

Assessing the Validity and Reliability of the Bull's Mental Skills Questionnaire (BMSQ) in Malaysian Gifted Students

Azrina Md Azhari^{1,2}, Nurwina Anuar^{2*}, Mohamad Nizam Nazarudin³

¹ Pusat PERMATA@Pintar Negara, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia.

^{2,3} Faculty of Education, Universiti Kebangsaan Malaysia, Bangi, Selangor, Malaysia.

Email: ¹p145901@siswa.ukm.edu.my, ²nurwina@ukm.edu.my, ³mohdnizam@ukm.edu.my

Corresponding Author*: Nurwina Anuar.

HOW TO CITE:

Azrina Md Azhari, Nurwina Anuar, Mohamad Nizam Nazarudin (2026). Assessing the Validity and Reliability of the Bull's Mental Skills Questionnaire (BMSQ) in Malaysian Gifted Students. International Journal of Special Education, 41(9s), 81-95

COPYRIGHT STATEMENT:

Copyright: © 2026 Authors.
Open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

ABSTRACT:

The development of mental skills contributes significantly to the well-being and performance outcomes of gifted students. Despite its widespread application in sport psychology research, the Bull's Mental Skills Questionnaire (BMSQ) lacks sufficient empirical validation in terms of validity and reliability within the Malaysian gifted student population. Thus, the present study was conducted to investigate the validity and reliability of the BMSQ within this population. A sample of 214 gifted students, aged 12 until 17 years, was included in this study. Descriptive analysis indicated moderate to high levels across the seven mental skill domains, with Mental Preparation and imagery ability recording the highest mean scores. Normality assumptions were satisfied, with skewness and kurtosis values within ± 1 . The Kaiser Meyer Olkin (KMO) measure of sampling adequacy (0.840) and Bartlett's Test of Sphericity ($\chi^2 = 2775.911$, $p < .001$) confirmed the suitability of the data for factor analysis. Exploratory Factor Analysis (EFA) using Principal Component Analysis with Varimax rotation extracted seven components explaining 65.82% of the total variance, consistent with the theoretical model proposed by Bull et al. (1996). The findings from the reliability analysis reflected a good level of reliability between 0.716 and 0.871, with an overall reliability of 0.859. These findings support the validity and reliability of the BMSQ in assessing multidimensional mental skills among gifted students and highlight its potential use in developing psychological interventions to strengthen mental skills within educational settings..

Keywords: Bull's Mental Skills Questionnaire (BMSQ), gifted students, factor analysis, mental skills.

1) Introduction:

Sport represents a multidisciplinary domain that integrates physical, educational and psychological

elements. Beyond physical performances, psychological competencies play a crucial role in influencing how individuals regulate emotions,

maintain focus and perform under pressure [9]. In situations where athletes have similar physical and technical proficiency, psychological elements frequently become the determining factor of performance [4] [27]. Mental skills are fundamental to achieving optimal performance in sport and other high-performance domains. Techniques including self-talk, goal setting and mental imagery enable athletes to manage pressure, maintain focus and regulate emotions to reach their Ideal Performance State (IPS) [23]. Core cognitive abilities such as decision-making, attention and working memory also support performance consistency under stress [52]. Mental Skills Training (MST) provides a structured framework for developing these psychological abilities by enhancing preparation, emotional control and recovery from setbacks. Although the most effective methods for implementing MST remain under discussion [20] contemporary approaches such as the Gold Medal Profile for Sport Psychology (GMP-SP) emphasize the integration of mental and physical preparation [14]. Empirical research consistently shows that mental factors including motivation, confidence, emotional regulation and goal setting play a crucial role in athletic success [4] [9].

A variety of tools have been developed over time to measure psychological and mental skills in athletes, with widely recognized examples including the Ottawa Mental Skills Assessment Tool (OMSAT-3), the Test of Performance Strategies (TOPS) and the Psychological Performance Inventory Revised (PPI-A). The OMSAT-3 from [15] has demonstrated strong factorial validity and reliability in various cultural contexts, including Turkish, Romanian and Portuguese adaptations. In the same way, the TOPS [47] examine athlete's use of mental performance strategies across both practice and competition contexts. Its subsequent validations across German, Turkish, Brazilian and Malaysian samples have confirmed its general applicability, although certain subscales such as emotional control and relaxation show cultural variation. Among these, the BMSQ stands out for its comprehensive coverage of seven core mental skill domains and its demonstrated cross-cultural

applicability [8]. Collectively, these tools have advanced the understanding of athlete's psychological readiness. However, variations in psychometric performance across cultures and contexts suggest the need for instruments that offer both comprehensive coverage and cross-cultural robustness.

The BMSQ, is a 28-item psychometric instrument developed to assess seven core psychological skills crucial for athletic performance such as concentration, anxiety/worry management, arousal control, imagery, self-confidence, motivation and Mental Preparation [30]. The scale has demonstrated strong validity and reliability across diverse athlete populations. In a Turkish validation study involving 294 athletes, the BMSQ exhibited acceptable Cronbach's alpha values ranging from 0.52 to 0.73 across subscales, explaining 62% of total variance [22]. Similarly, a Serbian study with handball players reported a modified five factor structure that maintained satisfactory reliability, highlighting cultural and contextual variations in the measurement of mental skills [22]. In addition, the BMSQ has been validated in several cultural and athlete contexts, including the United Kingdom [8] and South Africa [16]. These findings indicate that while the BMSQ demonstrates satisfactory internal consistency and reliability, its factor structure may vary depending on the cultural or athlete context in which it is applied.

Although mental skills research has predominantly focused on athlete populations, similar psychological demands are also evident in academic high-performance environments. Many gifted students experience high levels of stress, anxiety, maladaptive perfectionism and emotional exhaustion, particularly in achievement-oriented learning environments [2][5][32][38]. In Malaysia, similar patterns have been reported, including depression, anxiety, stress and adjustment difficulties among gifted students [1]. Qualitative studies also indicate that these socio-emotional challenges often arise from a combination of personal characteristics, genetic factors and environmental pressures, which together affect student's daily functioning and

overall well-being [31]. Such demanding environments require students to regulate emotions, maintain concentration and sustain motivation under pressure, conditions that closely resemble those experienced by athletes during competitive performance. Consequently, the transferability of mental skills across performance domains has gained increasing attention in contemporary research. Psychological competencies such as imagery ability, concentration, self-confidence and motivation are not exclusive to sport performance but are also relevant to academic achievement and personal development. For gifted students, these skills may play an important role in sustaining engagement, resilience and psychological well-being in demanding academic environments.

Despite its widespread validation across athletic contexts, the BMSQ has not yet been tested among non-athlete high-performance populations, such as gifted students. Although gifted students are known for their superior intellectual capacity, creativity, and academic excellence, they are also vulnerable to psychological strain, including elevated performance demands, persistent expectations, and struggles with emotional control. [18][33]. These pressures are often intensified by perfectionistic tendencies and the constant pursuit of excellence, which can increase stress levels and emotional vulnerability among them [36]. Existing research has yet to determine whether the BMSQ's original structure accurately reflects the mental skills profile of gifted students. Addressing this gap is crucial for extending the theoretical framework of mental skills beyond sport psychology into gifted and talented education, offering new insights into the psychological resilience and well-being of high-performing students.

Therefore, this study is conducted to explore the validity and reliability of the BMSQ among Malaysian gifted students, particularly in terms of its factor structure, internal consistency and measurement reliability. Establishing the validity of the BMSQ in the context of gifted students is expected to offer a reliable assessment of

student's mental skills. All these skills that are critical not only for sports performance but also for student's academic and personal excellence.

The significance of this study to extend the application of sport psychology measurement tools to the educational domain, particularly among high-achieving youth who experience performance pressure comparable to that of athletes. By validating the BMSQ for gifted students, The study provides further insight into the expression of mental skills among high-achieving learners. The findings are expected to inform educators, counsellors and sport psychologists on strategies to nurture mental resilience and psychological well-being through evidence-based interventions integrated into Physical and Health Education subjects in schools. Furthermore, this study offers theoretical implications for integrating sport psychology principles within gifted and talented education, emphasizing the transferability of mental skills across performance domains.

2) Methods and Methodology:

The study involved 214 gifted students aged 11 to 17 years who were studied at a first gifted education center in Malaysia, namely Kolej PERMATA@Pintar Negara, Universiti Kebangsaan Malaysia. Purposive sampling was used to select this college as the study site, as it is the first national center for gifted education in Malaysia. Subsequently, systematic random sampling was employed to select participants from the total population of 480 enrolled students. According to the table of sample size proposed by Krejcie and Morgan (1970), a population of 480 requires a minimum sample of 214 respondents. Therefore, 214 gifted students were selected in this study to ensure adequate representation of the population. Methodological guidelines commonly recommend a ratio of at least five to ten respondents per item to obtain stable factor solutions [19]. In addition, previous studies suggest that factor solutions tend to be more stable when the total sample size exceeds 200 respondents [54]. Therefore, 214 respondents considered adequate for conducting EFA on the 28-item instrument.

The BMSQ, initially developed by [8] was used as the measurement instrument in this study. The version used was adapted from the Military Mental Skills Questionnaire, which is a validated open-access version designed for performance enhancement and resilience assessment in both military and athletic contexts. The MMSQ is a publicly available adaptation developed by the United State Army's Holistic Health and Fitness program to measure psychological readiness and mental performance in military personnel. The instrument contains 28 items measured using a 6-point Likert scale, ranging from 1 (strongly disagree) to 6 (strongly agree). Higher scores reflect stronger levels of mental skills. The military-adapted version has previously been used for assessing Mental Preparation and psychological performance under pressure, showing satisfactory demonstrated acceptable internal consistency, with Cronbach's alpha values ranging between 0.66 and 0.75 [30]. This version was selected because it retained the same core structure and constructs as the original BMSQ while incorporating contextual wording relevant to performance settings.

An expert review was conducted prior to data collection, involving expert in sport psychology, physical and health education and gifted education to assess the clarity, cultural relevance and overall content validity of the questionnaire. The expert's evaluation yielded a content validity percentage of 90%, which exceeded the recommended benchmark of 70% suggested by [49]. A pilot study was then conducted with 34 students from the same target population to evaluate the internal consistency of the instrument. The reliability analysis yielded a Cronbach's alpha coefficient of 0.84, indicating good internal consistency of the questionnaire items. Based on these findings, minor refinements were made before administering the final version of the BMSQ to the larger sample. The data collection process was conducted face to face with all 214 participants to ensure standard administration and to clarify any queries from respondents. The completed questionnaires were checked for completeness before data entry and statistical analysis.

The dataset was analysed using SPSS version 28.0. To evaluate the validity and reliability of the BMSQ among Malaysian gifted students, descriptive, inferential and psychometric analyses were applied. As a first step, descriptive statistics were used to summarize demographic information and to calculate mean and standard deviation values for each mental skill dimension. Next, the normality of data distribution was assessed using skewness and kurtosis values, where acceptable ranges within ± 2 indicated normal data distribution suitable for parametric analyses [19]. After completing data screening, the adequacy of the dataset for factor analysis was assessed through the Kaiser–Meyer–Olkin (KMO) index and Bartlett's Test of Sphericity. Subsequently, an Exploratory Factor Analysis (EFA) employing Principal Component Analysis (PCA) with Varimax rotation was conducted to extract the underlying dimensions of the BMSQ. Only components with eigenvalues above 1.0 were retained, while items with loadings of at least 0.50 were regarded as significant contributors to their corresponding constructs. Subsequently, Cronbach's alpha was used to evaluate internal consistency across both the subscales and the overall instrument. Coefficients equal to or above 0.70 were considered to reflect satisfactory reliability [48]. At the final stage of analysis, findings from the normality assessment, factor analysis and reliability testing were combined to establish the validity and reliability of the BMSQ in capturing several mental skill domains within the Malaysian gifted student population.

3) Results:

(a) Demographic Characteristics of Participants:

The demographic characteristics of the participants are summarized in Table 1. The sample consisted of 214 gifted students, including 116 males (54.2%) and 98 females (45.8%). Most participants were aged between 12 and 15 years ($n = 141$, 65.9%), while 72 students (33.6%) were aged 16 to 17 years. A very small proportion ($n = 1$, 0.5%) was below 12 years old.

Table 1. Demographic Characteristics (n = 214)

Category	Frequency	Percentage
Male	116	54.2
Female	98	45.8
Below 12 years old	1	0.5
12 to 15 years old	141	65.9
16 to 17 years old	72	33.6

Note: This table shows the distribution of respondents by gender and age group (N = 214). Percentages are based on the total sample and rounded to one decimal place.

(b) Descriptive Statistics:

The descriptive statistics presented in Table 2 were used to evaluate the level of mental skills among Malaysian gifted students. The results indicate that the mean values for the seven BMSQ dimensions varied between 11.50 and 18.44, with Mental Preparation recording the highest mean score (M = 18.44, SD = 3.79)

followed by Imagery Ability (M = 18.33, SD = 3.49) and Motivation (M = 17.66, SD = 4.08). The lowest mean score was observed for Anxiety/Worry Management (M = 11.50, SD = 4.79), reflecting a comparatively limited capacity among participants to control anxiety and worry. This finding suggests that although gifted students demonstrate strong motivation and cognitive preparation, they may experience difficulties in managing anxiety and worry associated with high academic expectations. Table 2 presents the descriptive statistics of mental skill dimensions.

Table 2. Overview of Descriptive Statistics of Mental Skill Dimensions (n = 214)

Construct	Minimum	Maximum	Mean	SD
Imagery Ability	6	24	18.33	3.49
Mental Preparation	4	24	18.44	3.79
Self-Confidence	5	24	15.04	3.99
Concentration	4	24	13.88	4.49
Anxiety/Worry Management	4	24	11.50	4.79
Arousal Control	4	24	15.43	3.36
Motivation	4	24	17.66	4.08

Note: Overall, the descriptive results suggest that the respondents demonstrated moderate to high levels of mental skills, particularly in aspects related to preparation, imagery and motivation, while skills related to anxiety/worry management and concentration were comparatively lower.

(c) Normality Test:

Data normality was evaluated before factor analysis by examining skewness and kurtosis for each of the seven BMSQ dimensions. Table 3 indicates that skewness values ranged from – 0.721 to 0.429, whereas kurtosis values ranged from –0.340 to 1.094. According to statistical

guidelines [19], values within the range of ± 2 indicate acceptable univariate normality. Table 3

presents the normality test results for mental skill dimensions.

Table 3. Normality Test Results for Mental Skill Dimensions (n = 214)

Dimension	Skewness	Kurtosis
Imagery Ability	-0.589	0.622
Mental Preparation	-0.503	0.394
Self-Confidence	0.047	-0.057
Concentration	-0.038	-0.340
Anxiety/Worry Management	0.429	-0.264
Arousal Control	-0.183	1.094
Motivation	-0.721	0.350

Note: Therefore, the results confirmed that all data distributions were approximately normal, suggesting suitability for subsequent analyses such as the Exploratory Factor Analysis (EFA) and reliability testing.

(d) Exploratory Factor Analysis (EFA):

To explore the underlying dimensions of the BMSQ and establish its construct validity, an Exploratory Factor Analysis (EFA) was conducted among gifted students. The Kaiser–Meyer–Olkin (KMO) measure indicated adequate sampling for factor analysis (KMO = 0.840), surpassing the minimum recommended value of 0.60. This was further supported by a significant Bartlett’s Test of Sphericity ($\chi^2 = 2775.911$, $df = 378$, $p < .001$). These results indicate that the correlation matrix was suitable for factor extraction. Principal Component Analysis (PCA) with Varimax rotation was then applied, resulting in the extraction of seven components with eigenvalues greater than 1.0. Collectively, these components accounted for

65.82% of the total variance, indicating a robust factor structure. The proportion of variance explained by each factor ranged from 22.85% for Factor 1 to 3.66% for Factor 7. The rotated factor matrix further showed that all items loaded strongly on their respective factors, with factor loadings ranging from 0.50 to 0.80, thereby supporting the theoretical seven-factor model originally proposed by [8]. These seven factors represented Imagery Ability, Mental Preparation, Self-Confidence, Concentration, Anxiety/Worry Management, Arousal Control and Motivation. The seven-factor structure identified in this study is consistent with the theoretical model proposed by Bull [8], indicating that the underlying psychological constructs of mental skills remain stable when applied to gifted and talented student populations. Table 4 presents the KMO and Bartlett’s Test results, while table 5 presents the total variance explained by extracted factors. The results of the rotated component matrix for the BMSQ’s seven-factor model are provided in Table 6.

Table 4. Summary of KMO and Bartlett’s Test Findings

Test	Value
KMO Measure of Sampling Adequacy	0.840
Bartlett’s Sphericity Test (Approx. χ^2)	2775.911
Degrees of Freedom	378
p-value	0.000

Table 5. Summary of Variance Explained by the Extracted Factors

Component	Eigenvalue	% of Variance	Cumulative %
Mental Imagery	6.398	22.850	22.850
Mental Preparation	5.101	18.218	41.068
Self-Confidence	1.806	6.450	47.518
Concentration	1.617	5.774	53.292
Anxiety/Worry Management	1.380	4.929	58.221
Arousal Control	1.102	3.936	62.157
Motivation	1.026	3.664	65.822

Table 6. Rotated Component Matrix for the Seven-Factor Solution of the BMSQ

Item	Imagery Ability	Mental Preparation	Self-Confidence	Concentration	Anxiety/Worry Management	Arousal Control	Motivation
1	0.791						
2	0.779						
3	0.681						
4	0.754						
5		0.805					
6		0.801					
7		0.707					
8		0.742					
9			0.794				
10			0.698				
11			0.686				
12			0.692				
13				0.642			
14				0.644			
15				0.641			
16				0.733			
17					0.705		
18					0.581		
19					0.755		
20					0.804		

21						0.643	
22						0.504	
23						0.794	
24						0.621	
25							0.621
26							0.704
27							0.743
28							0.699

Note: The results showed strong evidence for the multidimensional structure of the BMSQ confirming seven distinct but related components of mental skills. The total variance explained (65.82%) and high item loadings (0.50–0.80) demonstrate that the instrument exhibits satisfactory construct validity for assessing mental skill domains among gifted students in Malaysia. These findings align with the original theoretical framework proposed by [8], suggesting that the BMSQ maintains its psychometric integrity when applied in a different cultural and educational context.

(e) Reliability Analysis:

Internal consistency was assessed using Cronbach's alpha for the BMSQ. The results revealed that the 28-item scale exhibited a high

level of reliability, with an overall alpha coefficient of 0.859, which is above the recommended threshold of 0.70 [48]. The reliability coefficients for the seven subscales ranged from 0.716 to 0.871, indicating good to excellent internal consistency across all dimensions. The subscale with the highest alpha value was Anxiety/Worry Management ($\alpha = 0.871$), followed by Mental Preparation ($\alpha = 0.832$) and Motivation ($\alpha = 0.822$). The lowest, yet still acceptable, reliability coefficient was found in Imagery Ability ($\alpha = 0.716$). These findings demonstrate that the instrument maintains strong reliability for assessing mental skills among gifted students in Malaysia. Table 7 provides an overview of the Cronbach's alpha coefficients across all subscales and for the instrument as a whole.

Table 7. Summary of Cronbach's Alpha Values for Each Subscale and the Overall Scale

Subscale	Number of Items	Cronbach's Alpha
Imagery Ability	4	0.716
Mental Preparation	4	0.832
Self-Confidence	4	0.727
Concentration	4	0.783
Anxiety/Worry Management	4	0.871
Arousal Control	4	0.721
Motivation	4	0.822
Overall Instrument	28	0.859

Note: The reliability coefficients obtained suggest that all subscales of the BMSQ are internally consistent and stable for use with gifted student populations in Malaysia. The results reaffirm the instrument's suitability for measuring multidimensional constructs of mental skills, including motivation, imagery, confidence, and concentration. The overall reliability value ($\alpha = .859$) supports its psychometric soundness in the gifted population in Malaysian educational context.

4) Discussion:

The present findings demonstrate that the BMSQ shows solid psychometric strength within the Malaysian gifted student population. The seven-factor structure identified in this study is consistent with the original model proposed by [8] indicating that the multidimensional construct of mental skills remains applicable within the gifted and talented student population. Average explained variance reported in psychological research approximately 40% to 45% by [44]. The results imply that the BMSQ effectively represents a significant portion of the underlying constructs, indicating a high level of factorial coherence within the gifted student population. Furthermore, the reliability analysis also indicates strong internal consistency across the instrument, suggesting that the BMSQ reliably measures multiple dimensions of mental skills among gifted students because surpassing the minimum acceptable standard of (0.70) [49]. The satisfactory KMO value and adequate sample size may also have contributed to the stable factor solution obtained in this study.

The descriptive pattern observed in this study also offers meaningful psychological insights into the characteristics of gifted students. High scores in Mental Preparation, imagery ability and motivation indicate that these students possess strong goal orientation and cognitive preparation strategies, which are commonly associated with high academic achievement. However, the comparatively lower scores in anxiety and worry management suggest that although gifted students demonstrate strong motivation and preparation, they may still experience difficulties

regulating emotional pressure and performance-related stress. This finding supports previous literature indicating that high expectations and perfectionistic tendencies often increase psychological vulnerability among gifted learners [3].

The relatively high proportion of variance explained (65.82%) may be attributed to the fact that gifted students, much like athletes, operate in performance-oriented environments where psychological skills are consistently applied. When individuals experience similar performance demands and expectations, their responses tend to converge around the intended constructs, producing a more stable and coherent factor structure. Similarly, the high internal consistency obtained in this study ($\alpha = 0.859$) is plausible given that gifted students are accustomed to structured assessments [28] high academic expectations [6][10] and continuous self-monitoring [4][31]. Moreover, Cronbach's alpha typically increases when items measure the same underlying construct and exhibit strong inter-item correlations, resulting in greater response homogeneity [13][21][34].

The robustness of these findings may also stem from the psychological similarities between gifted students and athletes. Both groups function in high-performance environments marked by high expectations, competition and the need for continuous emotional regulation. Gifted students often face intense pressure to excel academically, mirroring the stress experienced by athletes striving for peak performance [1][46]. Their emotional intensity and strong self-monitoring tendencies further demand advanced regulation skills to sustain focus and motivation [41][55]. Similarly, athletes depend on self-control, resilience and cognitive strategies to manage stress and maintain optimal functioning under pressure [9][39]. These shared psychological traits likely explain the stable factor structure and high reliability observed in this study when applying the BMSQ to gifted students.

Beyond overall psychometric strength, the factor structure obtained in this study provides further evidence of the BMSQ's theoretical robustness

across diverse populations. The Exploratory Factor Analysis (EFA) results revealed seven distinct yet interrelated psychological skills, consistent with the theoretical model originally proposed by [8]. The total variance explained (65.82%) in this study is slightly higher than that reported in the Turkish validation (62%) by [30] and comparable to the South African adaptation by Edwards and Steyn [16], both of which confirmed the multidimensional nature of the BMSQ. This alignment indicates that the construct of mental skills remains stable even when applied to non-athletic, high-performance populations such as gifted students. In contrast, [22] identified a five factors structure among Serbian handball players, where some factors were merged due to overlapping responses. The preservation of the original seven factor model in this study may be attributed to the diverse cognitive and emotional demands faced by gifted students [43][55] whose performance relies heavily on differentiated psychological skills such as motivation, imagery ability and anxiety and worry management. These findings suggest that while cultural and contextual factors can influence item clustering, the BMSQ retains its structural integrity when applied to populations engaged in performance excellence beyond sport.

These findings also align with previous research demonstrating that psychological skill structures tend to remain relatively stable across performance-oriented populations. Research in sport psychology indicates that psychological skills such as motivation, concentration, imagery and emotional regulation play an important role in helping athletes manage competitive pressure and sustain optimal performance [11][25][37][51]. Similarly, research involving gifted and high-achieving students indicates that psychological factors such as motivation, self-regulated learning and emotional competencies play an important role in sustaining academic engagement and performance in demanding learning environments [26][29][53]. These similarities suggest that individuals operating in high-performance environments, whether in sport or academic contexts, require comparable psychological competencies to manage pressure,

maintain focus and sustain motivation. Consequently, the applicability of the BMSQ in this study further supports the broader view that mental skills frameworks originally developed in sport psychology can also provide valuable insights into the psychological functioning of academically talented individuals.

Further examination of the descriptive data reveals important insights into the psychological strengths and challenges experienced by gifted students. Examining the mean scores for each subscale provides deeper insight into the specific psychological strengths and challenges of this population, thereby contextualizing the quantitative findings within their real performance and emotional experiences. Descriptive findings indicated that gifted students scored highest on Mental Preparation ($M = 18.44$), imagery ability ($M = 18.33$) and motivation ($M = 17.66$), reflecting strong cognitive preparation and intrinsic drive. These results suggest that gifted students are mentally equipped to plan, visualize and sustain effort toward goal achievement attributes often linked to their high academic motivation [12] and self-regulated learning style [35]. However, [39] suggest that gifted students may face challenges in applying these strategies to demanding tasks, indicating that although the mental capacities are present, their use is not always consistent.

The relatively low mean scores for anxiety and worry management ($M = 11.50$) and concentration ($M = 13.88$) reveal ongoing challenges in coping with stress and maintaining focus under high expectations. This pattern aligns with evidence that gifted students frequently experience high internal and external expectations cultivate perfectionistic tendencies that fuel anxiety and hinder focus [17][18][45]. Other than that chronic stress and emotional overexcitability contribute to lower emotional control and concentration [24][46]. Overall, these findings imply that while gifted students possess strong motivational and preparatory mental skills, they require additional support in anxiety and worry management and concentration ability to achieve balanced psychological functioning and sustained performance excellence.

These findings have both theoretical and practical implications. From a theoretical perspective, the results suggest that mental skills frameworks developed in sport psychology can be extended to academic high-performance contexts. This indicates that mental skills techniques may function as universal strategies for enhancing key psychological skills among gifted students, consistent with the original theoretical model. Practically, the validated BMSQ provides educators, counsellors and sport psychologists with a reliable tool to assess the mental skill strengths and weaknesses of gifted students. It enables the identification of specific areas requiring support particularly anxiety/worry management and concentration which were comparatively lower in this study. Such insights can inform the development of targeted mental skills training or psychological enrichment modules. Moreover, the BMSQ can serve as a valuable evaluation instrument for future intervention studies involving participation gifted students in sports or performances program, allowing for the measurement of pre and post intervention changes in mental skills and psychological readiness. Collectively, these implications underscore the potential of sport derived psychological measures to advance both theory and practice within the education of high performing learners.

While the study contributes meaningful insights, it is not without limitations that warrant attention. First, the sample included only gifted students from Malaysian educational contexts, which may limit the applicability of the findings to other cultural or educational settings. Second, the study depended entirely on self-report measures, which are prone to response bias and social desirability influences. Third, only exploratory factor analysis (EFA) was conducted. Subsequent research is encouraged to employ confirmatory factor analysis (CFA) with broader and more diverse samples to strengthen the validation of the BMSQ's seven-factor structure. Additionally, subsequent studies could explore criterion related validity by examining how BMSQ scores relate to student's academic

achievement, well-being or participation in performance program.

5) Conclusion:

In conclusion, this study provides empirical support for the validity and reliability of the BMSQ among gifted students in Malaysia. The seven-factor model was retained with satisfactory psychometric properties, indicating that the construct of mental skills originally developed in sport psychology can be effectively applied to academic high-performance contexts. Overall, the validated BMSQ is suitable for both research and practical assessment in gifted education settings. The instrument may assist educators, counsellors and sport psychologists in identifying students' psychological strengths and areas requiring support, particularly in relation to motivation, emotional regulation and concentration. Such insights may inform the development of targeted mental skills training or psychological enrichment programs aimed at supporting the well-rounded development of gifted students. Subsequent research is encouraged to explore the applicability of the BMSQ by applying confirmatory factor analysis (CFA) across larger and more diverse gifted populations. Longitudinal studies could also investigate how mental skills influence academic achievement, psychological well-being and participation in high-performance educational programs. In addition, intervention-based studies may utilize the BMSQ to evaluate the effectiveness of mental skills training modules designed specifically for gifted students.

6) Acknowledgement:

The authors would like to express their sincere appreciation to the Pusat PERMATA@Pintar Negara and the Faculty of Education, Universiti Kebangsaan Malaysia for their assistance and cooperation in the implementation of this study. The authors also wish to thank all participants for their voluntary engagement and significant contributions.

7) Funding:

The research was conducted without financial support from external sources.

8) Data Availability:

Due to ethical and confidentiality constraints, the data are not publicly accessible but can be requested from the corresponding author.

9) Conflict of interest:

The authors confirm that no potential competing interests were involved in influencing the outcomes of this study.

References:

- Abu Bakar, A. Y., & Mohd. Ishak, N. (2014). Depression, Anxiety, Stress and Adjustments among Malaysian Gifted Learners: Implication towards School Counseling Provision. *International Education Studies*, 7, 6. <https://doi.org/10.5539/ies.v7n13p6>
- Agell, C., & Kellogg, M. (2020). *A Field Guide to Gifted Students: A Teacher's Introduction to Identifying and Meeting the Needs of Gifted Learners* (1st ed.). Routledge. <https://doi.org/10.4324/9781003232599>
- Alfaiz, F. (2025). Prevalence and Diversity of Challenges Faced by Gifted Students in Saudi Arabia: Insights from Educational Specialists. *International Journal of Learning, Teaching and Educational Research*, 24, 65–90. <https://doi.org/10.26803/ijlter.24.7.4>
- Ayranci, M., & Aydın, M. (2025). The Complex Interplay Between Psychological Factors and Sports Performance: A Systematic Review and Meta-Analysis. *PLOS One*, 20. <https://doi.org/10.1371/journal.pone.0330862>
- Blaas, S. (2014). The Relationship Between Social-Emotional Difficulties and Underachievement of Gifted Students. *Australian Journal of Guidance and Counselling*, 24(2), 243–255. <https://doi.org/10.1017/jgc.2014.1>
- Borland, J. (2005). Gifted Education Without Gifted Children: The Case for No Conception of Giftedness (pp. 1–19). <https://doi.org/10.1017/CBO9780511610455.002>
- Brink, H. (2025). The Complexity, Autonomy, Authenticity and Support (CAAS) Framework for Gifted Students' Needs in Technology Education: A Systematic Literature Review. *Roeper Review*, 47(2), 125–135. <https://doi.org/10.1080/02783193.2025.2466514>
- Bull, S. J., Albinson, J. G., & Shambrook, C. J. (1996). *The Mental Game Plan: Getting Psyched for Sport*. Sports Dynamics.
- Butt, J., & Mills, A. (2023). Psychological Characteristics of Optimal Performance (pp. 610–620). <https://doi.org/10.4324/9781003173588-70>
- Chan, D. (2015). Education for the Gifted and Talented. *International Encyclopedia of the Social & Behavioral Sciences*. <https://doi.org/10.1016/B978-0-08-097086-8.92137-8>
- Cumming, J., Olphin, T., & Law, M. (2007). Self-Reported Psychological States and Physiological Responses to Different Types of Motivational General Imagery. *Journal of Sport and Exercise Psychology*, 29(5), 629 – 644. <https://doi.org/10.1123/jsep.29.5.629>
- Dixon, D., Jansen, L., & Gentzis, E.-A. (2025). When Talent Works Hard: Psychosocial Perceptions Predict Academic Engagement in Gifted Students. *Journal for the Education of the Gifted*, 48. <https://doi.org/10.1177/01623532251371736>
- Duhachek, A., Coughlan, A., & Iacobucci, D. (2005). Results on the Standard Error of the Coefficient Alpha Index of Reliability. *Marketing Science*, 24, 294–301. <https://doi.org/10.1287/mksc.1040.0097>
- Durand-Bush, N., Baker, J., van den Berg, F., Richard, V., & Bloom, G. A. (2023). The Gold Medal Profile for Sport Psychology (GMP-SP). *Journal of Applied Sport Psychology*, 35(4), 547–570. <https://doi.org/10.1080/10413200.2022.2055224>
- Durand-Bush, N., Salmela, J., & Green-Demers, I. (2001). The Ottawa mental skills assessment tool (OMSAT-3*). *The Sport Psychologist*, 15, 1–19. <https://doi.org/10.1123/tsp.15.1.1>
- Edwards, D. J., & Steyn, B. (2011). Establishment of Norms for the Bull's Mental Skills Questionnaire in South African University Students: An Exploratory Study. *African Journal for Physical, Health Education, Recreation and Dance*, 17. <https://doi.org/10.4314/ajpherd.v17i3.71105>

- González Urbina, A., Gómez-Arízaga, M., & Conejeros-Solar, M. (2017). Caracterización del Perfeccionismo en Estudiantes con Alta Capacidad: Un Estudio de casos exploratorio. *Revista de Psicología*, 35, 605–640. <https://doi.org/10.18800/psico.201702.008>
- Grugan, M. C., Olsson, L. F., Hill, A. P., & Madigan, D. J. (2025). Perfectionism, School Burnout and School Engagement in Gifted Students: The Role of Stress. *Gifted Child Quarterly*, 69(3), 255–268. <https://doi.org/10.1177/00169862251328015>
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *MULTIVARIATE DATA ANALYSIS EIGHTH EDITION*. www.cengage.com/highered
- Hammermeister, J., & VonGuenther, S. (2005). Sport Psychology: Training The Mind for Competition. *Current Sports Medicine Reports*, 4, 160–164. <https://doi.org/10.1007/s11932-005-0061-1>
- Heo, M., Kim, N., & Faith, M. (2015). Statistical Power as a Function of Cronbach Alpha of Instrument Questionnaire Items. *BMC Medical Research Methodology*, 15. <https://doi.org/10.1186/s12874-015-0070-6>
- Jakšić, D., Trbojević Jocić, J., Maričić, S., Miçooğullari, B. O., Sekulić, D., Foretić, N., Bianco, A., & Drid, P. (2022). Mental Skills in Serbian Handball Players: In Relation to the Position and Gender of Players. *Frontiers in Psychology*, Volume 13-2022. <https://doi.org/10.3389/fpsyg.2022.960201>
- Jones, M., & Mattie, P. (2024). Self-talk, Goal Setting, and Visualization (pp. 63–85). <https://doi.org/10.4324/9781003378969-6>
- Klose Smith, C., & Wood, S. (2020). Supporting the Career Development of Gifted Students: New Role and Function for School Psychologists. *Psychology in the Schools*, 57, 1558–1568. <https://doi.org/10.1002/pits.22344>
- Lane, A. M., Thelwell, R. C., Lowther, J., & Devonport, T. J. (2009). Emotional Intelligence and Psychological Skills Use among Athletes. *Social Behavior and Personality*, 37(2), 195 – 202. <https://doi.org/10.2224/sbp.2009.37.2.195>
- Lavrijsen, J., Sypré, S., Soenens, B., Vansteenkiste, M., Camerman, E., Ramos, A., & Verschueren, K. (2024). Fostering Excellence: Nurturing Motivation and Performance Among High and Average Ability Students Through Need-Supportive Teaching. *Journal of School Psychology*, 105. <https://doi.org/10.1016/j.jsp.2024.101322>
- Limone, P., & Toto, G. (2018). The Psychological Constructs and Dimensions Applied to Sports Performance: A Change of Theoretical Paradigms. *Journal of Physical Education and Sport*, 18, 2034–2038. <https://doi.org/10.7752/jpes.2018.s5302>
- Majid, R. A., Jelas, Z. M., & Ishak, N. M. (2012). Behavioral Characteristics Prototypes of Academically Talented Students: Implications for Educational Interventions. *Asian Social Science*, 8(15), 298 – 305. <https://doi.org/10.5539/ass.v8n15p298>
- Mammadov, S., Cross, T. L., & Ward, T. J. (2018). The Big Five Personality Predictors of Academic Achievement in Gifted Students: Mediation by Self-Regulatory Efficacy and Academic Motivation. *High Ability Studies*, 29(2), 111 – 133. <https://doi.org/10.1080/13598139.2018.1489222>
- Miçooğullari, B. O., Edwards, D. J., & Ekmekçi, R. (2021). Psychometric Properties of Bull's Mental Skills Questionnaire in a Turkish Population. *Exercise and Quality of Life*, 13(2), 13–20. <https://doi.org/10.31382/eqol.211202>
- Muda, T., & Saleh, N. (2024). Profil Isu Sosioemosi Pelajar Pintar Dan Berbakat: Profile of Socio-Emotional Issues of Intelligent and Talented Students. *ATTARBAWIY: Malaysian Online Journal of Education*, 8, 253–265. <https://doi.org/10.53840/attarbawiy.v8i1.192>
- Ninkov, I. (2020). Education Policies for Gifted Children Within a Human Rights Paradigm: a Comparative Analysis. *Journal of Human Rights and Social Work*, 5, 1–10. <https://doi.org/10.1007/s41134-020-00133-1>
- Noor, B. (2023). Pressure and Perfectionism: A Phenomenological Study on Parents' and Teachers' Perceptions of the Challenges Faced by Gifted students in Self-Contained Classes. *Frontiers in Education*, Volume 8-2023. <https://doi.org/10.3389/feduc.2023.1225623>
- Pakzad, R., & Alaeddini, F. (2017). Misuse and Misconception of Cronbach's Alpha Coefficient as an Index of Internal Consistency of Measuring Tools. *Iranian Journal of Epidemiology*, 12(4). <http://irje.tums.ac.ir/article-1-5622-en.html>

- Paz-Baruch, N., & Hazema, H. (2023). Self-Regulated Learning and Motivation Among Gifted and High Achieving Students in Science, Technology, Engineering, and Mathematics Disciplines: Examining Differences Between Students from Diverse Socioeconomic Levels. *Journal for the Education of the Gifted*, 46, 016235322211438. <https://doi.org/10.1177/01623532221143825>
- Pfeiffer, S., & Stocking, V. (2000). Vulnerabilities of Academically Gifted Students. *Special Services in the Schools*, 16. https://doi.org/10.1300/J008v16n01_06
- Reinebo, G., Alfonsson, S., Jansson-Fröjmark, M., Rozental, A., & Lundgren, T. (2024). Effects of Psychological Interventions to Enhance Athletic Performance: A Systematic Review and Meta-Analysis. *Sports Medicine*, 54(2), 347 – 373. <https://doi.org/10.1007/s40279-023-01931-z>
- Renati, R., Bonfiglio, N., Dilda, M., Mascia, M., & Penna, M. (2022). Gifted Children through the Eyes of Their Parents: Talents, Social-Emotional Challenges, and Educational Strategies from Preschool through Middle School. *Children*, 10, 42. <https://doi.org/10.3390/children10010042>
- Ridgley, L., Rubenstein, L., & Callan, G. (2021). Are Gifted Students Adapting Their Self-Regulated Learning Processes When Experiencing Challenging Tasks? *Gifted Child Quarterly*, 66, 001698622110254. <https://doi.org/10.1177/00169862211025452>
- Robazza, C., Morano, M., Bortoli, L., & Ruiz, M. C. (2023). Athletes' Basic Psychological Needs and Emotions: The Role of Cognitive Reappraisal. *Frontiers in Psychology*, Volume 14-2023. <https://doi.org/10.3389/fpsyg.2023.1205102>
- Saß, S., Köller, O., & Zimmermann, F. (2025). Smart But Maladapted? Differences in the Psychological Functioning of Intellectually Gifted Students Compared with Average-Ability Students. *Gifted Child Quarterly*, 69, 219–236. <https://api.semanticscholar.org/CorpusID:276397964>
- Shaunessy, E., & Lazarou, B. (2020). Curriculum and Instruction for the Gifted: The Role of School Psychologists. *Psychology in the Schools*, 57, 1542–1557. <https://doi.org/10.1002/pits.22379>
- Sisk, D. (2021). Managing the Emotional Intensities of Gifted Students with Mindfulness Practices. *Education Sciences*, 11, 731. <https://doi.org/10.3390/educsci11110731>
- Smedslund, G., Arnulf, J. K., & Smedslund, J. (2022). Is Psychological Science Progressing? Explained Variance in Psycinfo Articles during the Period 1956 To 2022. *Frontiers in Psychology*, Volume 13-2022. <https://doi.org/10.3389/fpsyg.2022.1089089>
- Sorrenti, L., Caparello, C., & Filippello, P. (2024). Exploring The Role of Perfectionism in School Success: A Structural Equation Modeling Approach. 12. <https://doi.org/10.13129/2282-1619/mjcp-4312>
- Suyitno, S., Winarto, Sulistiana, D., & Supriyono. (2024). Gifted Students: Analysis among Psychological Problems, Social and Emotional Well-Being. *Edelweiss Applied Science and Technology*, 8(5), 1302–1310. <https://doi.org/10.55214/25768484.v8i5.1833>
- Thomas, P. R., Murphy, S. M., & Hardy, L. (1999). Test of Performances Strategies: Development and Preliminary Validation of a Comprehensive Measure of Athletes' Psychological Skills. *Journal of Sports Sciences*, 17 9, 697–711. <https://api.semanticscholar.org/CorpusID:11406756>
- Thorndike, R. M. (1995). Book Review: *Psychometric Theory* (3rd ed.) by Jum Nunnally and Ira Bernstein New York: McGraw-Hill, 1994, xxiv + 752 pp. *Applied Psychological Measurement*, 19(3), 303–305. <https://doi.org/10.1177/014662169501900308>
- Tuckman, B. W., & Waheed, M. A. (1981). Evaluating an Individualized Science Program for Community College Students. *Journal of Research in Science Teaching*, 18, 489–495. <https://api.semanticscholar.org/CorpusID:143973915>
- Wadey, R., & Hanton, S. (2008). Basic Psychological Skills Usage and Competitive Anxiety Responses: Perceived Underlying Mechanisms. *Research Quarterly for Exercise and Sport*, 79(3), 363 – 373. <https://doi.org/10.1080/02701367.2008.10599500>
- Walton, C. C., Keegan, R. J., Martin, M., & Hallock, H. (2018). The Potential Role for Cognitive Training in Sport: More Research Needed. *Frontiers in Psychology*, Volume 9-2018. <https://doi.org/10.3389/fpsyg.2018.01121>
- Wang, W.-L. (2022). Socio affective Factors Related to Engagement in Regular Classes of Academically Gifted Adolescent Students in Taiwan. *Social Behavior and Personality*, 50(4). <https://doi.org/10.2224/sbp.11223>

- Yang, Y., & Xia, Y. (2015). On the Number of Factors to Retain in Exploratory Factor Analysis for Ordered Categorical Data. *Behavior Research Methods*, 47(3), 756 – 772. <https://doi.org/10.3758/s13428-014-0499-2>
- Zakreski, M. (2018). When Emotional Intensity and Cognitive Rigidity Collide: What Can Counselors and Teachers Do? *Gifted Child Today*, 41, 208–216. <https://doi.org/10.1177/1076217518786984>