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ORIGINAL ARTICLE

Examination of Mental Training and Mental Toughness in Elite Boxers

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ABSTRACT

Background: Mental training and toughness play an important role as well as physical training and toughness in increasing the performance of an athlete.

Aim: This study aimed to i) evaluate the mental training and mental toughness levels of elite boxers in terms of various variables, ii) examine the relationship between mental training and mental toughness levels, and iii) investigate the predictive level of mental toughness levels of mental training levels.

Methods: The sample of the study consisted of 191 elite boxers. The data of the study were collected with the online questionnaire method using the Mental Training Inventory in Sports and the Mental Toughness Inventory in Sports. SPSS package program was preferred for data analysis and independent samples t-test was used for pairwise comparisons and one-way analysis of variance was used for multiple comparisons. Pearson Product Moments Correlation Coefficient (r) was used to test the relationship between mental training and mental toughness in elite boxers, and linear regression analysis was used to determine the ratio of mental training to predict mental toughness level.

Results: While the digital game playing level of secondary school students was low, their level of loneliness was found to be moderate, and it was determined that there was a significant and negative difference between digital game addiction and loneliness. A statistically significant difference was found between the levels of Digital Game Addiction (DGA7) and the variable of gender, presence of digital devices, and daily digital game playing status. However, it was concluded that there was a statistically significant difference between the perceived loneliness levels of the participants and their gender, age, income status, and availability of digital devices.

Conclusion: As a result, while the mental training levels of elite boxers differed significantly according to age and being national athlete status, there was no difference according to gender. Mental toughness levels differed significantly according to age categories, but there was no difference according to gender and being national athletic status. There was a positive and significant relationship between the mental training levels of elite boxers and their mental toughness levels. Moreover, it was concluded that the mental training levels of elite boxers were a significant predictor of their mental toughness levels (34%). This result showed that the athletes who want to increase their mental toughness levels should do mental training.

Keywords: Mental Training, Mental Toughness, Elite Boxers.

INTRODUCTION

Mental training and toughness play an important role as well as physical training and toughness in increasing the performance of an athlete. The human is an entity that develops in physical, mental and social dimensions and there is a mutual relationship between each dimension. For this reason, working only on physical development can be considered as an incomplete and wrong practice for athletes.

Sports Performance has defined as the physiological, biomechanical and psychological efficiency of the athlete during the activity. Achieving an optimal and superior performance depends on the development of both the psychological and physiological abilities of the athlete and increasing them to a certain level by the purpose (Konter, 2003). The ultimate goal of the athlete to reach an optimal and superior performance is to win the competitions he or she participate in. According to Yarayan and İlhan (2018), in todays' sports, the line between winning and losing is getting thinner and it is noticing that increasing performance intensity puts great pressure on athletes. Athletes and coaches who were caught unprepared for many pressures are in search of coping with this situation. Therefore, with increasing awareness of psychological factors in recent years, it can be thought that athletes and coaches should give importance to psychological work as well as physical work. This applies to both individual and team sports. The concepts of mental training and mental toughness have an important place in the mental preparation processes of athletes. This applies to both individual and team sports. The concepts of mental training and mental toughness have an important place in the mental preparation processes of athletes. While mental training in sports is defining as the whole of psychological techniques aimed at controlling and changing an individual's internal and external, mental and physical behaviours and experiences (Unestahl, 1982). Mental toughness in sports is defined as the ability to perform under pressure in sports (Loehr, 1982).

Boxing, one of the individual combat sports, is a sport that requires a high level of physical and mental performance due to its current structure and practice, where body contact and combat are experienced most intensely (Quinna, 1994). Boxing sport includes strategies such as defending and attacking, increasing the tempo during the match and decreasing the tempo when necessary. For this reason, mental training practices should be done in addition to physical training while

preparing for matches. The basis of mental training is the intense imagination of a movement without practice (Hecker and Kaczor, 1988). Before the match, boxers need to practice and imagine the tactics and strategies many times.

Especially after analyzing the previous matches of the opponents to whom the match will be played, it is a method that boxers frequently apply to determine the strategy and imagine how to defend and attack. After these strategies are trained in the mind, they are reinforced with physical training. In boxing, it is important to attack and defend at the same time and with the same concentration. A boxer needs to be both physically and mentally tough until the last moment of the match. Mental toughness is the power to recover from negative events such as setbacks, conflict, increased responsibility and failure, and the positive psychological capacity that needs to be developed to recover (Luthans, 2002) and required to win a match in boxing. Even if the boxers are behind or ahead in points, there is always a chance of winning or losing the match with one punch. Therefore, they need to have mental toughness until the end of the match.

When the literature is examined, there are studies in which mental training and mental toughness are examined both together and separately in different sports branches. However, no study has been found on mental training and mental toughness, which are important factors in boxing. Therefore, it is thought that there is a need for further research in this area. In this context, this study aimed to i) evaluate the mental training and mental toughness levels of elite boxers in terms of various variables, ii) examine the relationship between mental training and mental toughness levels, and iii) investigate the predictive level of mental toughness levels of mental training levels.

MATERIAL & METHODS

Research Model: In this research, the relational screening model was used within the scope of the screening model. This model aims to determine the existence and/or degree of co-change between two or more variables[27].

Population and Sample: The universe of this research consisted of boxing athletes in Turkey, and the sample consisted of 191 elite boxers who were determined according to the easily accessible sampling method and participated voluntarily. The demographic characteristics of the participants included in the study were given in Table 1.

Table 1. Demographic Characteristics of the Participants

Characteristics	Categories	f	%
Gender	Female	53	27,7
	Male	138	72,3
Age Group	School boys/girls	23	12,0
	Cadets	39	20,4
	Juniors	34	17,8
	Seniors	95	49,7
Being national athlete	Yes	56	29,3
	No	135	70,7
Total		191	100,0

When Table 1 was examined, it was seen that 138 (72.3%) of the boxers were male and 53 (27.7%) of the boxers were female. Moreover, 12% of the boxers were school boys/girls, 20.4% were cadets, 17.8% were juniors and 49.7% were seniors. Again, 56 (29.3) of the boxers participating in the research were active national athletes, and 135 (70.7%) were elite boxers who did not take part in the national team.

Data Collection Tools: Following the aim of the research, the sport mental training scale, mental toughness scale and personal information form created by the researchers were used.

The Sport Mental Training Scale (SMTS): The scale was developed by Behnke, Tomczak, Kaczmarak, Komar and Gracz (2017) and adapted into Turkish by Yarayan and İlhan (2018). The scale, which was consisted of 5 sub-dimensions including Mental Foundational Skills (4 items), Mental Performance Skills (6 items), Interpersonal Skills (4 items), Self-talk (3 items), and Mental Imagery (3 items), was a 5-point Likert type consisting of 20 items. The lowest score that can be obtained from the scale was 20, and the highest score was 100. When the reliability of the inventory was examined, Cronbach's alpha internal consistency coefficient was determined as α=0.82 for Mental Foundational Skills, α=0.85 for Mental Performance Skills α=0.85 for Interpersonal Skills, α= 0.91 for Self-talk, α=0.82 for Mental Imagery, and the General Internal Consistency Coefficient of the Inventory was determined as α=0.91 (Yarayan and İlhan, 2018).

Sport Mental Toughness Questionnaire-SMTQ: The questionnaire was developed by Sheard et al. (2009) to determine the mental toughness of athletes, and adapted into Turkish by Altıntaş (2015). The questionnaire consisting of 14 questions determining the sub-dimensions of Confidence (6 items), Constancy (4 items) and control (4 items) also presented information about total mental toughness. Athletes performed a 4-point Likert type evaluation to indicate their level of participation in the questions asked in the inventory. The scale also included reverse questions (2, 4, 7, 8, 9, 10) and these questions were reverse coded (Altıntaş, 2015).

Data Collection: The data of the research were collected online. Data collection tools were prepared to allow online response collection via the Google Forms application, and were then emailed to boxers who actively participated in boxing tournaments and took part in the national team. An informative text on the importance and necessity of the study was added to the front of the form, where participation in the study was not mandatory, it was completely voluntary.

Analysis of Data: SPSS 20.0 package program was used in the analysis of the data obtained in research. The normality test of the obtained data was tested with the Kolmogorov-Smirnov test. Besides, kurtosis and skewness values were also taken into consideration and it was concluded that the data were normally distributed. In the analysis of normally distributed data; Independent samples t-test was used for pairwise comparisons and one-way analysis of variance (One-way ANOVA) was used for multiple comparisons. Moreover, when a significant difference was detected as a result of the one-way analysis of variance, the LSD test, one of the Post-Hoc tests, was used to find the source of the difference. Pearson product moment's correlation coefficient (r) was used to test the

relationship between mental training and mental toughness levels of boxers. In addition, the predictive status of mental training for mental toughness was tested with simple linear regression analysis.

RESULTS

The results of the research were presented in tables in this section.

According to Table 2, the scores obtained from the overall questionnaire regarding the mental training levels of the elite boxers [t(189)= .47; p>.05] as well as mental foundational skills [t(189)= ,81; p>.05], mental performance skills [t(189)= ,0.5; p>.05], interpersonal skills [t(189)= ,60; p>.05], self-talk [t(189)= 1.71; p>.05] and mental Imagery [t(189)= -.96; p>,05] sub-dimensions, there was no significant difference according to gender in terms of mental training levels.

As can be seen in Table 3, the scores obtained from the general questionnaire according to the age categories regarding the mental training levels of the elite boxers [F(3, 187)= 3.26; p<.05] and self-talk [F(3, 187)= 2.88; p<.05] and mental imagery [F(3, 187)= 3.27; p<.05] sub-dimensions were significantly different. It was seen that these differences are in favor of the seniors category. Mental foundational skills [F(3, 187)= 1.31; p>.05], mental performance skills [F(3, 187)= 2.64; p>.05] and interpersonal skills [F(3, 187)= ,56; p>.05], and in its sub-dimensions, there was no significant difference according to age categories in terms of mental training level.

Table 2. Comparison of Mental Training Levels of Elite Boxers by Gender

Variables	Gender	n	□	S.D.	df	t	p
Mental Foundational Skills	Female	53	16,74	1,91	189	-,81	,42
	Male	138	17,02	2,27			
Mental Performance Skills	Female	53	22,70	3,15	189	-,05	,96
	Male	138	22,72	3,47			
Interpersonal Skills	Female	53	17,19	2,00	189	,60	,55
	Male	138	16,99	2,11			
Self-talk	Female	53	12,25	2,21	189	1,71	,09
	Male	138	11,60	2,38			
Mental Imagery	Female	53	12,60	1,79	189	,47	,64
	Male	138	12,47	1,71			
General Questionnaire	Female	53	81,47	8,35	189	,47	,64
	Male	138	80,80	9,03			

Table 3. Comparison of Mental Training Levels of Elite Boxers by Age Categories

Factors	Age categories	n	□	S.D.	Source of the variance	Sum of Squares	Mean Squares	F	p	Difference
Mental Foundational Skills	School boys/girls	23	16,70	1,99	Intergroup	18,64	6,21	1,31	,27	
	Cadets	39	16,46	2,14	Intragroup	883,73	4,73			
	Juniors	34	16,85	2,39	Total	902,37				
	Seniors	95	17,23	2,15						
Mental Performance Skills	School boys/girls	23	22,13	2,96	Intergroup	88,00	29,33	2,64	,05	
	Cadets	39	21,67	2,60	Intragroup	2078,73	11,12			
	Juniors	34	22,59	3,01	Total	2166,73				
	Seniors	95	23,34	3,76						
Interpersonal Skills	School boys/girls	23	16,74	2,20	Intergroup	7,33	2,44	,56	,64	
	Cadets	39	16,79	1,94	Intragroup	810,34	4,33			
	Juniors	34	17,29	1,99	Total	817,67				
	Seniors	95	17,13	2,14						
Self-talk	School boys/girls	23	11,26	3,25	Intergroup	46,01	15,34	2,88	,04*	2-4
	Cadets	39	11,03	2,17	Intragroup	996,76	5,33			
	Juniors	34	11,79	2,01	Total	1042,76				
	Seniors	95	12,21	2,19						
Mental Imagery	School boys/girls	23	12,13	1,81	Intergroup	28,37	9,46	3,27	,02*	2-4 3-4
	Cadets	39	12,15	1,80	Intragroup	541,37	2,90			
	Juniors	34	12,09	1,78	Total	569,74				
	Seniors	95	12,89	1,60						
General Questionnaire	School boys/girls	23	78,95	8,59	Intergroup	736,20	245,40	3,26	,02*	2-4
	Cadets	39	78,10	7,34	Intragroup	14089,78	75,35			
	Juniors	34	80,62	8,69	Total	14825,98				
	Seniors	95	82,80	9,18						

*p<,05

Table 4. Comparison of the Mental Training Levels of Elite Boxers to the National Athlete Status

Factors	National athlete status	n	□	S.D.	t	p
Mental Foundational Skills	Yes	56	17,268	2,12	1,33	,18
	No	135	16,81	2,20		
Mental Performance Skills	Yes	56	23,91	3,14	3,22	,00*
	No	135	22,22	3,36		
Interpersonal Skills	Yes	56	17,43	1,88	1,67	,09
	No	135	16,88	2,14		
Self-talk	Yes	56	12,25	2,12	1,80	,07
	No	135	11,59	2,41		
Mental Imagery	Yes	56	13,09	1,61	3,05	,00*
	No	135	12,27	1,73		
General Questionnaire	Yes	56	83,95	8,51	3,04	,00*
	No	135	79,76	8,70		

Table 5. Comparison of Mental Toughness Levels of Boxers by Gender

Factors	Gender	N	□	S.d.	t	p
Confidence	Female	53	18,20	2,77	-1,00	,32
	Male	138	18,63	2,56		
Constancy	Female	53	13,11	1,78	-,75	,45
	Male	138	13,34	1,90		
Control	Female	53	8,36	2,46	-1,37	,17
	Male	138	8,89	2,38		
General Questionnaire	Female	53	39,68	4,64	-1,51	,13
	Male	138	40,86	4,95		

Table 6. Comparison of Mental Toughness Levels of Elite Boxers by Age Categories

Factors	Age categories	n	□	S.D.	Source of the variance	Sum of Squares	df	Mean Squares	F	p	Difference
Confidence	School boys/girls	23	18,26	2,47	Intergroup	72,09	3	24,03	3,65	,01*	2-3 2-4
	Cadets	39	17,38	2,28	Intragroup	1229,63	187	6,58			
	Juniors	34	18,71	2,74	Total	1301,72	190				
	Seniors	95	18,97	2,63							
Constancy	School boys/girls	23	13,13	2,07	Intergroup	4,44	3	1,48	,42	,74	
	Cadets	39	13,15	1,79	Intragroup	659,86	187	3,53			
	Juniors	34	13,59	1,71	Total	664,29	190				
	Seniors	95	13,25	1,92							
Control	School boys/girls	23	9,17	2,59	Intergroup	62,17	3	20,72	3,73	,01*	1-3 2-4 3-4
	Cadets	39	8,26	2,29	Intragroup	1038,26	187	5,55			
	Juniors	34	7,79	2,11	Total	1100,43	190				
	Seniors	95	9,18	2,40							
General Questionnaire	School boys/girls	23	40,57	5,86	Intergroup	195,98	3	65,33	2,82	,04*	2-4
	Cadets	39	38,79	4,11	Intragroup	4331,55	187	23,16			
	Juniors	34	40,09	4,04	Total	4527,53	190				
	Seniors	95	41,40	5,05							

Table 7. Comparison of Mental Toughness Levels of Elite Boxers According to Their National Athletic Status

Factors	National Athlete Status	n	□	S.D.	df	t	p
Confidence	Yes	56	18,96	2,17	189	1,54	,13
	No	135	18,33	2,77			
Constancy	Yes	56	13,05	1,82	189	-1,07	,29
	No	135	13,37	1,89			
Control	Yes	56	8,98	2,37	189	,88	,38
	No	135	8,64	2,42			
General Questionnaire	Yes	56	41,00	4,64	189	,85	,40
	No	135	40,34	4,98			

Table 8. Correlation Analysis of the Relationship between Mental Training Levels and Mental Toughness Levels of Elite Boxers

Questionnaire	Sub-factors	□	S.D.	1	2	3	4	5	6	7	8	9	10
SMTS	1. Mental Foundational Skills	16,94	2,18	1,00	,59**	,54**	,46**	,62**	,84**	,66**	,60**	,13**	,64**
	2. Mental Performance Skills	22,72	3,38		1,00	,42**	,33**	,48**	,81**	,54**	,29**	,22**	,51**
	3. Interpersonal Skills	17,04	2,07			1,00	,28**	,49**	,70**	,33**	,40**	-,10	,28**
	4. Self-talk	11,78	2,34				1,00	,41**	,65**	,38**	,22**	,02	,29**
	5. Mental Imagery	12,51	1,73					1,00	,76**	,50**	,41**	-,02	,41**
	6. SMTS General	80,99	8,83						1,00	,64**	,49**	,09	,58**
SMTQ	7. Confidence	18,51	2,62							1,00	,58**	,06	,79**
	8. Constancy	13,28	1,87								1,00	,15*	,77**
	9 Control	8,74	2,41									1,00	,58**
	10. SMTQ General	40,53	4,88										1,00

**p<,05

Table 9. The Results of Linear Regression Analysis Regarding the Prediction of Mental Toughness Levels of Boxers' Mental Training Levels

Variables	B	Standard Error	β	t	p
Constancy	14,61	2,67	-	5,47	,00
Mental Toughness	,32	,03	,58	9,77	,00
R=,58 R^2=,34					
$F_{(1,189)}$= 95,45 p=,00*					

*p<,05

When table was examined, it was seen that the mental training levels of the elite boxers participating in the research, according to their national athlete status, and the scores they got from the General Questionnaire [t(189)= 3.04; p<.05] and mental performance skills [t(189)= 3.22; p<.05] and mental imagery [t(189)= 3.05; p<,05] sub-dimensions have significant differences in favor of national athletes. Mental foundational skills [t(189)= 1.33; p>.05], interpersonal skills [t(189)= 1.67; p>.05] and self-talk [t(189)= 1.80; p>,05] did not differ significantly in terms of sub-dimensions according to the national sportsmanship status.

When Table 5 was examined, it was seen that the mental toughness levels of the boxers participating in the research, according to gender and the general questionnaire scores [t(189)= -1,51; p>.05] and confidence [t(189)= -1.00; p>.05], constancy [t(189)= -.75; p>.05] and control [t(189-)= -1.37; p>.05] did not differ significantly by gender in terms of all sub-dimensions. Although there was no statistically significant difference, it was seen that the scores of elite male boxers from the general questionnaire were higher than elite female boxers.

When the data in Table 6 were examined, it was understood that the mental toughness levels of the elite boxers participating in the research showed a significant difference according to age categories [F(3, 187)= 2.82; p<.05]. As a result of the ANOVA test on the source of the difference, it was seen that the elite boxers in the juniors category had higher mental toughness levels than the elite boxers in the other category. As a result of the analysis performed according to the sub-factors of the questionnaire, the mental toughness levels of the elite boxers were found to be confidence [F(3, 187)= 3.65; p<.05] and control [F(3, 187)= 3.73; p<.05] sub-dimensions differed significantly according to age categories. As a result of the ANOVA test, it was seen that the elite boxers in the juniors category constitute the main source of the difference. In the continuity sub-dimension of the questionnaire, there was no significant difference according to age categories [F(3, 187)= ,42; p>.05].

When Table 7 was examined, it was seen that the mental toughness levels of the elite boxers participating in the study, according to their national athlete status, and the scores they got from the genral questionnaire [t(187)= -,85; p>.05] and confidence [t(187)= 1.54; p>.05], constancy [t(387)= -1.07; p>.05] and control [t(187)= .88; p>.05] did not differ significantly in terms of all sub-dimensions.

When the data in Table 8 were examined, it was seen that there was a positive and significant relationship between the mental training levels of the elite boxers participating in the study and their mental toughness levels (r =,58, p<,01). As a result of the examinations performed based on sub-dimensions, the confidence sub-dimension of the mental toughness inventory in sports and the mental foundational skills (r =,66, p<,01), mental performance skills (r =,54, p<,01), interpersonal skills of the mental training inventory in sports (r =,33, p<,01), self-talk (r =,38, p<,01) and mental imagery (r =.50, p<.01) were found to have positive significant relationships between all sub-dimensions. There were also positive significant relationships between all sub-dimensions of Continuity sub-dimension of mental toughness inventory in sports and mental foundational skills (r =.60, p<.01), mental performance skills (r =.29, p<.01), interpersonal skills (r =.40, p<,01), self-talk(r =,22, p<,01) and mental imagery (r =,41, p<,01). Finally, while there was a significant positive relationship between the control sub-dimension of the mental endurance inventory in sports and the mental foundational skills (r =,13, p<,01) and mental performance skills (r =,22, p<,01) of the mental training inventory in sports, there was no relationship was found between the interpersonal skills (r =-,10, p>,05), self-talk (r =,02, p>,05) and mental imagery (r = -,02, p>,05) sub-dimensions.

As seen in table 9, as a result of simple regression analysis, it was seen that the mental training levels of elite boxers were a significant predictor of their mental toughness levels (R=,58; R2=,34; F(1,189)=95,45; p=,00<,05). Accordingly, it was possible to say that 34% of the total variance regarding the mental toughness levels of elite boxers was explained by their mental training levels.

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

In this study, mental training and mental toughness levels of elite boxers were evaluated according to their age, gender, and national athlete status. The relationship between the mental training and mental toughness levels of elite boxers was examined and the predictor of mental toughness levels and mental training levels of elite boxers was investigated.

In the study, no significant difference was found according to gender in the mental training levels of elite boxers, both in the scores obtained from the overall inventory and in the sub-dimensions of Mental Foundational Skills, mental performance skills, interpersonal skills, self-talk and mental imagery. Studies supporting these results can found in the literature. In Altunkalem's (2020) study with elite athletes and Hocaoğlu's (2019) study, no significant difference was found in the comparison of mental skill styles of athletes according to gender. Similarly, Doğan (2019) compared the imagery styles of male and female athletes in his study, and no difference was found between the genders. However, contrary to this research, there were also studies (Akman, 2019; Kartal, Güvendi, Türksoy, & Altıncı, 2017) in which significant differences were found in favour of male athletes at the level of mental training.

Another result of the study was that there was a significant difference in favour of the adult category in

terms of the mental training levels of the elite boxers, both in the scores obtained from the overall inventory and in the sub-dimensions of self-talk and mental imagery according to the age categories. Similar to this result, Kara and Ustaoğlu-Hoşver (2019) and Altunkalem (2020) reached the same results in their study. As the age progressed, it was concluded that the level of mental training increased.

The mental training levels of the elite boxers participating in the research showed differences in favour of national athletes, according to the being national athletes status, the scores they get from the inventory as well as the scores they get from the mental performance skills and mental imagery sub-dimensions. Similar results also emerged in Altunkalem's (2020) study on elite-level athletes. It was possible to associate this situation with having more scheduled training plans of national athletes in camp training centers.

When the mental toughness levels of elite boxers were examined, it was seen that there was no significant difference found according to gender in terms of both the across inventory and all sub-dimensions such as confidence, continuity and control. Although there was no statistically significant difference found, it was seen that the scores of the elite male boxers in the inventory were higher than the scores of the elite female boxers. Benard (1991) also stated that there was no difference in mental toughness levels in individuals according to gender, and Yarayan, Yıldız and Gülşen (2018) stated that there was no significant difference in mental toughness levels of individual athletes according to their genders, but only male athletes in team sports have a higher level of mental toughness in the continuity sub-dimension. The results of these studies support our study results. However, in some studies, male athletes (Nicholls, Polman, Levy, and Backhouse (2009); Jalili et al, 2011; Masum, 2014; Onan, 2017; Juan and Lopez, 2015), while in other studies, female athletes (Çutuk, Beyleroğlu, Hazar and Çutuk, 2017; Yazıcı, 2016) concluded that mental toughness levels were higher. Examining more than one different branch or team sports can be shown as the reason for these differences. In a study that revealed a difference in favour of male athletes, it was claimed that males were associated with more community support than females (Findlay and Bowker, 2009).

According to another result of the study about mental toughness, it was understood that the mental toughness levels of the elite boxers participating in the study showed a significant difference according to age categories. It was observed that the elite boxers in the juniors category had higher mental toughness levels than the elite boxers in the other category. The study of Yarayan et al. (2018) with athletes doing individual and team sports and the study of Altunkalem (2020) with elite athletes were similar studies to this study; they concluded that the mental toughness levels of older athletes were higher than those of younger athletes. In addition, Bülbül (2015) stated that there may be an increase in the mental toughness levels of the athletes due to athletes experience increase. Connaughton, Wadey, Hanton, and Jones (2008) stated that experience (sports age) was an important factor in increasing the level of mental toughness in athletes. It was observed that the mental toughness levels of the elite boxers participating in the study did not differ significantly in terms of all sub-dimensions, either according to the national athletic status or throughout the inventory. A study supporting this result did not found in the literature. There were many studies (Wieser & Thiel, 2014; Erdoğan & Kocaekşi, 2015; Akınveren, 2017; Orhan, 2018) that showed the conclusion that being a national athlete has a positive effect on mental toughness. Among the reasons why similar results were not obtained in this study, it can be shown that the elite boxers participating in the study were experienced athletes who participate in national tournaments, although they did not take part in the national team.

It was seen that there was a positive and significant relationship between the mental training levels of the elite boxers participating in the study and their mental toughness levels. As a result of the examinations made based on sub-dimensions, it was seen that there were positive significant relationships between the confidence sub-dimension of the mental toughness inventory in sports and the mental foundational skills, mental performance skills, interpersonal skills, self-talk and mental imagery sub-dimensions of the mental training inventory in sports. There were also positive significant relationships between the continuity sub-dimension of the mental toughness inventory in sports and the mental foundational skills, mental performance skills, interpersonal skills, self-talk and mental imagery sub-dimensions of the mental training inventory in sports. Finally, there was a significant positive relationship between the control sub-dimension of the mental toughness inventory in sports and the mental foundational skills and mental performance skills of the mental training inventory in sports, while no relationship was found between the interpersonal skills, self-talk and mental imagery dimensions. In addition, as a result of simple regression analysis, it was seen that the mental training levels of elite boxers were a significant predictor of their mental toughness levels. In addition, as a result of simple regression analysis, it was seen that the mental training levels of elite boxers were a significant predictor of their mental toughness levels. Accordingly, it was possible to say that 34% of the total variance regarding the mental toughness levels of elite boxers was explained by their mental training levels.

This study was conducted by collecting cross-sectional data. For this reason, longer-term and longitudinal studies can be conducted to reveal the effects of the independent variables in the study on mental training in sports and mental toughness in sports. In addition, it was recommended to conduct studies with different samples and different models to examine the subject in more depth.

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