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MENTAL TOUGHNESS AND ATHLETIC PERFORMANCE IN MALE ADOLESCENTS FIELD ATHLETES: A MULTIPLE REGRESSION ANALYSIS

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ABSTRACT

The research is exploratory, evaluating how the four dimensions of mental toughness, Control, Commitment, Challenge, and Confidence, affect the athletic performance among male under 18 athletes who participated in the Sabah School Sports Council Championship 2024. The study employed a quantitative correlational design and a multiple-regression analysis which evaluated the predictive ability of these psychological variables on the performance outcome. Results showed none of the mental toughness dimensions significantly predicted athletic performance. However, Commitment, demonstrated the strongest, despite being non significant trend, suggesting athletes characterised by increased dedication and perseverance achieved high competition outcomes. However, the total regression model that explained performance variance had a relatively small proportion ($R^2 = 0.065$), indicating that mental toughness alone does not fully capture the performance in sports. Other determinants, such as physical conditioning, technical ability, and environmental factors like the quality of coaches and training infrastructure, had a stronger influence on the performance outcomes. The research highlights the need for an integrative training paradigm that combines psychological development of skills with physical conditioning. Based on this, coaches and sports psychologists are recommended to focus on creating Commitment through the use of a systematic mental Skills programme, which includes goal-setting methods and mental rehearsal methods. The findings are added to the overall understanding of mental toughness among adolescent athletes, which is especially the case in a non-Western setting like Malaysia. Further studies should be considered for future research that involves longitudinal studies, incorporates additional psychological factors (e.g., self-talk and motivation), and examines the cultural aspects that influence the development of mental toughness.

Keywords: mental toughness, commitment, adolescent athletes, athletic performance, sports psychology

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INTRODUCTION

The role of athletic performance is increasingly understood as an emergent characteristic resulting from the combination of physiological and psychological factors, which enhances the overall success of an athlete (Konopka et al., 2022). Although physical and technical skills cannot be ignored as prerequisites for success, there is growing evidence that psychological constructs, particularly mental toughness, play a comparably dominant role in achieving elite performance. More recent empirical research highlights the role of mental toughness as a key factor in helping athletes perform optimally during challenging times (Gucciardi et al., 2015; Jones et al., 2002). Mental toughness is the ability of an athlete to remain focused and perform at their best despite setbacks, failures, or stress (Clough et al., 2002). Athletes with high values of mental toughness exhibit stronger resilience, self-confidence, and dedication; thus, they recover faster than those with lower values and can maintain their performance under pressure (Cowden, 2017).

Mental toughness has garnered considerable research attention in the field of sports psychology, particularly among elite athletes. Although the current body of literature has focused on the high-performance individuals, there is an increasing scholarly need to investigate the functioning of mental toughness among youth athletes. In fact, consistent results show that mental toughness is strongly associated with being a better athlete and an increased ability to cope with psychological stress, even in stressful situations (Singh et al., 2022). The conceptualisation of mental toughness by Clough et al. (2002) was the 4C model, comprising Control, Commitment, Challenge, and Confidence, which together provided the psychological knowledge of mental toughness and equipped the athlete with the tools to become a better person in their discipline.

Nonetheless, empirical data indicate that these dimensions may become more or less significant in various sports and competitive situations (Singh et al., 2022). The strongest predictors of success are often cited as Commitment and Confidence (Gerber et al., 2018; Sheard et al., 2009), and the role of Control and Challenge appears to be dependent on specific sports and contextual variables (Mills et al., 2014; Ranjbar et al., 2022). The relevance of the 4C model, i.e., Control, Commitment, Challenge and Confidence to teenage athletes is understudied in Southeast Asia, and comparatively speaking, it is often more thoroughly studied in high-performance athletes operating in Western environments (Pilárik et al., 2024). Psychological training is often overlooked in Malaysia, where youth sports programmes are primarily focused on physical and technical training, which in turn can compromise the mental fitness of young athletes (Halim & Ismail, 2021). This lack of coverage highlights a crucial research gap and presents an opportunity to investigate the impact of mental toughness on performance consistency among adolescent sportspersons.

This research seeks to fill the said gap in the study by analysing how the testable mental toughness dimensions Control, Commitment, Challenge, and Confidence impact the athletic performance of male under-18 field athletes in the 2024 Sabah School Sports Council Championship. It is hypothesized that these mental toughness domensions will significantly predict performance, with higher levels of mental toughness being associated with better performance outcomes. Using multiple regression analysis, the study will assess the relative influence of each dimensions on performance results. The findings are expected to provide empirical evidence of how psychological preparedness impacts athletic stability in Malaysian

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youth athletes, as well as inform the development of wvidence based psychological training interventions aimed at enhancing mental resilience and improving performance.

LITERATURE REVIEW

Concept of Mental Toughness

It is a well-known fact that mental toughness is one of the most essential psychological constructs for success in competitive sports. It has commonly been considered a key component that helps athletes maintain optimal performance, especially in high-tension situations and during competition (Clough et al., 2002; Jones et al., 2002). High performing athletes commonly exhibit key mental toughness traits such as resilience, emotional regulation, focus and the ability to perform under pressure. Mentally tough athletes are also characterised by their ability to remain focused, confident, and resilient in the face of adversity, pressure, or failure (Gucciardi et al., 2015). These individuals can achieve the best results during challenges and recover flexibly after failure (Cowden, 2017). Such athletes are often adept at managing their emotional states, maintaining composure and pushing through difficult circumstances, all while sustaining high level of performance. Mental toughness is becoming both a personal characteristic (which can be inherited) and an activity that can be developed by conscious effort and training of the mind (Cowden, 2017; Sheard et al., 2009).

The 4C Model, developed by Clough et al. (2002), is also one of the most widely used frameworks to explain mental toughness. This model consists of four main dimensions, Control, which refers to the capability to manage emotions and stay cool in circumstances, Commitment, which refers to the ability to persevere and work hard towards the attainment of goals, Challenge, which refers to viewing adversity as a challenge to grow, and Confidence, which refers to having faith in oneself and perceiving self-efficacy. Among high performaing athletes, the dimensions of Confidence and Control are often most evident with athletes demonstrating a strong belief in their skills and the ability to stay calm under pressure. The 4C Model is praised for its simplicity, versatility in application across various sports, and predictive validity of its outcomes in athletic performance (Gucciardi et al., 2015; Ranjbar et al., 2022).

This model can provide a comprehensive understanding of mental toughness, as well as offer insights into the psychological qualities that contribute to an athlete's success and ability to perform under pressure. These dimensions, although well-established, may have particular significance depending on the situation and the population being studied.

Mental Toughness and Athletic Performance

Ample research has established a connection between mental toughness and improved athletic performance across a wide range of sporting activities. Mentally stronger athletes are more likely to be more focused, regulate their emotions, and persist in their goals, which significantly improves training and performance during competition (Crust & Swann, 2013; Jones et al., 2007). It is particularly noteworthy that high performing athletes often demonstrate a high level of Commitment, which keeps them motivated to push through setbacks and Confidence which enhances their ability to execute under pressure. Notably, Sheard et al. (2009) found that

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mentally tough athletes demonstrated greater consistency in their performance under pressure. In contrast, Gerber et al. (2018) also discovered that it alleviates the impact of competitive stress and burnout.

Among 4C components, Commitment and Confidence, are often considered the critical predictors of athletic success, as they have a substantial impact on an athlete's ability to endure in difficult circumstances. Commitment, when high, is also essential, as it motivates athletes to continue striving despite setbacks and failures. This finding aligns with research that suggests an athlete is deeply committed to the sport they choose, and this spirit drives them to persevere even in the face of hardships (Rajan & Varma, 2022). Conversely, individuals with high Confidence are more effective in their problem-solving and risk-taking behaviours when competing (Gucciardi et al., 2015). In high performing athletes, these two dimensions often work tandem, with strong sense of commitment driving the athlete to continuously push their bounderies while confidence enables them to take on challenges without hesitation.

However, the role of every component can vary depending on the level of experience, the type of sport, and the stage of development in an athlete (Mills et al., 2014). To illustrate, adolescent athletes can be more dependent on the discipline of their training with the help of Commitment, whereas elite athletes can be more dependent on Confidence and emotional control (Gerber et al., 2018; Ranjbar et al., 2022).

Adolescent Athletes and Psychological Development

Adolescence is a critical developmental transition that involves both somatic and affective development, making the development of mental toughness particularly relevant at that stage (Huang, 2022). A group of psychological stressors that are offered to adolescent athletes in particular are emotional fluctuations, increased sensitivity to stress, and the demands of negotiating between academic, social, and athletic activities. The above factors can significantly impact athletic performance. In competitive sport environments emotional fluctuations and mental distress are common and adolescents are often less equipped to handle these pressures. Empirical research suggests that competitive sport settings tend to trigger emotional instability and mental distress that, consequently, may undermine resiliency and self-esteem (Graupensperger et al., 2021). Candra and Hermahayu (2021) emphasise the importance of resilience training programmes among young athletes, noting how they can help them reduce stress factors, both related to sporting activities and life in general. This fact underscores the crucial role of psychological resilience in overcoming these challenges.

The focus of school sports programmes in the Malaysian context has historically been on physical and technical training components, with comparatively less emphasis on psychological skill building (Halim & Ismail, 2021). The lack of structured mental skills training among young athletes limits their ability to develop resilience and coping strategies essential for high performance. As a result, a significant proportion of young athletes are not exposed to mental-skills training in a well-structured manner, which limits their capacity to develop coping strategies and psychological steadiness in competition. A lack of systematic psychological training can hinder the development of key facets of mental toughness, which cannot be achieved without maintaining stable performance. This is supported by evidence that planned mental-skills training is necessary to build resilience among athletes (Hasmyati et al., 2022). Research on mental toughness in this population group will therefore hold informative

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value when designing specific interventions to enhance emotional control, concentration, and perseverance among young athletes.

Empirical Evidence and Research Gap

Several studies have employed regression analysis to assess the predictive value of mental toughness on performance. According to Cowden (2017), a substantial portion of the performance results of competitive tennis players can be attributed to mental toughness. On the same note, Ranjbar et al. (2022) have stated that the strongest predictors of performance among teen athletes were Confidence and Challenge. Nonetheless, the results have not always been the same in contexts. Research has found that mental toughness is strongly connected to performance, and its predictive ability decreases when the study factors in experience or motivation (Lin et al., 2017).

However, with these developments, little is known about mental toughness among adolescent athletes in Southeast Asia, more so in Malaysia. It might be based on culture, language, and development that affect the way young athletes perceive and communicate mental toughness (Halim & Ismail, 2021). Thus, the study aims to address this gap by employing multiple regression analysis to identify the elements of mental toughness that best predict athletic performance among male players under 18 in Sabah. This study will help form a more comprehensive picture of mental toughness, particularly in parts of the world where psychological training is not always prioritised, by providing the perspective of a non-Western adolescent situation.

This concentration extends beyond merely adding empirical evidence on the applicability of the 4C model in a non-Western adolescent population, as well as its contributions to empirical knowledge regarding coaching and educators who wish to incorporate psychological training into youth sports programmes. By integrating mental toughness training, coaches will be able to enhance the resilience of young athletes, enabling them to better cope with the psychological aspects of competition.

METHODOLOGY

Research Design

The research design is a quantitative and correlational study design, which employed a multiple regression technique to test the forecasting ability of the four dimensions of mental toughness, namely Control, Commitment, Challenge, and Confidence, on the performance of athletes. The choice of multiple regression was not accidental, as it can be used to evaluate the relative contribution of each psychological variable to the difference in athletic performance among athletes. This methodological option is especially relevant in explaining the role of each dimension of mental toughness in athletic performance, where a constant factor defines relationships and simultaneously controls them.

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Participants

A total sample size of 105 male athletes aged 18 and under participated in various field events at the 2024 Sabah School Sports Council Championship, serving as the sample population for this investigation. The sporting activities that were involved included high jump, long jump, shot put, discus throw, javelin throw, hammer throw, and triple jump. Participants were selected using purposive sampling with strict inclusion criteria: male athletes aged between 16 and 18 years old, active participants in the field events listed above in the 2024 championship, and who represent different schools in Sabah. This deliberate sampling strategy only included those athletes who would significantly contribute to meaningful results of the relationship between mental toughness and performance.

The variability in terms of performance among the athletes was assessed by classifying the participants into three different groups, which were based on their actual performance ranking in competitions, namely high performers (positions 1–5), moderate performers (positions 6-10), and low performers (positions 11-20). This hierarchy helped to clearly describe the performance differences in the group of adolescent athletes. Follow-up studies can examine the existence of other variables, such as training experience, to determine their effects on these performance levels and mental toughness.

The study received ethical permission from the Sabah Education Department and the informed consent of the relevant school authorities, coaches, and the participants. The purpose of the study was fully explained to the athletes, and their availability was made known to them through assurances of confidentiality. The consent process included open dialogue on the study's goals, methodologies, and risks involved in the research, thereby maintaining ethical rigour and ensuring that participants understood the research.

Instrument

The instrument used to assess the mental toughness of the athletes was the Mental Toughness Questionnaire (MTQ18). The MTQ18, developed based on Clough et al. (2002) and later revised by Dagnall et al. (2019), consists of 18 items that evaluate four dimensions: Control, Commitment, Challenge, and Confidence. The respondents indicate their agreement or disagreement with each item on a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating greater mental toughness.

Empirical studies have revealed that the MTQ18 possesses satisfactory psychometric quality across diverse groups of athletes, with Cronbach's alpha coefficients ranging from .70 to .85 (Clough et al., 2002; Gucciardi et al., 2015). The MTQ18 showed good internal consistency in the current research with a cumulative Cronbach's alpha of .78.

Procedure

Before data collection, the sports authorities at the Sabah State Education Department were contacted to obtain permission for data collection. The respondents would fill out a questionnaire an hour before their event of participation to ensure that they captured their pre-competition cognitive states, and ensure that the data was based on their psychological

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preparedness for participating in the physical task. The trained research assistants and coaches were responsible for the data collection process to ensure that responses were independent and accuracy was improved. A series of records of the official competition results was gathered after data collection and used as an objective performance measure in the regression analysis. This technique of methodology provided an objective foundation for the performance statistics, minimising possible bias in the evaluation of athletic performance.

Data Analysis

Data analysis was done by means of SPSS 29.0. Descriptive statistics, mean and standard deviation were used to compute each dimension of mental toughness. These statistics give a rough idea on how the mental toughness scores are distributed and varying thus on which analyses will be made. The assumptions of normality, linearity, multicollinearity, and homoscedasticity were pre-tested prior to the regression analysis and met; the assumptions are important towards the reliability and validity of the regression model.

Performance Categorization and Regression Justification

In the given research, the participants were categorized into three performance groups in the ranking of highest (positions 1-5), moderate (6-10), and low (11-20) performances. Although these categories were on an ordinal scale, performance variable was numerically coded (1 high performance, 2 for moderate, 3 for low) so as to treat performance as a continuous variable to undertake regression analysis. This method allowed us to determine the predictive values between the dimensions of mental toughness and performance.

Then, a multiple regression analysis was done to determine the predictability of the four independent variables, Control, Commitment, Challenge, and Confidence, on the dependent variable which was athletic performance. The aggregate model fit was also measured using the coefficient of determination (R^2) that is a measure of the amount of variance in athletic performance that the four predictors explain. The measure offers an understanding of predictability of the independent variables in general. The common standardised beta ((β) coefficients and ($p < .05$) (levels of significance) were also checked to determine the statistical significance of the individual predictors.

Through such analysis, one will be able to make the most critical factors within the framework of mental-toughness as well as explain the precise relationship between the factors and athletic performance.

RESULTS

Descriptive Statistics

The study employed a descriptive analysis to examine the levels of mental toughness in athletes across four dimensions: Control, Commitment, Challenge, and Confidence. According to Table 1, athletes revealed a moderate overall degree of mental toughness ($M = 3.03$, $SD = 0.37$). The mean score was highest in commitment ($M = 3.15$, $SD = 0.76$) then control ($M = 3.05$, $SD =$

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0.74) and challenge (M = 3.00 SD = 0.70). The lowest-scoring dimension was Confidence (M = 2.93, SD = 0.72), which may indicate that younger athletes still lack the self-belief of experienced competitors.

Table 1. Descriptive statistics for mental toughness dimensions (n = 105).

Dimension	Mean (M)	SD	Interpretation
Control	3.05	0.74	Moderate
Commitment	3.15	0.76	Moderate–High
Challenge	3.00	0.70	Moderate
Confidence	2.93	0.72	Moderate
Overall Mental Toughness	3.03	0.37	Moderate

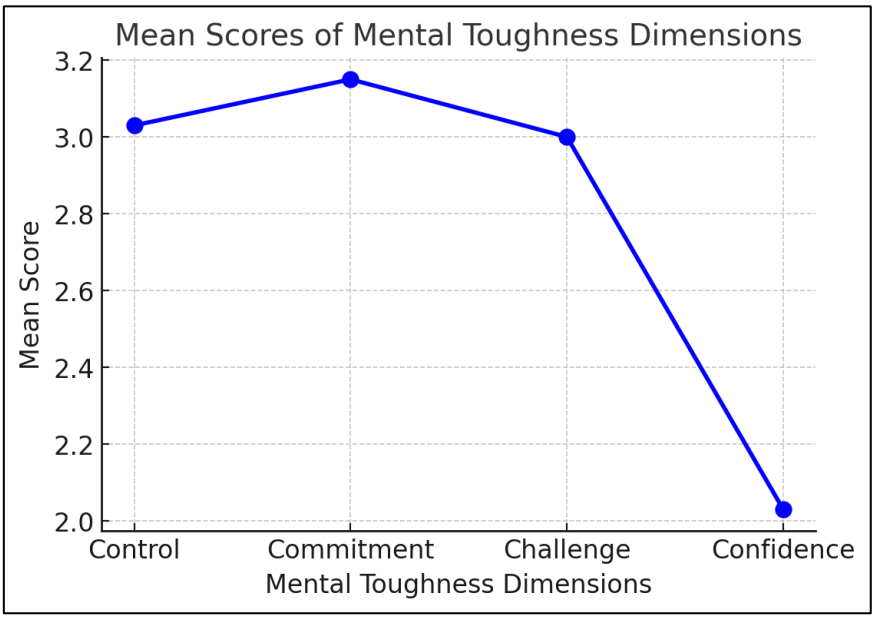

Figure 1. Mean scores for mental toughness dimensions.

Figure 1 illustrates a line graph that shows the relative intensity of each of the psychological dimensions of the athlete cohort, with the most salient psychological dimension being Commitment and the least being Confidence. The bar graph provided shows that most athletes have moderate levels of mental toughness, marked by an overwhelming tendency towards high ratings of the Commitment trait. This represents a significant degree of resilience in achieving goals, but also indicates the necessity to develop self-confidence to a greater extent.

Performance Distribution

The sportsmen participating in the current study were divided into three separate groups based on their official competition results. The first group consisted of high performers who scored in the top 5 of the sample, with a percentage of 33.3%. The second group consisted of moderate performers, who occupied the 6-10 positions, and constituted 33.3% of the participants. The

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last and third group was the low-performers, which included the range of eleven to twenty ranks and made up 33.3% of the sample. This classification facilitated a comparative analysis across performance levels, making it effective for testing the possibility of a correlation between mental toughness and sport performance.

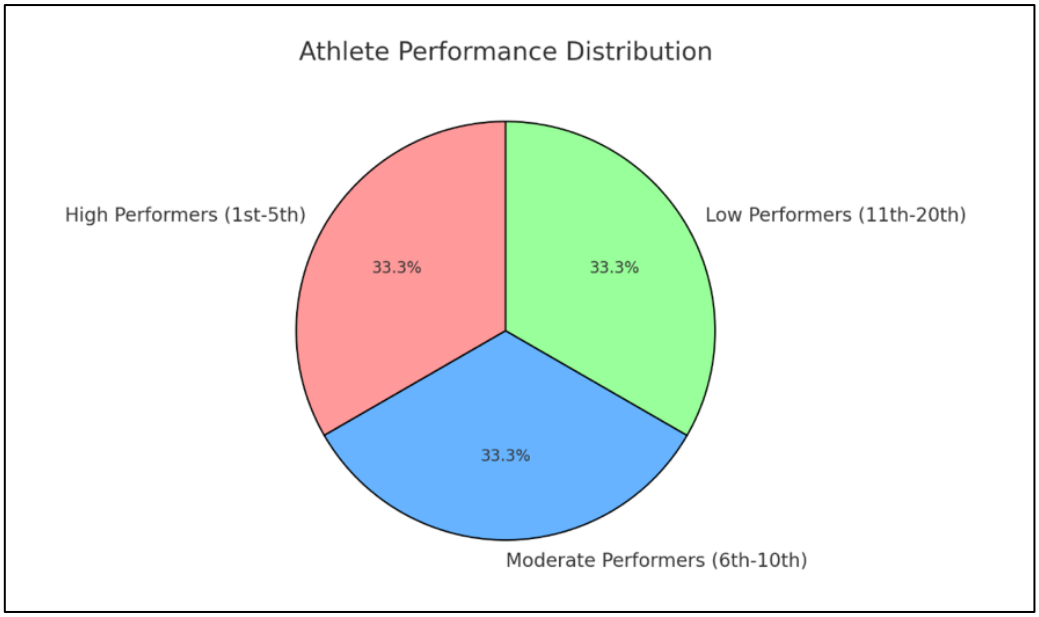

Figure 2. Pie Chart of athlete performance distribution

The distributions in Figure 2 provided sufficient variability for future comparisons and regression analysis, as well as striking a balance between groups, which made the predictive results more reliable.

Regression Analysis

The four dimensions of mental toughness were analysed using multiple regression analysis to understand how they could be used to predict athletic performance. The overall regression model failed to achieve statistical significance, $F(4, 100) = 1.72$, $p = .15$, indicating that the four predictors combined only explained a small portion, 6.5% of the variance in performance ($R^2 = 0.065$). However, the Commitment dimension has appeared as a positive but only marginal predictor ($\beta = 0.21$, $p = .07$), which suggests that athletes with a higher degree of Commitment demonstrated a slightly better outcome. Still, the result was not significant ($p < .05$). The other dimensions (Control, Challenge, and Confidence) were not statistically significant.

Despite the fact that Commitment was the most salient predictor in the regression model, the overall R^2 value was very low (0.065), indicating that mental toughness can only explain a small fraction of the variation in athletic performance. Such a tendency is common in psychological studies, where human performance is determined by a vast number of factors, which can be either internal (e.g., motivation, personality traits) or external (e.g., physical conditioning, training environment). Accordingly, mental toughness, although important, is just one component in the broader constellation of factors that contribute to an athlete's success. Other variables, including physical conditioning, technical skills, and environmental factors

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(e.g., quality of coaching, family support, and availability of training facilities), would have a more significant impact on performance outcomes. So, the intricacy of athletic success is evident, and psychological elements are mingled with physical and determining factors.

The visual representation of the relationship between mental toughness and performance may involve visual aids, such as scatter plots or bar graphs, to illustrate the extent to which the data points conform to the regression line. The use of these visuals would enhance the understanding of the model's fit and limitations. The standardised beta coefficients of the mental toughness dimensions can be further represented in a bar chart to show their relative predictive significance.

Future studies will strive to use more variables to achieve a holistic picture of athletic success. Indicatively, when factors such as motivation, self-talk, or social support are taken into account, this model can be expanded to predict more accurately and provide a holistic description of what determines performance.

Table 2. Multiple regression analysis predicting athletic performance from mental toughness dimensions (n = 105).

Predictor	B	SE B	β	t	p
Constant	0.512	0.328	-	1.56	.123
Control	-0.19	0.11	-0.18	-1.75	.081
Commitment	0.21	0.12	0.21	1.89	.070
Challenge	-0.07	0.11	-0.06	-0.61	.541
Confidence	-0.01	0.10	-0.01	-0.09	.928

Model Fit: $R^2 = .065$, *Adj* $R^2 = .023$, $F(4,100) = 1.72$, $p = .15$

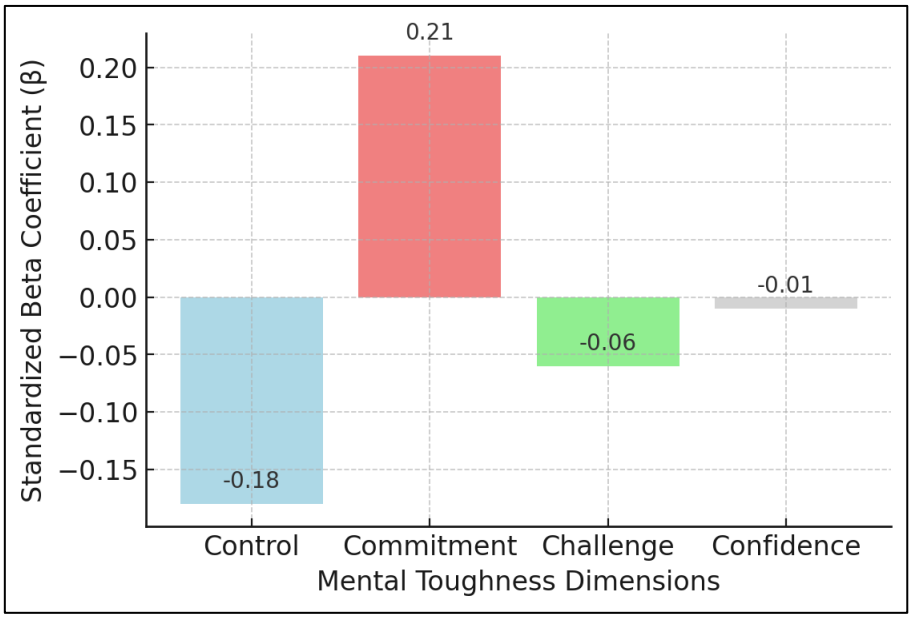

Figure 3. Regression coefficients for mental toughness dimensions.

Figure 3 shows the standardised β coefficients of the predictors Control, Commitment, Challenge, and Confidence. The corresponding bar of Commitment is out of proportion even

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with the rest, meaning that it has a relatively more substantial predictive influence, albeit not significant, on athletic performance. The overall regression model did not achieve statistical significance; however, there was a definite trend in which a particular variable, Commitment, served as a predictor in the overall results of performance. This trend suggests that a more substantial commitment and purposefulness can be linked to better athletic performance, which aligns with prioritising studies that persistence and discipline are key factors in achieving success in sports (Gucciardi et al., 2015; Sheard et al., 2009).

The relatively low R^2 also indicates that mental toughness accounts for a relatively small fraction of the variation in performance; therefore, physical, technical, and environmental factors are presumably larger factors that determine athletic performance at this stage of development.

DISCUSSION

Key Findings

The main objective of the study was to examine the predictive role played by the mental-toughness dimensions Control, Commitment, Challenge, and Confidence on the athletic performance of male field-event athletes who fall below the age of 18 years in the 2024 Sabah School Sports Council Championship. The findings of the multiple-regression analysis showed that, even though the entire model was not statistically significant, the only dimension that showed a marginally positive correlation with performance was the Commitment ($\beta = 0.21$, $p = .07$). The results are in line with previous studies in sports psychology that had found mental toughness dimensions, like Commitment and athletic performance outcomes, to have marginal-non significant relationships (Gucciardi et al*.,* 2015; Mills et al*.*, 2014).

Irrespective of this new trend, the model as a whole explained a relatively small proportion of the variation in performance ($R^2 = 0.065$). In turn, this implies that, although it can be argued that commitment is a salient predictor, mental toughness alone cannot be said to account for athletic performance outcomes fully. This observation is consistent with the idea that mental toughness is a defining, although non-exclusive, factor in athletic performance. Putting the pieces together, these works prove that it is a set of mutually dependent factors that can explain the residual value of athletic performance and include not only physical conditioning and technical mastery but also such critical variables as the quality of coaching, psychological variables, and the overall competitive environment (Beldon et al*.,* 2022; Caron et al*.,* 2022; Haugen et al*.,* 2020). In this respect, therefore, it is clear that a deeper insight into athletic performance is necessary that combines both the psychological and physiological aspects of it.

Mental Toughness and Athletic Performance

The fact that the role of the variable Commitment is the most significant in predicting the performance can be explained in line with the past research which highlights the significance of persistence and long-term goal orientation in sport (Gucciardi et al*.,* 2015; Jones et al*.,* 2007). Nevertheless, since the marginally insignificant result was observed with Commitment ($p = .07$), it should be noted that the most promising dimension to be investigated further is the

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dimension of Commitment. By creating a feeling of motivation and persistence in the difficult circumstances, it is this aspect of Commitment that gains particular applicability in the case of an athletic teenager who is already gaining psychological resiliency. The results of the current sample indicated that the individuals who had high rates of Commitment appeared to have persevered more during training and competitive activities and this allowed them to have a consistent performance. These results highlight that it is crucial to promote persistence and commitment in young athletes and, in doing so, help them grow to become growth minded and resilient.

Conversely, there were no critical predictors of athletic performance of the current sample by Confidence, Control, and Challenge. All these constructs theoretically constitute the core of mental toughness (Clough et al*.,* 2002), but their influences in this case can be not as significant. The issues that athletes may encounter in the adolescent period of development are usually connected with self-belief (Confidence) and emotional control (Control) which may negatively affect their quantifiable impact on the performance outcomes. Moreover, the literature indicates the key position of the environmental factors to the conceptualisation of adversity in individuals. The supportive practices are formed in the climate of resilience that can shift the attitude to challenges as opportunities in educational settings. Consequently, it might lead to the slowing down of the development of the required psychological traits, such as self-confidence and emotional control (Çetinkaya & Bulut, 2023).

The Low R^2 and the Complex Nature of Athletic Performance

The low-order R^2 of the regression analysis shows the complexity of the athletic performance and it also indicates that the psychological variables are not sufficient to explain the reported variance by him or her. As such, mental toughness and performance are most probably not directly interrelated, but are multidimensional and intricate. This opinion was supported by a recent systematic review by Guszkowska and Wojcik (2021), who hypothesized that mental toughness could lead to the improvement of performance. Nevertheless, it is merely a part of a vast series of contributing factors, and hence the complexity of the athletic achievement. Mental toughness may be a necessary component; nevertheless, it is just a constituent of a total performance matrix. Of importance to the overall success of an athlete is an effect of physical attributes, technical skills, and support systems, including coaching, family support, and training environment (Mills et al*.,* 2014). These determinants ought to be accorded the same amount of attention therefore, and in future research studies effort must be made to determine the synergies between these determinants.

Mental Toughness and Performance Levels

High, moderate, and low performers may differ in terms of mental toughness, which may be realized in different ways depending on the level of performance. The most mentally tough athletes are those who perform well and show high scores in Commitment, Confidence, Control and Challenge (Clough et al*.,* 2002). These athletes exercise perseverance (Commitment) despite the challenges, are confident even in extreme pressure situations, cannot suppress their emotions, and consider challenges as developmental opportunities. The collective experience of resilience and grit allows people to maintain high standards of performance, adapt easily to difficult circumstances, and recover back easily after failure. (Zheng et al*.,* 2025).

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Moderate performers on the other hand tend to exhibit high degree of Commitment and may be deficient in Confidence or Control. Such athletes are usually driven and committed to their sport and they might fail to believe in themselves or even control their emotions in pressurizing moments. This inconsistency is a pattern whereby people would perform well in low-pressure or recognizable environments and fail to perform well when demands rise, similar to those conditions where high performance in training environments would not generalize to high-stakes settings. (Varoquaux & Cheplygina, 2022).

Conversely, non-performers can exhibit reduced scores in all of the four dimensions of mental toughness, with an especially low score in Commitment and Confidence. These athletes can easily surrender to any kind of failure; they do not believe in their skills and cannot handle their emotions well in the moment of need. Consequently, they might struggle to deliver similar performance, usually performing poorly when there is a stiff competition.

Such mental toughness differences can be as a result of many factors which include: psychological growth, environmental factors and support systems. The high-quality coaching and a favourable training environment normally serve high-performing athletes to promote the psychological resilience and help to build greater mental toughness. (Guszkowska & Wójcik, 2021). On the contrary, moderate and low performers might have obstacles like the absence of psychological support, exposure to adversity, and mental toughness training, which makes them not develop in these very important areas.

This difference highlights the complex nature of mental toughness and performance because the athletes with diverse levels of performance can have diverse mental toughness characteristics and also experience different obstacles in acquiring those characteristics. Future studies are necessary to understand how mental toughness is influenced by the personal, environmental, and social factors at varying levels of performance and how psychological intervention can be modified to positively influence a particular aspect of mental toughness in sports people. (Martínez-Patiño et al*.,* 2021).

Comparison with Previous Research

The current results support earlier studies that have yielded inconsistent findings regarding the prognostic or predictive capacity of mental toughness on athletic performance. The authors of Benítez-Sillero et al*.* (2021) noted that, despite the generally higher effectiveness of mental toughness in predicting sports results compared to physical variables, its usefulness can be affected by the type of sport and other context-specific aspects. For example, dimensions of mental toughness identified in a study conducted by Gucciardi et al*.* (2015) included Commitment and Confidence as strong predictors of performance, while the dimensions of Challenge and Control were weaker predictors. Similarly, Ranjbar et al*.* (2022) found that commitment is the strongest predictor of performance, especially among younger athletes. This literature can be added to the current study, demonstrating that the saliency of Commitment can be the most relevant factor in the context of adolescent athletes in Malaysia, where the mental toughness of adolescents is at a developing stage. Such observation is consistent with Guszkowska and Wojcik (2021), who outlined the presence of a substantial correlation between mental toughness and sports performance, as well as the importance of interpersonal relationships in the development of resilience as a key element in developing adolescent athletes.

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The insignificance of Confidence and Control in this study suggests that the issues facing the development of the psychological aspect of Malaysian adolescent athletes may be unique, leading to implications for how the mentioned dimensions influence performance. Previous research emphasises the critical importance of the environment in developing psychological qualities, especially when nurturing environments and practising inclusivity, as is common in learning settings that lack the equal facilitation potential of perceiving adversity as an opportunity. This difference, in turn, can affect the development of vital psychological attributes, such as self-confidence and emotional control (Çetinkaya & Bulut, 2023). In line with Halim and Ismail (2021), it appears that the psychological training of Malaysian school athletes may be inadequate, which could explain the relatively lower role of Confidence and control in performance results. Future studies in Malaysia should aim to identify the cultural and contextual factors that may influence the manifestation of mental toughness in diverse individuals.

Practical Implications

The results of the study have tremendous implications for coaches, psychologists in the sport, and educators who deal with adolescent subjects. Individualised coaching strategies are the focus of the study by Martins et al. (2021), as the authors examine inter-player variability in the women's volleyball world elite. Based on their findings, they propose that coaches can exploit such differences to utilise individual differences and customise training protocols to suit the strengths of each athlete, thereby maximising performance outcomes. Since the concept of commitment has become the most significant predictor of performance, it is now up to coaches to focus on developing the attitudes of dedication and persistence in young athletes. Mental-skills training interventions can thus aim to help athletes create long-term goals, build long-term effort-based habits, and increase their will to practise and compete. There is empirical evidence that intrinsic and extrinsic motivation are key concepts in goal achievement, and, therefore, goal-setting is a vital element of mental-skills training. Through goal release, athletes gain guidance and orientation, which is a groundbreaking component in finding their way into competitive paths (Taheri et al., 2023). For example, the adoption of goal-setting strategies, mental rehearsal, and visualisation regimens can be relevant in supplementing Commitment and improving general performance among adolescent athletes.

Moreover, the research showed that mental toughness alone is not responsible for explaining a significant percentage of performance variance; hence, the need to combine psychological training with physical training and technical skill development. The combination of both mental and physical elements of training is likely to provide better athletic performance improvements. Ribeiro et al. (2025) argue against this perspective and insist on the implementation of mental training and motivational interventions within physical training programmes, thus demonstrating that significant performance improvements can be achieved through the synergy of psychological and physical exercise.

Limitations and Future Research

The current research has its drawbacks. The sample size (105 athletes) is relatively small, as the context of the Sabah School Sports Council Championship could limit the inferences made about other populations or sports. Additionally, the use of a cross-sectional design renders it

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impossible to conclude causality. A longitudinal study could also help address future research concerns, including monitoring the progress and changes in mental toughness of athletes, as well as their performance.

Additionally, it would be beneficial to sample other areas of Malaysia or focus more on high-performing athletes or groups of athletes who can provide a more comprehensive picture of the role of mental-toughness dimensions on performance at different levels of competition. In addition to the psychological factors, representatives such as self-talk, stress-coping strategies, and motivation could be explored further to shed light on the intricate interplay between the psychological aspects and performance.

CONCLUSION

This paper investigated the predictive validity of mental toughness dimensions of Control, Commitment, Challenge, and Confidence on athletic performance in male under-18 field event athletes who are attending the championship in the Sabah School Sports Council. The results showed that the most influential dimension was Commitment, whereby athletes with the highest degree of dedication and perseverance performed better in the competition. Nevertheless, the total regression indicated a relatively small portion of performance variation, suggesting that the success of athletes is determined by a combination of psychological, physical, technical, and environmental factors. These findings highlight the importance of combining mental skills training with physical and technique preparation to enhance the overall performance of adolescent athletes. The emphasis should be on building Commitment particularly for moderate and low performing athletes, through methods such as mental rehearsal, goal-setting, and visualisation, thereby helping to enhance both psychological and physical strength. For moderate and low performing athletes, Confidence could also be emphasized as it plays a crucial role in overcoming setbacks and maintaining a positive mindset. Control could be focused on to help athletes manage their emotions and anxiety during competition while Challenge might be useful for pushing athletes to embrace difficult situations as opportunities for growth. Overall, the paper can contribute to the existing knowledge of mental toughness in youth sports, demonstrating that Commitment is a key factor in the performance of adolescent athletes and highlighting the necessity of adopting a holistic approach to developing them.

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