: What is the vality value of PHQ-9?

The primary purpose of this study was to assess the validity and reliability of the items in the PHQ-9 questionnaire used to measure depression levels among school students in Malaysia. This instrument was adapted, modified, and refined into Malay from the Patient Health Questionnaire-9 (PHQ-9) developed by Kroenke et al. (2001) to measure anxiety symptoms according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV-TR). The content validity of PHQ-9 was evaluated by seven expert panel members from academia with expertise in mental health. The Content Validation Index (CVI) of the PHQ-9 instrument was found to be excellent, at 0.87. This clearly indicates that the questionnaire instrument used in this study has high validity from the seven expert panel members.

Research Questions 2: What is the reliability value of PHQ-9?

This was a pilot study involving 372 students from Negeri Sembilan and Selangor, Malaysia**.** The reliability analysis conducted found that the Cronbach's Alpha reliability coefficient for the PHQ-9 instrument was 0.84. This clearly indicates that the questionnaire instrument used in this study has high reliability, with strong correlation values between items**.** These findings are consistent with the initial development, validation, and reliability studies of PHQ-9 conducted by Kroenke et al. (2001), which found that the Cronbach's Alpha reliability coefficient for PHQ-9 was high, with values of $\alpha \geq 0.89$. Test-retest findings to measure content validity of PHQ-9 also showed high validity values, at 0.88, which is comparable to the findings of this study. Since PHQ-9 has been shown to have high validity and reliability and is concise and compact, many researchers have translated PHQ-9 into various languages. Studies conducted across the globe have found that PHQ-9 maintains excellent Cronbach's Alpha reliability even when translated into different languages by researchers worldwide.

For example, studies by Bazo-Alvarez et al. (2024) in Bolivia found that PHQ-9 has a reliability value of $\alpha \geq 0.87$, Gomez-Gomez et al. (2022) in Spain found that PHQ-9 has a reliability value of $\alpha \geq 0.84$, Marlow et al. (2022) in South Africa found that PHQ-9 has a reliability value of $\alpha \geq 0.88$, Sun et al. (2022) in China found a reliability value of $\alpha \geq 0.84$, and Cassiani-Miranda et al. (2023) in Colombia found that PHQ-9 has a reliability value of $\alpha \geq 0.80$. The findings of this study are consistent with these international studies, showing that the Malay version of PHQ-9 has excellent reliability, with $\alpha \geq 0.84$. Additionally, this study helps to answer the question of whether PHQ-9 is suitable for measuring depression levels among school students. In the initial study by Kroenke et al. (2001), the participants were mainly patients from health clinics aged 18 and above. Most studies have focused on using PHQ-9 in health clinics and hospitals to measure depression levels among patients in Malaysia (Azah et al., 2005; Sherina et al., 2012) and other countries (Degefa et al., 2020; Maroufizadeh et al., 2019; Sun et al., 2020, 2022; Wang et al., 2021). Although some studies have started using PHQ-9 with students, the majority of the participants were university students over the age of 18 (Beswick et al., 2022; Ghazisaeedi et al., 2022; S. Kim et al., 2021; Lingán-Huamán et al., 2023; Makhubela & Khumalo, 2023; McCord & Provost, 2020; Pranckeviciene et al., 2022; Rahman et al., 2022; Sun et al., 2022).

IMPLICATION

This study successfully fills a gap in the research landscape in Malaysia, as no previous studies have investigated the validity and reliability of PHQ usage among school students. This study proves that the Malay version of PHQ-9 is suitable for school students and has a strong Cronbach's Alpha value of 0.84. These findings align with recent international studies, which found that PHQ-9 is not only suitable for measuring anxiety levels among adults but is also effective for measuring depression levels among teenagers and school students under the age of 18 (Leung et al., 2020; Liang et al., 2023; Marlow et al., 2023; Miller et al., 2021; Pilunthanakul et al., 2021).

This study has several limitations, as the participants were only secondary school students. Therefore, future studies are recommended to examine the suitability of PHQ-9 for primary school students. This is particularly important as the post-COVID-19 era has seen a significant increase in mental health issues among children in Malaysia (Institut Kesihatan Umum, 2020, 2022b).

Thus, future research should focus on developing questionnaires suitable for use among primary school students. Additionally, the World Health Organization (2022) suggests that to reduce global mental health statistics, the focus should no longer be solely on treating patients but on developing early prevention programs. Therefore, future studies should develop intervention modules aimed at managing depression among school students. Finally, it is hoped that this study will contribute to preventing mental health issues among school students in Malaysia.

CONCLUSION

In conclusion, the Malay version of the Patient Health Questionnaire-9 (PHQ-9) has high validity based on the evaluation from seven expert panelists. The results show that panelist 1 gave a validity score of 0.90, panelist 2 also gave 0.90, panelist 3 gave 0.93, panelist 4 gave 0.86, panelist 5 gave 0.84, panelist 6 gave 0.82, and panelist 7 gave 0.87. The I-CVI calculation showed that the score based on the total number of expert panelists resulted in a validity score of 0.87, indicating that the PHQ-9 has high validity using the formula by Polit & Beck (2006).

Furthermore, the reliability analysis conducted on 327 students using SPSS and the Cronbach's Alpha method revealed a high reliability score of 0.84. This indicates that the PHQ-9 has good reliability. Moreover, the Reliability Test Analysis and Correlation Coefficient Values Between PHQ-9 Items showed that the correlation coefficients between items were also high, with the lowest being 0.811 and the highest being 0.829. These findings clearly indicate that the Cronbach's Alpha coefficient for each item in this research instrument is good and has high reliability, exceeding $\alpha \geq 0.70$.

This study can serve as a reference for counselors and practitioners in the field of mental health for conducting depression screening among school students. This is because the use of the PHQ-9 has never been implemented on school students, despite its widespread dissemination to schools nationwide. Therefore, this study can serve as a guide for implementing the PHQ-9 among secondary school students throughout the country. Additionally, it is hoped that this study can provide basic guidance for future researchers on translating psychological and counseling instruments. This is because most translated instruments do not adequately explain the correct methods for measuring the validity of an instrument. Hence, it is hoped that this study can provide clear guidance on how to use the Polit & Beck (2006) formula to obtain validity values for psychological and counseling instruments in the future.

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