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Posted Date: 29 May 2023

doi: 10.20944/preprints202305.1956.v1

Keywords: mental toughness skills; young athletes; age groups

Article

Characteristics of Mental Toughness in Young Basketball Players of Different Age Groups

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Abstract: Assessing the development of skills that ensure personal mental toughness in adolescence is important because the increasing autonomy and socialization of adolescents during adolescence inevitably creates the conditions for the emergence of an increasing number of external stressors. Paradoxically, adolescents' confidence in their ability to cope with external stressors decreases during adolescence, which may lead to poorer sport performance in adolescent athletes. The aim of this study was to determine and analyze mental toughness skills in the cadet and junior age groups of young basketball players. An additional aim is to reveal how general (total) mental toughness and age predict each of the athletic mental toughness skills. The analysis of the results of the study revealed that players in the junior age group scored statistically significantly higher on the challenge, commitment, emotional control, life control, overall control, self-confidence in one's abilities, self-confidence in interpersonal interactions, overall self-confidence, total mental toughness, determination and visualization scales. Statistically significant correlations were found between mental toughness skills and the different age groups in all scales except positive cognition and self-belief. Total mental toughness was a strong predictor of the athletic mental toughness skills, but age did not predict determination and self-beliefs skills.

Keywords: mental toughness skills; young athletes; age groups

1. Introduction

It is known that psychological factors typically determine success and achievements in sports [1,2]. It is claimed that at least 50 percent of success in sports is influenced by psychological factors related to mental processes [3]. To understand the possible causes of experienced failures in sports, there is an increasing interest in the phenomenon of mental toughness [4]. Mental toughness is defined as the athlete's ability to recover from failure, cope with external pressure, and overcome emerging difficulties [5]. Therefore, mental toughness is a term related to positive personal resources that are crucial in various achievement contexts [6]. Mental toughness not only reflects an effective mechanism for coping with stress as a response to stressors (e.g., evaluating stressful situations as opportunities for self-improvement) but also enables individuals to actively seek personal growth opportunities driven by high self-confidence [7]. This is supported by research findings. It is stated that individuals with higher levels of mental toughness are better able to set goals and are more inclined to reflect on the goal pursuit process [8,9], cope more effectively with external stressors in achieving their goals [6,10], and experience less anxiety [11,12]. It is also important to note that such psychological skills as mental toughness allow individuals to achieve success not only in the context of sports but also in other areas of life [3]. Although it is claimed that the sports environment and its characteristic features can contribute to the development of mental toughness, there is still a lack of empirically based information on the best practices for fostering and maintaining mental toughness [13].

At different times, there have been different approaches to the concept of mental toughness. However, in the most recent definitions of mental toughness, several attributes can be identified, including self-confidence and self-efficacy, emotion and attention regulation, optimism, and a goal-oriented mindset [14]. Therefore, mental toughness can be interpreted as a multidimensional skill that consists of a set of psychological abilities, where the components essentially relate to effective problem-solving in stressful situations [15]. One of the pioneers in discussing mental toughness was Loehr [16], who presented a concept of mental toughness exclusively focused on the domain of sports and the achievements associated with it. It was the first concept that treated mental toughness as a complex of skills. In Loehr's theory, mental toughness is described as the ability to consistently pursue the highest level of talent and skills, regardless of competitive circumstances [17]. Despite its specificity and increasing popularity in the sports field, Loehr's concept was not considered reliable. Golby et al. [18] presented a reliable version of this concept, consisting of four main components of athletic mental toughness: determination, visualization, positive cognition, and self-belief. The reliability of this four-component model was later confirmed by Gucciardi [19]. To measure the skills in Golby et al.'s athletic mental toughness skills model, they proposed an assessment tool called the Psychological Performance Inventory-Alternative (PPI-A) [18]. They validated the instrument's validity and reliability, stating that the PPI-A is suitable for scientific research. According to various authors [3,20], the research and practice of developing athletes' mental toughness should focus on the skills that determine mental toughness, enabling them to experience success not only in sports but also in other contexts that contribute to their personal growth. Therefore, the scientific community is encouraged to explore other mental toughness skill models applicable to different contexts. One such proposed model of mental toughness skills is by Clough et al. [21]. They conceptualized the 4C model, which has become the most desirable conceptual framework for studying mental toughness in the sports context [22] and has recently gained popularity and application in other contexts [23]. The 4C model [21] is based on Kobasa's [24] model of psychological resilience. Indeed, Kobasa's resilience theory served as the foundation for modern conceptualization of mental toughness. However, Kobasa's conceptualization of resilience differs from mental toughness in two aspects. Firstly, resilience is a broad construct encompassing multiple protective processes (e.g., biological and social factors) and cannot be directly measured, necessitating indirect conclusions in research [25]. On the other hand, mental toughness is measured as a specific set of skills that are important for creating educational programs to enhance individuals' achievements in various contexts [6]. This led to the development of the 4C model [21]. The 4C conceptualization [21] is based on Kobasa's [24] resilience model and comprises three dimensions: control, commitment, and challenge. The fourth dimension, confidence, forms the uniqueness of the 4C model [21]. Two out of the four dimensions of the 4C model, control and confidence, were expanded to reflect emotional control and life control, as well as self-confidence in one's abilities and self-confidence in interpersonal interactions. In this conceptualization, each dimension represents skills that are considered foundational for mental toughness and are important in various life situations [21]. The authors of the 4C model also created the Mental Toughness Questionnaire 48 (MTQ48) [21], which measures the skills that constitute the 4C model. Its validity and reliability have been confirmed in various life contexts, including the sports context [26–29]. It is claimed that the Mental Toughness Questionnaire 48 (MTQ48) is the most reliable instrument for measuring general mental toughness skills [30].

In summary, currently, two main models of mental toughness skills dominate: the athletic mental toughness skills model [18], which is exclusively focused on the sports context and holds significant importance in that domain, and the 4C general mental toughness skills model [21], which serves as a conceptual foundation for mental toughness in various contexts. Behnke et al. [31] recommend conducting studies and implementing mental toughness training programs that combine the skills encompassed by both of these conceptual frameworks.

 doi:10.20944/preprints202305.1956.v1

This study aims to fill certain existing gaps in scientific research. It is argued that the scientific community lacks evidence-based data on effective practices for developing mental toughness skills, which would strengthen the methodological foundation of mental toughness skills and create effective training programs [32]. For example, the majority of mental toughness research is focused on highly skilled adult athletes [3,33–38], despite scientific research data indicating a decrease in adolescents' belief in their ability to cope with external stressors at the age of 16 or 17 [39,40]. Thus, the significance of mental toughness skills during adolescence can be particularly important. Therefore, a study on the expression of mental toughness skills in cadets (15-16 years old) and juniors (17-18 years old) is highly relevant during this transitional period. Existing scientific studies examining mental toughness during adolescence [40–43] were conducted by selecting specific age ranges within adolescence and comparing them with others or by studying male and female adolescent athletes without differentiating them. Research data shows that female athletes have a lower level of mental toughness [44,45], and they also face difficulties in acquiring mental toughness skills due to existing norms that still limit them [46]. Therefore, due to this reason, mental toughness research should be conducted, and training programs should be developed, taking into account existing gender differences, as including both genders in studies can lead to erroneous conclusions. Additionally, studies on mental toughness skills during adolescence only cover a specific and narrow range of skills, such as athletic mental toughness skills [3] or general mental toughness skills [47]. Considering the existing gaps in scientific research, the main goal is to reveal the peculiarities of mental toughness skills in male basketball players of the cadet and junior age categories. The hypothesis is formulated that junior basketball players will demonstrate stronger mental toughness skills than cadets.

An additional aim is to reveal how general (total) mental toughness and age (sociodemographic factor) predict each of the athletic mental toughness skills (determination, visualisation, positive cognition, and self-beliefs). This additional aim of the study was justified on the basis of the following findings concerning young athletes [48], where linear regression analysis determined the relationship between general mental toughness and use of athletes' psychological skills.

The secondary hypothesis was based on the results of a previous study [48] that indicated that "linear regression analyses revealed that self-talk, emotional control, and relaxation strategies were significantly and positively related to mental toughness in both practice and competition." [48] (p. 43) and on the results of a previous study that age was significant predictor of athletic (sports) mental toughness [49], expecting that age (sociodemographic factor) and general mental toughness possibly predict athletic mental toughness skills.

2. Materials and Methods

2.1. Study design

A cross-sectional study design was chosen to achieve the objectives of the current study [50].

2.2. Study participants and procedure

In total, 378 young basketball players were surveyed during this study. A two-stage cluster sampling procedure was used, where the required number of basketball schools was first selected by lottery from a list of 57 sports schools (the first stage). Subsequently, all male cadet and junior players from the selected basketball schools (second stage) participated in a survey. The study was conducted in nine Lithuanian basketball sports schools. The study was conducted from December 2021 to January 2022. The surveys were conducted before the training sessions of the young basketball players, with the participation of their coaches. During the study, confidentiality and anonymity of the research data were ensured, and the questionnaires used in the study did not require any personal information that could identify the participants. The study was approved by the Social Research Ethics Committee of the Lithuanian Sports University (Approval No. SMTEK-47, Approval Date: 2021-06-03). Additionally, permissions were obtained from the administrations of the respective sports schools where the study was conducted. The survey included information about the ongoing

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study, a statement regarding personal consent to participate in the research, demographic questions (regarding the age of the participants), and two validated instruments for measuring mental toughness indicators used in Lithuania.

2.3. Sociodemographic variables

The sample of the study consisted of 177 cadet (cadets—athletes with a passport age of 15–16 years) basketball players (46.8%) and 201 junior (juniors—athletes with a passport age of 17–18 years) basketball players (53.2%). Therefore, a total of 378 young basketball players participated in the study. All participants were male, and their average age was 16.36 ± 1.15 years.

2.4. General mental toughness skills

In order to assess general mental toughness skills, the Mental Toughness Questionnaire 48 (MTQ48) [21] was chosen. The questionnaire consists of 48 statements and has four scales, two of which have two additional subscales. The challenge scale includes 9 questionnaire statements, while the commitment scale consists of 10 questionnaire statements. The control scale is composed of two additional subscales: life control, which includes 7 questionnaire statements, and emotional control, which also includes 7 questionnaire statements. The self-confidence scale is also formed by two additional subscales: self-confidence in interpersonal interactions, which includes 6 questionnaire statements, and self-confidence in one's abilities, which includes 9 questionnaire statements. Additionally, a composite indicator called total mental toughness is calculated. Each statement of the questionnaire is rated on a 5-point Likert scale as follows: 1 - strongly disagree, 2 - disagree, 3 - neither agree nor disagree, 4 - agree, 5 - strongly agree [21]. This questionnaire has been adapted for use in Lithuania in the sample of cadet and junior athletes' groups (aged 15-16 and 17-18 years) [51]. The results of the questionnaire's consistency were satisfactory (Cronbach's alpha coefficient - .79), as well as the internal consistency of the questionnaire's subscales (Cronbach's alpha ranging from .76 to .82) [51]. External validity of the Lithuanian version of the MTQ48 has been tested using comparisons of the overall questionnaire scores, which confirm the absence of significant mean difference and small effect size (Cohen's d = .08) between the English and Lithuanian versions of the MTQ48 [51]. In this study, the following values of internal consistency for the scales of the overall study sample were determined (Cronbach's α): challenge .62, commitment .62, life control .60, emotional control .60, overall control .67, self-confidence in interpersonal interactions .69, self-confidence in one's abilities .60, overall self-confidence .63, total MTQ-48 .82.

2.5. Athletic mental toughness skills

To assess athletic mental toughness skills, the Psychological Performance Inventory-Alternative (PPI-A) [18] was chosen. The alternative version of the PPI-A questionnaire consists of 14 statements. This questionnaire has 4 scales. The determination scale includes 3 questionnaire statements, the visualization scale consists of 4 questionnaire statements, the positive cognition scale also consists of 4 statements, and the self-belief scale includes 3 questionnaire statements. Each questionnaire statement is rated on a 5-point Likert scale as follows: 1 - almost never, 2 - rarely, 3 - sometimes, 4 - often, 5 - almost always [18,19]. The Lithuanian version of the PPI-A had been adapted and validated in the cadet and junior age groups of young basketball players [52], and its internal consistency results are satisfactory (Cronbach's alpha of the questionnaire scales ranged from .69 to .83) [52]. Factor analysis of the PPI-A revealed a four-factor solution which was in full agreement with those identified by the authors of the original scale version, and distinguishing of the four factors (scales) similar to those of the original scale version was interpreted as an indication of the instrument's construct validity [52]. In current study, the following values of internal consistency for the scales of the overall study sample were determined (Cronbach's α): determination .84, visualization .75, positive cognition .75, self-belief .82.

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2.7. Statistical data analysis

The research data were analyzed using IBM SPSS Statistics (version 28.0), a program designed for social sciences. The normality of the variables was checked by calculating skewness and kurtosis values, which were all between -1 and 1. Means, standard deviations, mean differences (Ds), and Pearson's correlations were then calculated for the study variables. Independent samples t-test was used to determine the equality of means for independent samples. Differences in values are considered statistically significant if the probability value (p-value) is less than .05 (at 95% confidence level) or $p < .001$ (at 99% confidence level). Two hierarchical (stepwise) regression analyses were conducted to examine the predictive relationship between general (total) mental toughness and age on each of the athletic mental toughness skills (determination, visualization, positive cognition, and self-beliefs). The first regression step included total mental toughness, and the second step included total mental toughness and age. The internal consistency of the questionnaire scales used in the study was assessed and verified based on the Cronbach's alpha coefficient. The effect size was determined using Cohen's d criterion. Cohen's d effect sizes are generally classified as small ($d = 0.2$), medium ($d = 0.5$), and large ($d = 0.8$) [50].

3. Results

In order to assess the correlations between the variables in the study, the Pearson correlation coefficient was calculated. The Pearson correlation coefficient was calculated between different mental toughness skills and the age of athletes (Table 1).

It was found that the highest positive and statistically significant correlations were observed between age and visualization, total mental toughness (MTQ-48), emotional control, overall self-confidence, and self-confidence in one's abilities. Positive and statistically significant correlations were also found between commitment, overall control, self-confidence in interpersonal interactions, determination, challenge, life control, and age. Positive correlations, although not statistically significant, were observed between age and positive cognition and self-belief. The highest positive and statistically significant correlations were identified between overall self-confidence and self-confidence in one's abilities, self-confidence in interpersonal interactions, as well as between total mental toughness (MTQ-48) and commitment, self-confidence in one's abilities. There were no negative correlations between the study variables.

Table 1. Correlations of study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Challenge	1													
2. Commitment	.536**	1												
3. Emotional control	.307**	.536**	1											
4. Life control	.622**	.228**	.229**	1										
5. Overall control	.581**	.497**	.810**	.756**	1									
6. Self-confidence in one's abilities	.445**	.739**	.670**	.243**	.597**	1								
7. Self-confidence in interpersonal interactions	.207**	.467**	.375**	.077	.299**	.497**	1							
8. Overall self-confidence	.401**	.723**	.634**	.202**	.548**	.917**	.803**	1						
9. Total MTQ-48	.779**	.853**	.688**	.539**	.787**	.835**	.557**	.831**	1					
10. Determination	.623**	.628**	.391**	.363**	.481**	.617**	.340**	.581**	.717**	1				
11. Visualisation	.380**	.713**	.630**	.207**	.549**	.780**	.421**	.730**	.730**	.611**	1			
12. Positive cognition	.616**	.607**	.358**	.358**	.456**	.516**	.307**	.496**	.673**	.696**	.552**	1		
13. Self-belief	.288**	.270**	.108*	.227**	.209**	.192**	.098	.177**	.291**	.343**	.186**	.432**	1	
14. Age	.202**	.313**	.353**	.122*	.311**	.345**	.242**	.349**	.360**	.230**	.374**	.058	.023	1

Notes. *$p < .05$; ** $p < .001$.

doi:10.20944/preprints202305.1956.v1

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In order to assess the indicators of mental toughness among cadets and juniors age category basketball players, independent samples t-test was conducted. The effect size, Cohen's *d*, was also determined (Table 2).

Table 2. U16 and U18 players' mental toughness skills statistics.

	Cadets (N = 177)	Juniors (N = 201)	*t*-value	*p*-value	Cohen's *d*
Challenge	3.55 ± .49	3.72 ± .32	-4.01	< .001**	-.41
Commitment	3.35 ± .41	3.59 ± .32	-6.39	< .001**	-.65
Emotional control	3.14 ± .37	3.45 ± .44	-7.31	< .001**	-.76
Life control	3.24 ± .41	3.34 ± .37	-2.38	.02*	-.26
Overall control	3.19 ± .30	3.39 ± .32	-6.34	< .001**	-.64
Self-confidence in one's abilities	3.30 ± .57	3.70 ± .52	-7.14	< .001**	-.73
Self-confidence in interpersonal interactions	3.24 ± .40	3.43 ± .36	-4.83	< .001**	-.50
Overall self-confidence	3.27 ± .40	3.56 ± .39	-7.22	< .001**	-.73
Total MTQ-48	3.34 ± .32	3.57 ± .27	-7.48	< .001**	-.78
Determination	11.69 ± 2.64	12.79 ± 2.01	-4.57	< .001**	-.47
Visualisation	13.47 ± 3.07	15.84 ± 2.80	-7.83	< .001**	-.81
Positive cognition	15.07 ± 2.85	15.35 ± 2.08	-1.12	.26	-.11
Self-belief	10.27 ± 2.70	10.38 ± 2.37	-.45	.65	-.04

Notes. * $p < .05$; ** $p < .001$. Total MTQ-48 – total mental toughness.

The statistical analysis of the collected research data revealed that juniors basketball players demonstrated higher scores in all measured scales of skills compared to cadets players. The effect size (Cohen's *d*) ranged from small (-.11) to medium (-.78). When comparing the mental toughness skills of juniors and cadets basketball players, it can be observed that juniors exhibited higher scores in general mental toughness skills: challenge ($D = .17$; $p < .001$), commitment ($D = .24$; $p < .001$), emotional control ($D = .31$; $p < .001$), life control ($D = .10$; $p = .02$), overall control ($D = .20$; $p < .001$), self-confidence in one's abilities ($D = .40$; $p < .001$), self-confidence in interpersonal interactions ($D = .19$; $p < .001$), overall self-confidence ($D = .29$; $p < .001$), total mental toughness (MTQ-48) ($D = .23$; $p < .001$), as well as in athletic mental toughness skills: determination ($D = 1.1$; $p < .001$) and visualization ($D = 2.37$; $p < .001$). No statistically significant results were found between juniors and cadets basketball players in terms of athletic mental toughness skills: positive cognition and self-belief.

For the first regression analysis—with determination skills as the dependent variable—introducing total mental toughness as the predictor at Step 1 revealed a significant predictive effect, $F(1, 376) = 397.20$, $p < .01$; $R^2 = .51$ (Table 3).

At Step 2, the addition of age did not indicate a significant increase in variance explained (R^2-change = .0003, $F(1,375) = .022$, $p = .883$), suggesting that age did not contribute a significant amount of predictive value for the dependent variable (determination).

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Table 3. Hierarchical regression results for athletic mental toughness indicators (determination, visualization, positive cognition, and self-beliefs).

Step	Dependent variable	Predictor variable(s) entered	R^2	R^2-change	*F*-change	df1	df2	Beta
1	Determination	Total mental toughness	.51	.51	397.20**	1	376	.717**
2		Total mental toughness	.51	.0003	.022	1	375	.719**
		Age						-.006
1	Visualisation	Total mental toughness	.53	.53	429.72**	1	376	.730**
2		Total mental toughness	.54	**.01**	9.15	1	375	.691**
		Age						.113**
1	Positive cognition	Total mental toughness	.45	.45	311.65**	1	376	.673**
2		Total mental toughness	.48	**.03**	22.60*	1	375	.739**
		Age						-.188**
1	Self-belief	Total mental toughness	.09	.085	34.79**	1	376	.291**
2		Total mental toughness	.09	.005	2.16	1	375	.318**
		Age						-.077

Notes. * $p < .05$; ** $p < .001$.

For the second regression analysis with visualization as the dependent variable (Table 3), the addition of total mental toughness as a predictor at Step 1 yielded a significant effect ($R^2 = .53$, F (1, 376) = 429.72, $p < .001$). At Step 2, the addition of age produced a significant increase in variance explained (R^2-change = .01, F (1, 375) = 9.15, $p = .003$), suggesting that age contributed a significant amount of predictive value for the dependent variable. The overall model of the simple regression analysis (adjusted $R^2 = .54$) explained 54% of the variance in basketball players' total mental toughness scores in the study context (an effect-size index considered large).

For the third regression analysis with positive cognition as the dependent variable, the addition of total mental toughness as a predictor at Step 1 yielded a significant effect ($R^2 = .45$, F (1, 376) = 311.65, $p < .001$). At Step 2, the addition of age produced a significant increase in variance explained (R^2-change = .03, F (1, 375) = 22.60, $p < .001$), suggesting that age contributed a significant amount of predictive value for the dependent variable. The overall model of the simple regression analysis (adjusted $R^2 = .48$) explained 48% of the variance in basketball players' total mental toughness scores in the study context (an effect-size index considered large).

For the fourth regression analysis with self-belief as the dependent variable, the addition of total mental toughness as a predictor at Step 1 yielded a significant effect ($R^2 = .09$, F (1, 376) = 34.79, $p < .001$). At Step 2, the addition of age did not indicate a significant increase in variance explained (R^2-change = .005, F (1,375) = 2.16, $p = .143$), suggesting that age did not contribute a significant amount of predictive value for the dependent variable (self-belief).

4. Discussion

The first hypothesis, stating that junior basketball players would demonstrate stronger mental toughness skills, was confirmed. The study revealed that junior athletes exhibited higher levels of challenge (effect size is small), commitment (effect size is small), emotional control (effect size is small), life control (effect size is small), overall control (effect size is small), self-confidence in one's abilities (effect size is small), self-confidence in interpersonal interactions (effect size is small), overall self-confidence (effect size is small), total mental toughness (MTQ-48) (effect size is small),

determination (effect size is large), and visualization (effect size is large) skills. These findings are consistent with the results of other studies conducted by different authors. Benítez-Sillero et al. [3] examined the mental toughness skills of adolescent soccer players from different age categories. The authors revealed that junior soccer players exhibited higher levels of overall self-confidence (effect size is medium; d = -.50) and visualization (effect size is small; d = -.31) skills compared to cadet soccer players [3]. Another study conducted by a different author [53] explored the level of mental toughness skills among adolescent basketball players. It was revealed that junior basketball players had higher levels of emotional control (effect size is small; d = .08) and overall self-confidence (effect size is small; d = .22) skills compared to cadet basketball players [53]. Csáki et al. [54] investigated the mental toughness outcomes of elite soccer players from different age categories and found that junior athletes exhibited higher levels of overall self-confidence (effect size is small; d = .22) skills. Our study results are also consistent with the findings of a study conducted by Sural et al. [47] with elite boxers. The authors [47] revealed that junior boxers demonstrated higher levels of self-confidence in interpersonal interactions (effect size is small; d = -.25) and overall self-confidence (effect size is medium; d = -.53) skills.

The second hypothesis—that age like sociodemographic factor and general (total) mental toughness predict each of the athletic mental toughness skills (determination, visualisation, positive cognition, and self-beliefs)—has been partially confirmed. Total mental toughness was a strong predictor of the athletic mental toughness skills, but age did not predict determination and self-beliefs skills. The findings that total mental toughness and age did not predict determination skills and self-beliefs skills may be explained by the fact that we investigated only groups of athletes of late adolescence (ages 15–18) but when young athletes with a wider range of ages (aged from 14 to 20) were analyzed, researchers found that age was a significant predictor of mental toughness skills among young male athletes and mental toughness increased with age [49]. When a narrower range of ages (ages from 15 to 18) was analyzed, age wasn't significant predictor of mental toughness skills [55]. Nevertheless, more empirical studies are necessary to confirm or reject this explanation.

4.1. Strengths and limitations

The advantages of this study are related to filling existing scientific gaps. Firstly, this study is conducted with cadet (15-16 years old) and junior (17-18 years old) athletes, and this age range is particularly important in terms of the expression and development of mental toughness skills, as most studies on mental toughness are conducted with adult athletes. An advantage of this study is that it examines not only specific athletic mental toughness skills but also general mental toughness skills, which are applicable in various life settings.

During this study, only male adolescent and junior athletes were examined, as research suggests that there are gender differences that influence the expression of different mental toughness skills, which could lead to misleading conclusions. Therefore, the inclusion of only male young athletes in this study is both an advantage, as it allows for a more reliable measurement of existing differences in mental toughness skills, and a limitation, as the comparison of mental toughness skills between male and female young basketball players was not conducted.

The limitations of this study are primarily related to the fact that it identifies the optimal period for the development of mental toughness skills, but no specific mental toughness training program was designed and implemented for young male basketball players during the study. The results of this study also revealed that young athletes exhibit lower levels of both general mental toughness skills and athletic mental toughness skills. Therefore, future research should also investigate younger athletes (12-14 years old) as it is possible that younger adolescents may demonstrate even lower scores in mental toughness skill indicators.

5. Conclusions

The data from this study helped fill existing gaps in scientific research regarding the characteristics of general mental toughness skills and athletic mental toughness skills in cadet and junior athletes.

During the study, it was revealed that junior athletes are better able to accept and overcome challenges, actively engage and commit to their activities, manage their emotions and lives, have higher self-confidence in interpersonal interactions, and trust their abilities more compared to cadet athletes. It was found that general (total) mental toughness strongly predicts athletic mental toughness skills, but age does not predict determination and self-belief skills.

These findings can be valuable for future researchers who will develop mental toughness training programs for young athletes, with a focus on examining both general and athletic mental toughness skills as investigated in this study. The development of mental toughness skills training programs should be oriented towards cadet athletes since the level of mental toughness skills is lower among athletes in this age category.

Author Contributions: Conceptualization, R.M.; Investigation, E.P.; Data curation, E.P.; Formal analysis, R.M.; Methodology, R.M.; Writing – original draft, E.P.; Writing – review & editing, E.P. and R.M. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: The research was conducted in accordance with the Helsinki Declaration and was approved by the Ethics Committee of the Lithuanian Sports University, approval number– SMTEK–47. Approval Date: 2021-06-03.

Informed Consent Statement: Informed consent was obtained from all participants involved in the study.

Data Availability Statement: The datasets collected and analyzed during the current study are available from the corresponding author on reasonable request.

Conflicts of Interest: The authors declare no conflict of interest.

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