

The Relationship between Training Duration and Mental Toughness in Adolescent Soccer Players

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Abstract Mental toughness in adolescents comprises key psychological attributes, including challenge, commitment, self-confidence, and control. Studies show that characteristics of mental toughness begin to develop in childhood, with prosocial behavior and low levels of internalizing and externalizing problems at the age of five predicting mental toughness at the age of fourteen. This study aims to examine mental toughness in adolescent soccer players based on the length of their training experience in a sports club. This study employed a descriptive research design to determine whether participation in soccer activities contributes to the development of mental toughness. The participants were 77 adolescents aged 15 years who were actively involved in soccer clubs and had accumulated between one and ten years of training experience. Based on the data analysis, a statistically significant difference in mental toughness was found between the two groups. Players with more than five years of training experience demonstrated a higher score range, indicating the potential for better mental performance compared to those with less than five years of experience. These findings suggest that integrating sports activities into educational curricula may provide significant benefits for the development of mental toughness in adolescents.

Keywords Mental Toughness, Soccer, Adolescents, Training

1. Introduction

Mental toughness is a multidimensional construct encompassing positive psychological attributes that are crucial for achievement and mental health [1]. It includes elements, such as motivation, the ability to cope with stress, concentration, confidence, and perseverance [2], [3]. Mental toughness is associated with effective coping strategies, positive outcomes in education and mental health, and various adaptive psychological traits [1]. Approximately 50% of the variance in mental toughness can be attributed to genetic factors [1]. The development of mental toughness involves deliberate mental skills training and environmental influences [3]. Strategies to improve mental toughness include goal setting, self-talk, and visual imagery [4]. Although debate remains regarding whether mental toughness is innate or progressive, research indicates that it can be improved through targeted interventions [3], [4]. Further research is needed to explore early development and to evaluate the effectiveness of mental toughness training programs [3].

In adolescents, mental toughness is a multifaceted construct that includes attributes, such as challenge, commitment, confidence, and control [5]. Studies indicate that traits of mental toughness originate in childhood, with

prosocial behavior and low levels of internalizing and externalizing problems at age five predicting higher mental toughness at age fourteen [6]. Mental toughness profiles in adolescent athletes have been associated with greater developmental assets and lower negative emotional states [7]. Gender differences have also been observed, with females reporting lower levels of mental toughness and higher levels of sleep disturbance compared to males [6]. Understanding adolescents' perceptions of the attributes of mental toughness within educational settings can inform strategies to support and promote these positive psychological attributes [8]. The development of valid measurement tools, such as the Mental Resilience Scale for Adolescents, has further facilitated research in this area [5].

Mental health problems among Indonesian adolescents represent a significant concern, with prevalence rates ranging from 9.4% to 31.6% [9], [10]. Key challenges include emotional regulation, body image concerns, academic pressure, and the influence of social media [11]. Sociodemographic factors, such as educational level and area of residence, are associated with mental health problems, with higher prevalence among junior high school students and adolescents living in district areas [10]. Lifestyle factors also contribute to adolescent mental health [9]. Despite these challenges, many Indonesian adolescents demonstrate high levels of psychological, emotional, and social well-being, with 46.3% classified as having flourishing mental health [12]. To address these issues, researchers recommend developing culturally appropriate mental health education programs, improving support systems, and promoting adaptive coping mechanisms [11], [12].

Previous studies indicate that participation in sports clubs and organized physical recreation can enhance mental toughness and overall mental health. Athletes who undergo mental toughness training show improvements in physical self-concept and psychological adaptation [13]. The Sports Mental Toughness Questionnaire has been developed as a valid instrument to assess mental toughness in athletes [14]. Participation in organized sports activities has been linked to improved mental health, increased alertness, and greater resistance to stress [15]. A meta-analysis of mental toughness training interventions in sport revealed a large effect size, indicating strong program effectiveness [16]. However, many studies in this field carry a high risk of bias, highlighting the need for more rigorous research. Based on these considerations, this study aimed to examine whether the length of training experience influences mental toughness among adolescent soccer players.

2. Method

2.1. Design

In this study, the researcher used a descriptive research

method to see if participation in soccer sports activities can develop mental toughness. As for the research approach in this study, a quantitative research approach is used, with the aim of looking at the mental toughness of adolescents based on their duration of participation in soccer activities. Therefore, the author used an ex post facto design, where the author conducted a survey of soccer sports clubs that had carried out continuous coaching.

2.2. Respondents

The survey was conducted among adolescents participating in soccer clubs in Bandung City. A total of 77 male participants aged 15 years voluntarily completed the questionnaire. All respondents were actively involved in regular soccer training at their respective clubs.

2.3. Instrument

Data were collected using a closed-ended questionnaire with a four-point Likert scale. A modified version of the Mental Toughness Questionnaire (MTQ) was used to measure mental toughness [17]. The instrument was developed by Sheard, a sports psychology expert from York St. John University, United Kingdom [18]. The questionnaire consisted of twelve items representing three components: confidence, constancy, and control. The reliability coefficient was 0.862, with validity indices ranging from 0.310 to 0.560.

2.4. Procedure

The research procedure consisted of three stages: preparation, implementation, and reporting. During the preparation stage, the questionnaire and research sample were determined. Data collection was conducted over one week using a Google Form distributed to soccer club members in Bandung City. The collected data were then compiled and analyzed using Jamovi statistical software version 2.6.

3. Results

The following section presents the data description and analysis of mental toughness in youth soccer players based on the length of their club participation. The analysis focuses on two variables: mental toughness and training duration. Training duration was categorized into two groups: players with less than five years of training experience and players with more than five years of training experience.

Table 1 presents the descriptive statistics of mental toughness according to the length of training in youth soccer clubs. A total of 35 respondents had less than five years of training experience, while 42 respondents had more than five years of training experience. The group with more than five years of training experience comprised a larger number of respondents. The mean mental toughness

score for players with less than five years of training experience was 34.4, whereas players with more than five years of experience had a higher mean score of 38.5, indicating greater average mental toughness in the latter group.

Table 1. Descriptive Statistics of Mental Toughness Based on Training Duration

	Training Duration	Mental Toughness
N	More than 5 years	42
	Less than 5 years	35
Mean	More than 5 years	38.5
	Less than 5 years	34.4
Median	More than 5 years	38.0
	Less than 5 years	35
Standard deviation	More than 5 years	3.48
	Less than 5 years	3.17
Minimum	More than 5 years	32
	Less than 5 years	25
Maximum	More than 5 years	50
	Less than 5 years	40

The median mental toughness score was 35 for players with less than five years of training experience and 38 for those with more than five years of experience. The standard deviation was 3.17 for the less-experienced group and 3.48 for the more-experienced group. This indicates that the variability of mental toughness scores was slightly higher among players with more than five years of training experience, although both groups demonstrated relatively homogeneous score distributions. The minimum and maximum scores ranged from 25 to 40 for players with less than five years of experience and from 32 to 50 for players with more than five years of experience. The wider score range in the more-experienced group suggests the potential for stronger mental performance.

In addition to Table 2, the research data are also presented visually in the form of a plot, as shown in Figure 1.

Table 2. Normality Test of Mental Toughness Scores

Variable	
Mental Toughness	
N	77
Shapiro-Wilk W	0.971
p-value	0.071

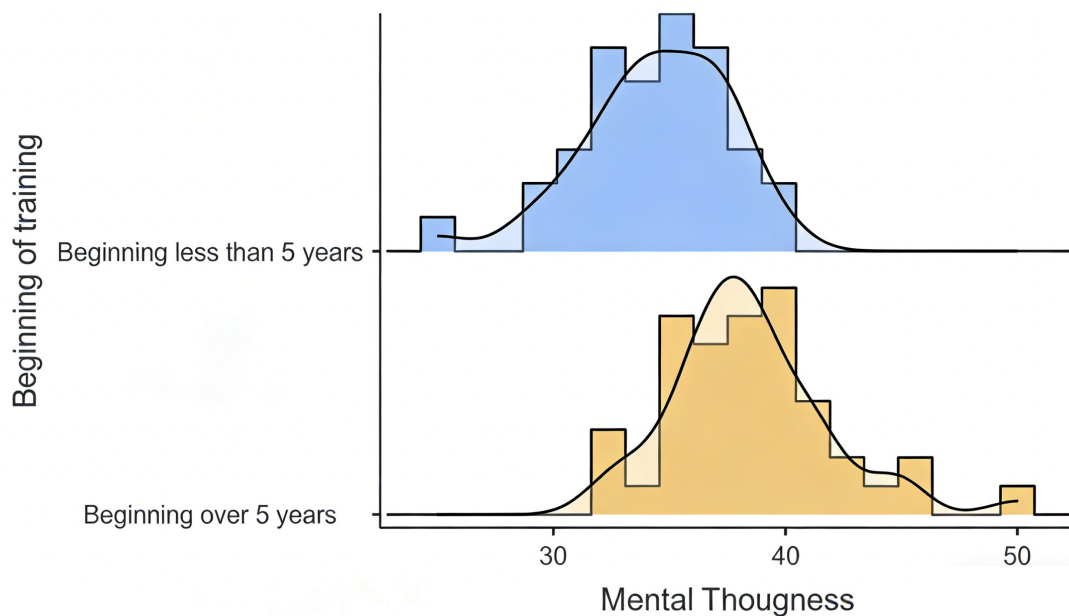


Figure 1. Distribution Plot of Mental Toughness Scores According to Training Duration

The following section describes and explains the results presented in Table 2, which represents a preliminary assumption test conducted prior to the independent samples t-test. The normality of the data distribution was assessed using the Shapiro–Wilk test (W and p-value). This test was performed to determine whether the mental toughness data followed a normal distribution.

The Shapiro–Wilk test yielded a W value of 0.971, which is close to 1, indicating that the data distribution approximates normality. The p-value was 0.071, which is greater than the significance level of 0.05. Therefore, the mental toughness data can be considered normally distributed at the 5% significance level ($\alpha = 0.05$). Based on this result, the assumption of normality was met, and the use of a parametric independent samples t-test was deemed appropriate.

Figure 2 presents a normal Q–Q (quantile–quantile) plot of the standardized residuals. The vertical axis represents the standardized residuals, while the horizontal axis represents the theoretical quantiles of the normal distribution. The data points largely follow and cluster around the diagonal reference line, indicating that the residuals are approximately normally distributed. Although minor deviations are observed at the tails, these remain within acceptable limits. Therefore, the assumption of residual normality for the analytical model can be considered satisfied.

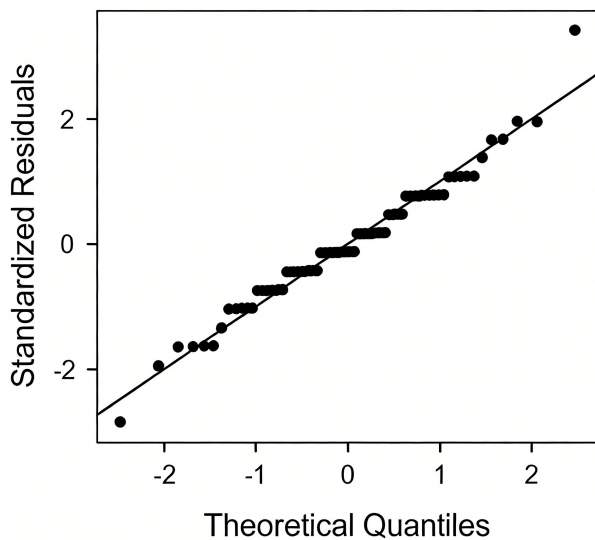


Figure 2. Plot Independent Samples T-Test of Mental Toughness

The following section presents the results of the independent samples t-test shown in Table 3, which examined differences in mental toughness based on training duration (more than five years vs. less than five years). The obtained t value ($t = 5.29$) represents the test statistic comparing the mean mental toughness scores of the two groups. This relatively large t value indicates a substantial difference between groups. The associated p-value was less than 0.001, which is well below the

significance threshold of 0.05, indicating statistical significance. These results demonstrate a statistically significant difference in mental toughness between athletes who had trained for more than five years and those who had trained for less than five years ($p < 0.001$). Therefore, the length of training experience has a significant influence on athletes' mental toughness.

Table 3. Independent Samples t-Test Results for Mental Toughness

Independent Samples T-Test				
		Statistic	df	p-value
Mental Toughness	Student's t	5.29	75.0	<.001

Note. $H_0: \mu$ (training duration > 5 years) \neq μ (training duration < 5 years)

4. Discussion

Based on the results of the data analysis, this study found a statistically significant difference in mental toughness between athletes who had trained for more than five years and those who had trained for less than five years. Athletes with more than five years of training experience demonstrated a wider score range and higher overall mental toughness, indicating greater potential for stronger performance. These findings are consistent with previous research showing that physical activity and exercise have a positive influence on mental health and psychological development. Regular participation in exercise has been shown to improve overall mental well-being, reduce anxiety and stress, and enhance social functioning [19], [20], [21]. Individuals who engage in sports activities also tend to demonstrate better mental health outcomes compared to those who do not participate [22]. Moreover, physical exercise has been shown to improve brain function and contribute to the treatment of mental health disorders such as depression and anxiety [22]. Group-based sports activities, in particular, play an important role in adolescents' social and psychological development [21], [23], [24]. The positive effects of exercise on mental health are associated with physiological adaptations, including respiratory, musculoskeletal, cardiovascular, and hormonal changes, which enhance individuals' capacity and resilience in coping with environmental stressors [22].

Research examining the impact of soccer participation on mental health has produced mixed findings. Several studies report positive outcomes, including improved mental health, increased confidence, and stronger social connections among participants [25], [26]. These benefits have been observed in both short-term and long-term contexts, suggesting that soccer may complement traditional mental health interventions [25]. However, other evidence indicates that factors such as injury, career dissatisfaction, and post-retirement challenges can contribute to mental health problems among professional

players. Although qualitative studies suggest potential mental health benefits, a systematic review concluded that involvement in soccer does not necessarily result in fewer mental health problems compared to the general population [27].

Mental toughness is widely recognized as a crucial psychological attribute for success in sports [28], [29], [30]. Despite its importance, there remains a lack of consensus regarding its conceptualization and measurement [28], [29]. Nevertheless, research consistently demonstrates that mentally resilient athletes tend to compete at higher levels and achieve superior performance outcomes [30]. To address conceptual challenges, the Goal–Expectancy–Self-Control model has been proposed, identifying self-control, self-efficacy, and goal orientation as core components of mental toughness [31]. This framework helps explain how mental toughness influences athletic performance and provides a theoretical basis for future research and intervention development. Both qualitative and quantitative approaches have been employed to investigate mental toughness, with ongoing efforts to develop valid and reliable measurement instruments [28], [29].

Previous studies also indicate that both mental and physical exercise can enhance cognitive and motor performance. Exercise duration has been shown to influence attentional processes, particularly in tasks requiring sustained controlled processing [32]. Nyberg [33] reported that motor and mental exercises induce different neuroplastic adaptations, although both contribute to performance improvement. Fabre et al. [34] compared aerobic and mental exercise in older adults and found that both approaches improved cognitive function, particularly memory. Notably, the combination of aerobic and mental exercise produced greater cognitive benefits than either intervention alone. These studies highlight the potential of mental exercise as a valuable tool for improving performance in a variety of domains, from surgical education to general cognitive function, with effects comparable to or complementary to those of physical exercise.

Research shows that psychological interventions can improve mental skills in soccer players. A 16-week psychological skills training program was found to improve mental toughness and overall psychological well-being in professional players [35]. Similarly, an eight-week mindfulness-based cognitive therapy program significantly improved cognitive skills such as focus, imagery, and competition planning in youth players [36]. Mental imagery training has also been shown to reduce trait anxiety in young players, although its effects on other anxiety measures were limited [37]. Beyond psychological interventions, laterality-specific physical training using the non-dominant leg for ten weeks significantly improved mental rotation performance compared to dominant-leg training [38]. These findings suggest that both mental and physical training approaches can positively influence

cognitive performance and psychological well-being across different age groups in soccer.

Mental toughness develops through a multifaceted process involving skill mastery, supportive environments, strategic psychological training, and deliberate exposure to challenging experiences. Evidence suggests that mental toughness develops through interconnected mechanisms, including competitiveness, international experience, and psychological skill acquisition [39]. Crust [40] emphasized the importance of gradually exposing athletes to demanding situations within a supportive environment, enabling the development of independent problem-solving abilities. Exposure to high-pressure situations has been shown to foster mentally tough characteristics [41]. Weinberg [3] further distinguished between “taught” mental toughness, which results from deliberate psychological skills training, and “caught” mental toughness, which emerges through environmental and social influences. A meta-analysis confirmed the effectiveness of mental toughness interventions, reporting a large effect size ($d = 0.80$), although substantial variability across studies was observed [16].

This study has several limitations that need to be considered in interpreting the results and drawing generalizations of the findings, namely, the use of a quantitative descriptive, cross-sectional design limits the ability to draw causal or long-term conclusions regarding the development of mental toughness. Besides, the sample was relatively homogeneous, consisting solely of 15-year-old male athletes from soccer clubs in Bandung City, which restricts the generalizability of the findings to other age groups, genders, sports, and regions. Moreover, the sample size was relatively small ($n = 77$). Finally, grouping participants based solely on training duration may not fully capture important variations in training experience, such as training intensity, competition frequency, coaching quality, and the club’s social environment, all of which may influence mental toughness but were not examined in depth in this study.

5. Conclusions

The results of this study indicate a statistically significant difference in mental toughness between athletes who trained for more than five years and those who trained for less than five years. Adolescents who had participated in soccer training for more than five years demonstrated higher mental toughness scores, suggesting a greater potential for enhanced psychological performance. These findings suggest that integrating structured sports activities into educational and training programs may provide meaningful benefits for the development of mental toughness in adolescents. Further research is needed to deepen the understanding of mental toughness and its developmental processes across different age groups and contexts. The results of this study may also serve as a

reference for parents in providing opportunities for children to engage in organized sports activities, particularly soccer clubs.

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