

Valid and reliable instrument for measuring Malaysian talented students' social support

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Article Info

Article history:

Received Jul 24, 2024

Revised Aug 11, 2025

Accepted Jan 31, 2026

Keywords:

Content validity index
Exploratory factor analysis
Reliability
Social support
Validity

ABSTRACT

Social support is an essential protective factor against the risk of talent development failure, especially in the catastrophic situation. This study aimed to test the validity and reliability of social support instruments specifically for talented sports students in Malaysia. Content validity index (CVI), exploratory factor analysis (EFA), and internal consistency are the methods used to ensure that measurement instruments are appropriate for use in local contexts and cultures. A total of 268 from four talented sports students aged 16 years were selected by proportionate stratified random sampling in this study. The study found that the instrument had good content validity, with the items reaching the minimum level of CVI value and exceeding the recommended cut-off point of 0.78. Factor analysis found that the final measurement model has three factors, namely i) family support, ii) friends' support, and iii) coach support, with factor loading ranging between 0.49 and 0.89. The correlation matrix was also measured through the KMO and Bartlett test of sphericity. All three factors had internal consistency values of 0.83 for coach support and 0.85 for family and friend support, which was defined as good. Future research is warranted to explore the instrument with different samples and measurements in various scenarios.

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1. INTRODUCTION

The emphasis on social support in overcoming stress and challenges in life is not new. Today, social support acts as an important aspect that can help improve the performance capabilities of talented sports individuals [1]. It is because their future depends on their excellent ability in their domain. The need to achieve the best performance in sports talent without a support system can be stressful and demanding as talented individuals must go through various challenges during the talent development process, including unexpected challenges that can be catastrophic [1], [2].

This population experiences various adverse effects from the COVID-19 pandemic and endemic phase that still need attention, e.g., stamina disturbances [3]. Thus, future career paths and long-term stamina are also affected [4]. As for individuals infected and positive for COVID-19, emotional disturbances are felt more even though many years have passed [5], [6]. Overall, the COVID-19 pandemic and endemic phase

burdens talented individuals because the need to develop talent and the urge to succeed in their respective domains still needs to be met [7].

Studies over the past decades have also provided essential findings on social support that affects the quality of life [8]. However, previous studies are limited to Western culture. To date, few studies have investigated the importance of social support in various contexts and circumstances, and an accurate measurement scale of social support [9], [10]. Nevertheless, understanding the accurate social support measurement scale for talented sports students in Malaysia still needs to be improved. While most studies focus on empirical data, there needs to be more literature on the testing measurement scale of social support for talented sports students in Malaysia.

Commonly, social support is measured by self-assessment using a questionnaire approach. Past studies showed that social support instruments have good validity and reliability [11]. However, social support measurement among adolescent or student populations must be improved [12], [13], including talented sports students. Besides, non-uniformity of construction and dimensions are issues of concern. Instruments used only one construct to three constructs to measure social support [14].

Similar cases are found within the dimensional issue where significant people test on husband and wife, special friends, and pets [8]. The emphasis on coaches as significant people for social support still needs to be improved, as coach support plays a critical role [15], [1]. Coaches are believed to help increase resilience in unexpected situations [16], [15]. Hence, significant human constructs should be measured in various contexts [8], e.g., coach. In addition, past researchers' widely used constructs and dimensions may differ in the local context [16] and translated version [8]. Doubtful aspects of the validity and reliability of some social support instruments may have a seriously terrible impact [8].

The validity and reliability issues specified are also no exception in Malaysia. In the context of social support instruments in Malaysia, several Malay translations from different studies can measure social support [17]. However, the validity and reliability of the instrument can be disputed. Most of them are more focused on the trustworthiness aspect [18], [19], whereas the validity is equally vital in an instrument [20]. The validity needs to be thoroughly analyzed and done briefly. Mostly, it involved at least three experts [21]. Similarly, the validity of constructs was not determined using specific factor analysis values. Kaiser-Meyer-Olkin (KMO) tests, Bartlett's test of sphericity, and communality are omitted [22]. Therefore, these studies determine the validity and reliability of measuring social support instruments among talented sports students in Malaysia using more detailed and systematic ways.

2. METHOD

Verification of the validity and reliability of the test for measuring Malaysian talented students social support was carried out based on content validity, construct validity and internal consistency. This study has chosen the content validity index (CVI) method, as suggested [21]. This method has several advantages compared to other methods. CVI is also suitable for showing whether an item can represent a particular construct. The strength of the CVI method is seen in its efficiency and accuracy in quantitative measurement through simulation assessment instruments. Simple calculations and determination of critical values make CVI more efficient and easier to use [21]. CVI values can be calculated for each item on the scale (item content validity index or I-CVI) and the overall scale for content validity (scale content validity index or S-CVI).

Compared to alternative methods in determining content validity, such as the T index and rWG index, the CVI method is more efficient and more accessible in terms of implementation and interpretation [23]. It also provides formulas and recommendations for determining the value. The CVI method is also widely used by local researchers and abroad as a first step in preparing a research instrument [21].

As suggested, each expert should rate every item on a relevance scale based on the score 1 not relevant, 2 somewhat relevant, 3 relevant, and 4 very relevant for using the CVI method. Item scored 3 or 4 indicates that the item is appropriate, acceptable, and recoded as 1. While an item scored at level 1 or 2 indicates that the item needs to be revised, or the item's appropriateness is low and recoded as 0. The content validity of each item is based on the cut-off score suggested, which is 0.78 [24]. The item content validity index (I-CVI) is then calculated using (1), whereas the number of experts agreed is divided by the total number of experts.

$$I - CVI = \frac{\text{Number of experts agreed}}{\text{Total number of experts}} \quad (1)$$

For S-CVI, the critical value used is 0.86. The content validity (S-CVI) construct is based on the average of the I-CVI scores for all items on the scale. S-CVI is calculated by summing all the content validity index values for each item (I-CVI) and dividing by the total number of items according to the (2):

$$S - CVI = \frac{I-CVI_1 + I-CVI_2 + \dots + I-CVI_n}{n} \quad (2)$$

where, n is the number of items.

Results from the (2) calculation will yield the I-CVI and S-CVI values. Any value that exceeds the cut-off score and is close to 1.00 indicates that experts agree that items are essential in the content validation process. On the other hand, if the I-CVI value is less than 0.78 and the S-CVI value is less than 0.86, less than half of the experts believe the item is needed. Similarly, CVI values and scores are guided by the number of experts involved, i.e., the value score for seven experts is at least 0.86 [25]. The item must be fixed or discarded from the instrument if the calculated CVI value is less than the suggested value.

Then, construct validity which refers to the instrument's accuracy in measuring an idea based on the theory used and involved. Construct validity describes what it is supposed to measure through a test or experiment. It validates measurements with multiple indicators. Construct validity also shows how the results correspond to the theory [22].

Next, construct validity conducted through exploratory factor analysis (EFA) and using the principal component analysis (PCA) method, as suggested [22]. Objectively, EFA is implemented to reduce the number of variables, determine the structure or relationship between variables, and measure construct unidimensional or multidimensional. There are several criteria for reporting EFA results, namely, i) the correlation test between items or variables, which is Bartlett's test of sphericity, should be significant ($p < 0.05$); ii) KMO sample adequacy test is ≥ 0.5 ; iii) Eigenvalue more significant than 1 (> 1); iv) items retained are only with factor loading greater than or equal to 0; and v) number of factors based on the appropriateness of items, theories, and past studies.

This study also used internal consistency through Cronbach's alpha. Cronbach's alpha can also provide the correlation coefficient that shows an instrument's reliability [22]. Cronbach's alpha reliability values range from 0.00 to 1.00, with a value less than 0.60 considered low. As the Cronbach's alpha value has a positive relationship with the number of items in the instrument, an instrument with less than 10 items should be more than 0.5 [22]. The contribution of each item to the measured study is also determined by an acceptable correlation range above 0.30 [22]. Removal of items with less than 0.30 can increase the reliability of the measured construct.

3. RESULTS AND DISCUSSION

3.1. Test for measuring talented students' social support

Before discussing the validity and reliability of the test for measuring talented students' social support in more detail, this section will first make up the measurement instrument. This study uses purposive sampling techniques, and only those with expertise in psychology and sports psychology can be the respondents. It is aligned with experts should be related to the field and can do the detailing process [20]. The main criteria for the selection of experts are i) a researcher in the field of psychology or sports psychology, ii) having more than five years of experience in the field, iii) having at least a master's degree in psychology or sports psychology academic qualifications, and iv) agreeing to get involved in the study.

As for data collection, this study used a face-to-face approach and email based on experts' convenience and preferences. Experts were contacted via email to have their approval and explain the purpose of the study. Only seven, instead of nine, experts agreed to be on the panel. The number of experts is sufficient for this study [21]. The questionnaire required an assessment of the content validity of the 12 social support items and was adapted from a previous study in the Malay language [19], and back-to-back translation. Initially, perceived social support was measured using the multidimensional scale of perceived social support (MSPSS), including support from family and friends [8].

Each expert reviewed all items by evaluating the relevance level based on a four-point scale, namely 1 not relevant, 2 somewhat relevant, 3 relevant, and 4 very relevant. Experts can leave their comments at the end of the questionnaire. The expert evaluation was used for content validity using (1) and (2). Each item would have the value of I-CVI and overall S-CVI and would be compared with the necessary critical value. As this study used seven experts, the critical values of I-CVI are 0.78 and 0.86 for S-CVI [21].

Next, construct validity through EFA and using the PCA method was carried out as recommended [22]. Two hundred sixty-eight talented sports students (16 years old) in the Sports Schools of Kedah, Kuala Lumpur, Pahang, and Sarawak were involved and selected through proportionate stratified random sampling. These athletes have been selected because of their higher achievement level and classified as talented sports students in their area, and ability to do cognitive evaluations. Regarding suggested appropriate number of samples for valid statistical analysis, such as EFA should exceed 100 and use a ratio of 5:1, the number of 268 samples used in this study is sufficient [22]. Then, a Cronbach's alpha value was used to determine each scale's internal consistency.

3.2. Validity and reliability of the test for measuring social support instruments

The study comprises three female experts (42.9%) and four male experts (57.1%). All experts have at least a master's degree and vast experience in the area, with a minimum of five years. They are also active in service as five experts serve at public universities and others at the Malaysian Teacher Education Institute (IPGM) and sports schools. Based on expert validation, all items exceed the critical value of 0.78 for the I-CVI value as shown in Figure 1.

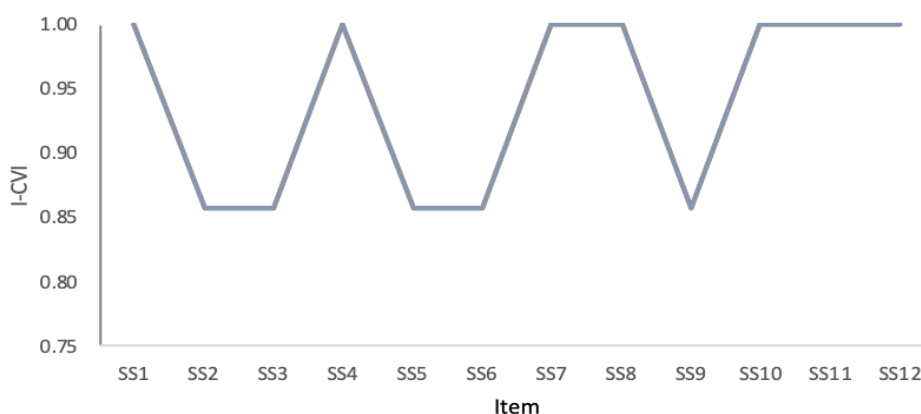


Figure 1. I-CVI value

Table 1 shows the seven experts' evaluation of the relevance level on the item scale. Seven items have the maximum value of I-CVI of 1.00, which means all seven experts agree that this item is highly relevant. Five items recorded an I-CVI value of 0.86, meaning one expert disagrees about the level of relevance of items in the instrument. In summary, the values of I-CVI and S-CVI for the twelve items clearly show consensus among most experts who felt that these items are essential to maintaining the instrument.

Table 2 shows the content validity index of the social support instrument based on the I-CVI and S-CVI values obtained for each construct. The S-CVI/average value is between 0.93 and 0.96. The total value shows that all items in this instrument are relevant and have high content validity in representing each construct.

Table 1. Evaluation of the relevance level on the item scale by seven experts

Item	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Expert in agreement	I-CVI
SS1	1	1	1	1	1	1	1	7	1.00
SS2	1	1	1	1	1	0	1	6	0.86
SS3	1	1	1	0	1	1	1	6	0.86
SS4	1	1	1	1	1	1	1	7	1.00
SS5	1	1	1	0	1	1	1	6	0.86
SS6	1	1	1	0	1	1	1	6	0.86
SS7	1	1	1	1	1	1	1	7	1.00
SS8	1	1	1	1	1	1	1	7	1.00
SS9	1	1	1	1	1	0	1	6	0.86
SS10	1	1	1	1	1	1	1	7	1.00
SS11	1	1	1	1	1	1	1	7	1.00
SS12	1	1	1	1	1	1	1	7	1.00
S-CVI/average									0.94

Note: SS is social support.

Table 2. Content validity index of the social support instrument

Construct	Number of items	No. items	I-CVI		S-CVI/ average by construct
			Relevant	Very relevant	
Family support	4	SS3, SS4, SS8, SS11	1	3	0.96
Friend support	4	SS6, SS7, SS9, SS12	2	2	0.93
Coach support	4	SS1, SS2, SS5, SS10	2	2	0.93

Note: SS is social support.

Construct validity through EFA and using the PCA was performed then. EFA evaluates factor-loading items and item components [22]. This instrument was adapted and modified with the current study, so the procedure is a must. Table 3 shows the KMO value of 0.87 for the social support instrument. It proves the sufficient samples used in the factor analysis. The factor analysis is also shown by Bartlett's test of Sphericity, which is significant. The commonality value of the items is above 0.30, which is between 0.50 and 0.84. The total variance contributed by the factors is 69.96% and is considered vital [22]. Orthogonal rotation with the varimax method and eigenvalue greater than 1 has produced three factors.

The analysis found that Factor 1 consists of 4 items with a variance percentage of 5.82%, Factor 2 with 4 items of 1.44%, and Factor 3 consists of 4 items with a variance percentage of 1.14%. The items in Factor 1 have factor loading values in the range of 0.69 to 0.80, Factor 2 between 0.49 to 0.86, and Factor 3 between 0.57 to 0.90. The factor loading meets the values suggested by [22], which is above 0.5 (>0.5) for each factor, and suitable for the following factor analysis. The resulting factors are labeled based on the meaning of each item that builds each factor in the social support instrument. Factor 1 was labeled coach support, Factor 2 was labeled family support, and Factor 3 was labeled friend support. These three factors have a high internal consistency value (Cronbach's alpha), with 0.83 for coach support and 0.85 for family and friend support. The values are in the acceptable range above 0.60 [25]. Table 3 summarises the results of the factor analysis of the social support instrument.

Table 3. Results of EFA of the social support instrument

Factor	Item	Item description	Factor loadings	Communalities	Alpha value
Factor 1: coach support	SS5	I have a special person who is a real source of comfort to me	.80	.71	.83
	SS2	There is a special person with whom I can share joys and sorrows	.77	.66	
	SS1	There is a special person who is around when I am in need	.72	.65	
	SS10	There is a special person in my life who cares about my feeling	.69	.59	
Factor 1: family support	SS3	My family really tries to help me	.86	.84	.85
	SS4	I get the emotional help and support I need from my family	.84	.77	
	SS11	My family is willing to help me make decisions	.79	.78	
	SS8	I can talk about my problems with my family	.49	.50	
Factor 1: friend support	SS12	I can talk about my problems with my friends	.89	.84	.85
	SS9	I have friends with whom I can share my joys and sorrow	.90	.83	
	SS7	I can count on my friends when things go wrong	.59	.58	
	SS6	My friends really try to help me	.57	.65	
Eigenvalues			5.82	1.44	1.14
Percentage contribution of variance			48.52	11.96	9.49
Total percentage contribution of variance					69.96
Kaiser-Meyer-Olkin measure of sampling adequacy					.87
			Approx. Chi-Square	1807.52	
			df	66	
			Sig.	.00	

Note: SS is social support.

4. CONCLUSION

Overall, the results demonstrate quality and consistency in the validity and reliability of the instrument. The expert feedback for all twelve items shows that the panel has carefully processed valid content to produce potential and suitable items in the context. The content validity process had been carefully conducted to provide more concrete results than other content validity in past studies. This study used different methods. The CVI method provides more interpretation and empirical results. The CVI method used in this study also ensures quality in the validity of the content process because of the diverse specialist variations in terms of number and background. This aspect indirectly guarantees better validity.

This study has provided important information about the validity of content instruments and social support for talented sports students in Malaysia and during unforeseen circumstances such as the COVID-19 pandemic and endemic phase. Empirically, the CVI method shows the importance of each item and scales to ensure it represents the content of the construct - high I-CVI scores for most items and S-CVI in total show the expert's point of view. Furthermore, no item should be added based on the expert consensus that helped increase the instrument's confidence.

As for construct validity obtained, we found social support instruments for talented sports students based on three constructs: family support, friend support, and coach support. The items loaded on the three factors are consistent with the factor structure found in the original instrument. The findings show that three main factors contribute significantly to the overall variance in the social support instrument. All the retained items showed that they intersected with other items and met the minimum loading value criteria of 0.50.

Based on the reliability value obtained, this study confirms that the social support instrument is based on three constructs, namely family support, friend support, and significant other (coach support). All three constructs that exceed 0.60 are also convincing that the instrument is consistent with this study. Specifically, validity and reliability findings become indicators that this Malay instrument is suitable for use in studies related to the social support of talented sports students in Malaysia in various scenarios.

It is suggested that subsequent research should be focused on the different samples to know the measurement items' quality and psychometric characteristics. Furthermore, deep exploration can be carried out regarding early age. It is also suggested that the Rasch model be used on the instrument to assess the validity and reliability on different sides. This will be very useful for measuring the social support instrument for other levels of education, such as elementary and junior high school levels.

ACKNOWLEDGMENT

The authors want to express our deepest gratitude to the Ministry of Education Malaysia and anonymous participants for their cooperation and time in providing the researcher with all the needed information. We would also like to thank this article's reviewers for their constructive comments.

FUNDING INFORMATION

This research was made possible through monetary assistance provided by Universiti Kebangsaan Malaysia. The authors gratefully acknowledge this financial support, which facilitated the successful completion of the study.

AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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Khairul Farhah	✓	✓		✓	✓	✓		✓	✓	✓		✓	✓	✓
Khairuddin														
Wan Ahmad Munsif	✓	✓		✓		✓		✓	✓	✓		✓	✓	
Wan Pa														
Nur Choiri Siregar	✓					✓				✓			✓	

C : **C**onceptualization

M : **M**ethodology

So : **S**oftware

Va : **V**alidation

Fo : **F**ormal analysis

I : **I**nvestigation

R : **R**esources

D : **D**ata Curation

O : **O** Writing - **O**riginal Draft

E : **E** Writing - Review & **E**editing

Vi : **V**isualization

Su : **S**upervision

P : **P**roject administration

Fu : **F**unding acquisition

CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest to declare that are relevant to the content of this article.

INFORMED CONSENT

We have obtained informed consent from all individuals who participated in this study. All participants were informed of the purpose, procedures, and voluntary nature of their involvement, and consent was obtained prior to data collection. The authors affirm that participants' privacy and confidentiality were strictly protected throughout the research process, in accordance with established ethical guidelines.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [TZTM], upon reasonable request. Due to privacy and confidentiality agreements with participating schools and respondents, the data are not publicly available. Any requests for access to the dataset should be directed to the corresponding author, who may provide anonymized data for academic and non-commercial research purposes.

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