



An Investigation of Perfectionism and Mental Toughness in Athletes

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Please cite this paper as follows:

Kurtulgel, E. & Çepikkurt, F. (2024). An Investigation of Perfectionism and Mental Toughness in Athletes. *International Journal of Recreation and Sport Science*, 8(1), 104-116. <https://doi.org/10.46463/ijrss.1554748>

Article History

Received:
23.09.2024
Accepted:
16.12.2024
Available online:
20.12.2024



ABSTRACT

This study was conducted to examine the relationship between perfectionism and mental toughness in track and field athletes. A total of 280 track and field athletes participated in this study as voluntarily, 105 female and 175 male. "Sport Multidimensional Perfectionism Scale", "Sport Mental Toughness Questionnaire" and, Personal Information were used as data collection tools. Descriptive statistics, t-test, Pearson Correlation Analysis and canonical correlation analysis were applied in the analysis of the data. The results revealed that, male and female athletes did not differ between perfectionism and mental toughness scores. Further, it also shows that the perfectionism and mental toughness scores of track and field athletes do not differ according to their branch categories and injury status. But, according to the nationality of athletes, there was a significant difference in favor of national track and field athletes in the personal sub-dimension of perfectionism and in the control sub-dimension of mental toughness. It was concluded as a result of the canonical correlation analysis conducted to determine whether there is a relationship between the perfectionism and mental toughness scores of track and field athletes which is the main problem of this study that, there was a significant relationship between the perfectionism and mental toughness scores of track and field athletes. In conclusion, considering the findings obtained in the study, it can be said that male and female track and field athletes reflect similar perfectionism characteristics and, their mental toughness are similar. National track and field athletes can be defined as mentally overcontrolled track and field athletes having high personal standards. It can also be said that track and field athletes with positive perfectionism tendencies have high mental toughness but, track and field athletes with negative perfectionism tendencies have less mental toughness.

Keywords: Perfectionism, Mental Toughness, Track and Field Athletes, Canonic Correlation.

INTRODUCTION

The intense physical and psychological effort required by athletes to achieve and maintain success in their sports are understood to affect their performance. Concepts such as effective coping in dealing with increasing pressure and expectations, being psychologically connected and strong, concentration/focus, and a solid character are associated with mental toughness for both athletes and trainers (Connaughton, Wadey, Hanton, &

Jones, 2008; Crust, 2008; Crust et al., 2014; Gucciardi, Hanton, & Mallett, 2012). Mental toughness is a construct affecting people's evaluations of and attitudes towards events and the feelings they experience concerning those events, while also directing their associated efforts and behaviors (Gucciardi & Gordon, 2009). It is defined as the ability to struggle against or resist failure (Dennis, 1981; Goldberg, 1998; Taylor, 1989), to persist, be determined/undeterred, or refuse to quit (Dennis, 1981; Goldberg, 1998). Mental toughness is also defined as the ability to recover from adverse events, such as setbacks, conflict, increased

responsibility, or failure, and a positive psychological capacity that must be developed in order for an individual to recover (Luthans, 2002). It is furthermore considered a psychological structure that helps people to cope with stress, behave appropriately, maintain concentration under pressure, and be less sensitive to stressful situations (Jones, 2002). Individuals with mental toughness are more disciplined, self-confident, and flexible, and do not give up on their goals when they encounter difficulties (Middleton et al., 2004; Crust et al., 2014).

Jones, Hanton, and Connaughton (2002), who conducted studies on mental toughness in sports, noted that athletes possessing mental toughness shared a number of characteristics. Mentally tough athletes strongly believe that their individual goals are achievable, are more determined to overcome obstacles to success, and have greater self-confidence, believing themselves to possess greater abilities compared to their competitors. They exhibited a greater desire to be successful, could focus in the face of distractions, and continue concentrating even under circumstances in which they had no control. The mentally tough athletes participating in that study also stated that during competition they were able to maintain control, overcome emotional and physical pain, and cope by accepting the anxiety of competition, without letting the stress negatively affect their performance (Jones et al., 2002).

The findings of numerous studies in the field of sports psychology have identified mental toughness as a factor that improves athletic performance (Slimani, Miarka, Cheour, 2016; Cowden, 2016; Meggs, Chen & Koehn, 2019). In addition, it is also associated with increased physiological endurance (Crust and Clough, 2005), increased training time and efficiency (Ducworth & Quinn, 2009), and more appropriate reaction to negative feedback (Clough, Earle, & Sewell, 2002). Mental toughness also facilitates endurance in uncertain situations (Gümüsoğlu & Aşçı, 2020) and has the potential to indirectly affect performance.

In studies on mental toughness in sports, it has been negatively related to stress (Cowden et al. 2016) and burnout (Kurtulget, Kaplan, & Çepikkurt, 2018), while being positively correlated with coping with stress and pressure (Swann et al. 2016; Ekmeççi & Miçooğulları, 2018), self-efficacy (Yıldız, 2017; Nicholls et al. 2011), and self-confidence in athletics (Başer, 2019). One of the personality traits known to be associated with mental toughness is perfectionism, which reflects an individual's effort to achieve flawlessness and the tendency to set very high performance standards while being highly self-critical in evaluating one's own behaviors and performance (Flett & Hewitt, 2002). In other words, perfectionism emerges when the desire to set and reach high personal performance standards takes on an unhealthy form. (Çepikkurt, 2011). The theories of Hamachek (1978) provide the basis for studies on

perfectionism. He argued that there are two types of perfectionism, positive (adaptive) and negative (maladaptive). While Hamachek (1978) explained positive perfectionism as the characteristics that contribute to a deep sense of satisfaction in the individual, he defined negative perfectionism as the characteristics that do not allow the individual to enjoy their own (high level) performance or make the necessary effort to experience this pleasure. Adaptive perfectionism expresses thoughts and behaviors oriented towards achieving high-level goals necessary to achieve positive results and is guided by positive empowerment and desire for success. Maladaptive perfectionism refers to thoughts and behaviors directed towards achieving certain high-level goals in order to avoid negative consequences and is guided by negative empowerment and fear of failure (Slade & Owens, 1998). In sports, some researchers see perfectionism as the ability to achieve high performance (Gould, Dieffenbach, & Moffett, 2002). In this context, being mentally tougher and having higher standards than one's opponent may be crucial in maintaining an optimal psychological state and thus improving one's chances for success (Cadenas et al., 2016).

Although numerous studies have been conducted on perfectionism and mental toughness, both of which are important topics in sports psychology, have been studied separately, there are relatively few studies examining the relationship between these two variables. In a study examining mental toughness and perfectionism, a positive relationship was found between positive perfectionism and mental toughness, and a negative relationship between negative perfectionism and mental toughness (Cadenas et al., 2016). Klibert et al. (2014) reported a negative relationship between socially imposed perfectionism and mental toughness in students. Sindik, Nazor, and Vokosav (2011) found a positive relationship between the personal standards subscale, a dimension of positive perfectionism, and mental toughness. In their study on the relationship between perfectionism and mental toughness in Iranian taekwondo athletes, Mohebi and Zarei (2016) observed a negative relationship between mental toughness and dealing with errors, perceived family pressure, and perceived trainer pressure, while reporting a significant positive relationship between personal standards and mental toughness. In other words, the maladaptive dimensions of perfectionism negatively affected mental toughness (Mohebi & Zarei, 2016). Cowden et al. (2019) concluded that mental toughness is a personality trait that facilitates meeting high standards and supports performance excellence and success (Cowden, Crust, Jackman, & Duckett, 2019).

As in the above mentioned research (for example, Cadenas et al., 2016; Klibert et al., 2014; Sindik, Nazor, and Vokosav, 2011; Mohebi and Zarei, 2016; Cowden et al., 2019) related to this topic suggests the importance of examining how perfectionism, understood to be a critical component in achieving a

high level of athletic performance, may be related to mental toughness, and of revealing the relationship between these two psychological factors.

The main purpose of the present study was to evaluate the relationship between perfectionism mental toughness in the participating athletes. The secondary objective was to determine whether the athletes' perfectionism and mental toughness scores differed with respect to different demographic characteristics such as gender, national status (membership in the Turkish national team or not), and age.

METHOD

Research Model

This study was conducted using a relational scanning model, a type of descriptive method, to assess the relationship between perfectionism and mental toughness. We also employed cross-sectional scanning methods aimed at determining whether athletes' perfectionism and mental toughness scores

exhibited significant differences in terms of variables such as gender and national status.

Study Group

In this study, a purposive sampling method was used to make the most effective use of limited sample resources and to identify information-rich cases (Patton, 2002). With this method, individuals or groups of individuals who are particularly knowledgeable about a phenomenon or have experience with this phenomenon are selected and identified (Cresswell & Plano Clark, 2011). In this context, the study sample group consisted of athletes aged 18 and above who participated in the Turkish championships in 2019 in the sprint, middle-distance, and long-distance events and included 105 women ($\bar{X}_{age} = 20.89 \pm 2.33$) and 175 men ($\bar{X}_{age} = 21.22 \pm 3.38$) for a total of 280 subjects. While the mean number of years that the female athletes had participated in sports was 8.30 ± 3.15 , the average for the male athletes was 7.86 ± 3.54 . The number of hours per week that the athletes trained averaged 16.00 ± 6.78 for females and 16.40 ± 6.38 for males.

Table 1. Demographic Characteristics of the Study Participants

Gender	n	\bar{X}_{age}	$\bar{X}_{sport\ years}$	Duration of Weekly Training (hours)
Female	105	20.89	8.30	16.00
Male	175	21.22	7.86	16.40
Total	280	21.10	8.03	16.25

Data Collection Tools

Information concerning the measurement tools used for data collection is presented below.

The Sport Multidimensional Perfectionism Scale (Sport-MPS), developed by Dunn et al. (2002), consists of 30 items and four subscales (personal standards, excessive concern over mistakes, perceived family pressure, and perceived trainer pressure).

The validity and reliability study of the scale for Turkish athletes was conducted by Çepikkurt (2011), whose factor analysis determined that 19 items and 3 subscales explained 46.2% of the total variance.

The perceived trainer pressure subscale was revealed not to be a determinant in the population of Turkish athletes studied. The values calculated for Cronbach's alpha were .76 for the personal standards and excessive concern over mistakes and subscales and .77 for perceived family pressure. For the sample group in the present study, the internal consistency coefficients calculated for Cronbach's alpha were .72 for the excessive concern over errors subscale, .62 for personal standards, and .70 for

perceived family pressure. These values obtained show that the The Sport Multidimensional Perfectionism Scale is sufficient for reliability level (Kayış, 2009).

The Sports Mental Toughness Questionnaire (SMTQ), developed by Sheard, Golby, and Van Wersch (2009) to determine the sports-specific mental toughness of athletes, is comprised of 14 items and 3 subscales: confidence, constancy, and control. The adaptation for Turkish athletes was performed by Altıntaş and Koruç (2015), who calculated reliability coefficients of .84, .79, and .51 for confidence, control, and constancy, respectively. In the present study, the internal consistency coefficients were .62, .52, and .58 for confidence, control, and constancy, respectively.

The Cronbach's alpha value calculated for overall mental toughness was .68. These values obtained seem to be compatible with the values obtained by Altıntaş and Koruç (2015)'s and the reliability level of the scale is accepted to be sufficient (Kayış, 2009).

Personal information form developed by the researchers were used to collect identifying information about participants.

Data Analysis

First, skewness and kurtosis values were examined in order to determine whether the participating athletes' perfectionism and mental toughness scores exhibited normal distribution. The t-test was used to evaluate whether the participants' mental toughness and perfectionist tendencies differed according to gender and national status. Canonical correlation analysis was performed to reveal the relationship between the athletes' perfectionism and mental toughness scores.

Canonical correlation analysis: Canonical correlation analysis is a technique used to examine the relationships between two sets of variables, each of which is comprised of at least two values, usually with one of the variable sets defined as the explanatory variable (or independent variable set), while the other set is considered dependent. However, the variable sets need not be defined in this manner. In this type of analysis, the objective is maximum correlation between variable sets; for this purpose, new (canonical) variable pairs are obtained from linear combinations of variables in both sets (Kalaycı, 2009).

In order to apply canonical correlation analysis to research data, the following criteria must be met:

1. The data points under consideration must exhibit normal distribution.
2. There should be no measurement errors with respect to the characteristics being examined.
3. Among the variables considered, no multicollinearity should be observed.
4. To ensure the reliability of the results obtained, the sample size should be as large as possible (exceeding the number of variables by a factor of at least 20).

RESULTS

We conducted tests to determine whether the mental toughness and perfectionism scores of the athletes participating in the study differed according to such variables as gender and national status. In addition, we examined the relationship between perfectionist personality traits and mental toughness, the main issue addressed by this study.

Table 2. Descriptive Statistics of the Participants' Scale Scores and Normality Test Results

SCALE / Subscale	n	Min	Max	\bar{X}	SD	Skewness	Kurtosis
Perfectionism							
Personal Standards	280	1,83	5,00	3.70	.734	-.146	-.726
Excessive Concern over Mistakes	280	1,00	5,00	2.84	.833	.063	-.451
Perceived Family Pressure	280	1,00	5,00	2.98	.848	.026	-.411
Mental Toughness							
Confidence	280	1,50	4,00	3.08	.503	-.378	-.056
Control	280	1,00	4,00	2.46	.614	-.164	-.477
Constancy	280	1,50	4,00	3.17	.576	-.388	-.577
Overall Mental Toughness	280	1,86	4,00	2.93	.391	.153	-.263

The participants' average subscale scores for the Sport Multidimensional Perfectionism Scale presented in Table 2 revealed a higher mean score for personal standards, considered a characteristic of adaptive perfectionism, than for excessive concern over mistakes and perceived family pressure, which are both considered characteristics of maladaptive perfectionism.

Regarding the subscale scores from the Sports Mental Toughness Inventory, the mean score for constancy was higher than those for confidence and control.

Taking into account the criteria that skewness values should fall between +1 and -1 and kurtosis values between +2 and -2 (Huck, 2008), skewness and kurtosis values indicated that the data for all subscales exhibited normal distribution, so parametric analysis methods could be used to analyze the data.

The t-test for independent groups was used to calculate whether the subscale scores of the Sport Multidimensional Perfectionism Scale differed in terms of gender.

Table 3. T-Test Results Comparing Subscale Scores for the Sport Multidimensional Perfectionism Scale and Sports Mental Toughness Questionnaire According to Gender

SCALE / Subscale	Gender	n	\bar{X}	SD	t	p
PERFECTIONISM						
Personal Standards	Female	105	3.70	.74	.059	.953
	Male	175	3.70	.74		
Excessive Concern over Mistakes	Female	105	2.75	.88	-1.311	.191
	Male	175	2.89	.80		
Perceived Family Pressure	Female	105	2.93	.79	-.691	.490
	Male	175	3.01	.88		
MENTAL TOUGHNESS						
Confidence	Female	105	3.06	-.53	.608	.544
	Male	175	3.10	.49		
Control	Female	105	2.52	.69	1.237	.217
	Male	175	2.43	.57		
Constancy	Female	105	3.21	.63	1.011	.313
	Male	175	3.14	.55		
Overall Mental Toughness	Female	105	2.95	.55	.645	.520
	Male	175	2.92	.34		

$p > .05$

As shown in Table 3, there were no statistically significant differences in terms of gender in the mean scores for the subscales of the Sport Multidimensional Perfectionism Scale and Sports Mental Toughness Questionnaire ($p > .05$). These findings can be interpreted as indicating similar levels of perfectionist tendencies and mental toughness among the participating female and male athletes. The athletes participating in this study also received higher average scores for personal standards, a positive (adaptive) dimension of

perfectionism, than for the other subscales representing maladaptive traits. As for mental toughness, the participating athletes scored highest for constancy and lowest for control.

T-test analysis was conducted to determine whether the perfectionism and mental endurance scores of the athletes participating in the study differed according to their national status (whether competing internationally as a member of the Turkish national team or not); the results are presented in Table 4.

Table 4. Results of the t-test Comparing Perfectionism and Mental Toughness Subscale Scores According to National Status

Subscales	National status	n	\bar{X}	SD	t	p
Personal Standards	Yes	133	3.81	.712	2.384	.018*
	No	147	3.60	.741		
Excessive Concern Over Mistakes	Yes	133	2.77	.863	-1.401	.162
	No	147	2.90	.802		
Perceived Family Pressure	Yes	133	2.95	.868	-.486	.627
	No	147	3.00	.831		
Confidence	Yes	133	3.11	.514	.722	.471
	No	147	3.06	.493		
Control	Yes	133	2.55	.588	2.381	.018*
	No	147	2.38	.628		
Constancy	Yes	133	3.18	.586	.330	.741
	No	147	3.16	.568		
Overall Mental Toughness	Yes	133	2.97	.409	1.602	.110
	No	147	2.89	.372		

* $p < .05$

As indicated by the findings presented in Table 4, in terms of national status, those athletes on the national team scored significantly higher not only on the personal standards subscale of perfectionism (t

= 2.384, $p < .05$) but also on the control subscale of mental toughness with respect to athletic pursuits.

The relationship between the participants' perfectionism scores and mental toughness scores was examined using canonical correlation analysis.

Accordingly, the subscales of the Sport Multidimensional Perfectionism Scale were determined to be the independent variable set (Set 1), consisting of excessive concern over mistakes (X1), perceived family pressure (X2), and personal standards (X3). The subscales of the Sports Mental Toughness Questionnaire were designated as dependent variables and named Set 2. The variables comprising the latter were confidence (Y1), control (Y2), and constancy (Y3).

The number of observations in the data sets exceeded the total number of variables by a factor of

more than 20 (6 variables; $n = 280$). After ascertaining that the relationship between the variable sets was linear and that the data were normally distributed (see Table 2), it was determined that the first conditions for canonical correlation analysis had been met. In order to evaluate multicollinearity between variables, the remaining condition for canonical correlation analysis, we examined correlations between the variables of Set 1 and Set 2. The results of the Pearson correlation analysis are presented in Tables 5 and 6.

Table 5. Correlation Analysis Results for Perfectionism Variables

Variables	X1 (ECo/M)	X2 (PFP)	X3 (PS)
X1 (Concern Over Mistakes)	1		
X2 (Perceived Family Pressure)	.44	1	
X3 (Personal Standards)	.16	.28	1

COM: Concern Over Mistakes; PFP: Perceived Family Pressure; PS: Personal Standards

Table 6. Correlation Analysis Results for Mental Toughness Variables

Variables	Y1 (Confidence)	Y2 (Control)	Y3 (Constancy)
Y1 (Confidence)	1		
Y2 (Control)	.17	1	
Y3 (Constancy)	.33	.21	1

Regarding the results of the correlation analyses presented in Tables 5 and 6, as the correlation values between the variables were all below .70 and no multicollinearity between variables was observed,

the data set was considered suitable for canonical correlation analysis.

The relationship between the dependent variables (Set 2) and independent variables (Set 1) is presented in Table 7.

Table 7. Correlation Results Between Perfectionism (Set 1) and Mental Toughness (Set 2)

Variables	Y1 (Confidence)	Y2 (Control)	Y3 (Constancy)
X1 (Concern Over Mistakes)	-.04	-.22**	-.25**
X2 (Perceived Family Pressure)	-.06	-.17**	-.09
X3 (Personal Standards)	.33**	-.04	.36**

** $p < .001$

As indicated by the correlation coefficients between the first and second canonical sets shown in Table 7, negative relationships were observed between "excessive concern over mistakes" and "control" ($r = -.22$) and the former and "constancy" ($r = -.25$), as well as between "perceived family pressure" and "control" ($r = -.17$). However, there was a weak positive relationship between "personal standards" and "trust" ($r = .33$) and between the former and "constancy" ($r = .36$).

The results of the canonical correlation analysis examining the relationships between the independent variables (perfectionism) and dependent variables (mental toughness), including the canonical coefficients, Wilks' lambda, R_c^2 values, and degrees of freedom, are presented in Table 8. As there was an equal number of variables (3) in both sets of variables, three canonical variables and three canonical correlation coefficients were obtained.

Table 8. Canonical Correlations and Significance

Canonical Coefficient (R_c)	Correlation	R_c^2	Eigenvalue	Wilks' Lambda	F	SD	p
1	.52	.30	.37	.68	12.902	9	.000*
2	.26	.07	.07	.96	5.459	4	.000*
3	.10	.01	.01	.99	2.775	1	.097

* $p < .05$

In order to correctly interpret the results of canonical correlation analysis, canonical functions must be statistically significant (Tabachnick & Fidell, 2007). As can be seen in Table 8, the first and second canonical correlation coefficients were both statistically significant, with values of $r = .52$ (Wilks' $\lambda = .677$; $R_c^2 = .30$; $p < .05$) and $r = .26$ (Wilks' $\lambda = .925$; $R_c^2 = .07$; $p < .05$), respectively. The square of the canonical correlation coefficient (R_c^2) given in Table 8 indicates the explained shared variance

between the dependent and the independent variable. The R_c^2 value given in Table 8 for the first canonical set showed a correlation of .30 (explaining 30% of the shared variance), while that of the second canonical set was only .07 (explaining 7% of the shared variance).

Further correlation analysis conducted for this study included the calculation of the standardized and canonical correlations for the raw values of each variable, the results of which are shown in Table 9.

Table 9. Canonical Correlation Coefficients for Standardized and Raw Values of Perfectionism (Set 1) and Mental Toughness (Set 2) Variables

	Standardized Canonical Correlations			Canonical Correlations for Raw Values		
	1	2	3	1	2	3
X1 (Concern Over Mistakes)	-,44	,85	,57	-,53	1,02	,69
X2 (Perceived Family Pressure)	-,24	,00	-1,12	-,28	,00	-1,32
X3 (Personal Standards)	,96	,41	,05	1,30	,56	,07
Y1 (Confidence)	,41	,65	,74	,81	1,30	1,47
Y2 (Control)	-,06	-,84	,60	-,09	-1,36	,97
Y3 (Constancy)	,80	-,31	-,65	1,39	-,53	-1,12

The loadings on canonical variables yielded by the perfectionism and mental resilience variables are presented in Table 10.

Table 10. Loadings on Canonical Functions Yielded by Set 1 and Set 2 Variables

	1st Canonical Function		2nd Canonical Function	
	Canonic al loadings	Cross- loadings	Canonica l loadings	Cross- loadings
X1 (Excessive Concern over Mistakes)	-.40	-.21	.91	.23
X2 (Perceived Family Pressure)	-.17	-.09	.49	.13
X3 (Personal Standards)	.82	.43	.54	.14
Y1 (Confidence)	.66	.34	.41	.10
Y2 (Control)	.18	.09	-.79	-.20
Y3 (Constancy)	.92	.48	-.26	-.07

The findings shown in Table 10 represent the canonical loadings and cross-loadings on canonical functions yielded by the variables in each set. The value of .30 was accepted as the criterion in interpreting the loadings imposed by the variables on canonical functions.

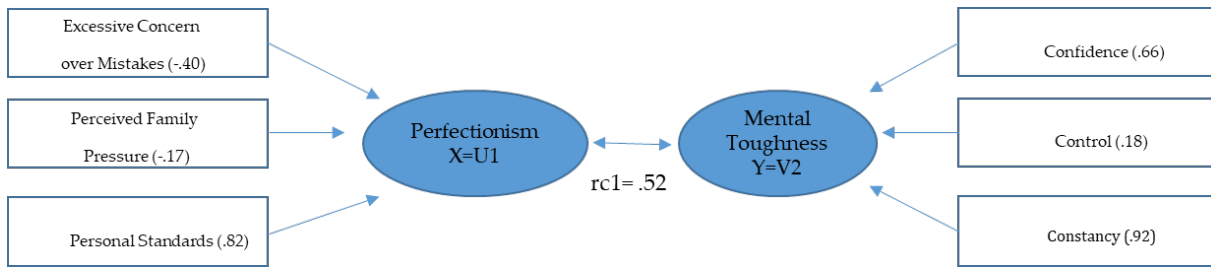
Correlations and loadings exceeding a value of 0.30 between variables and loadings are considered meaningful and interpretable. Cross-loadings, on the other hand, indicate the extent to which independent variables explain the canonical variable consisting of dependent variables (Tabachnick & Fidell, 2007).

Examination of the canonical loadings reveals that the variables "excessive concern over mistakes"

($r = -.40$) and "personal standards" ($r = .82$) from the first canonical function and "confidence" ($r = .66$) in SET 2) and "constancy" ($r = .92$) from the second yielded significant loading to the first canonical function. Similarly, when the second canonical function is examined, all of the variables in Set 1 are shown to yield significant loading, while among the variables in Set 2, only "control" and "constancy" variables yielded negative but significant loading to the second canonical function.

The structural coefficients related to the first canonical function and the canonical correlation coefficients between the perfectionism and mental toughness data sets related to this function are presented in Figure 1.

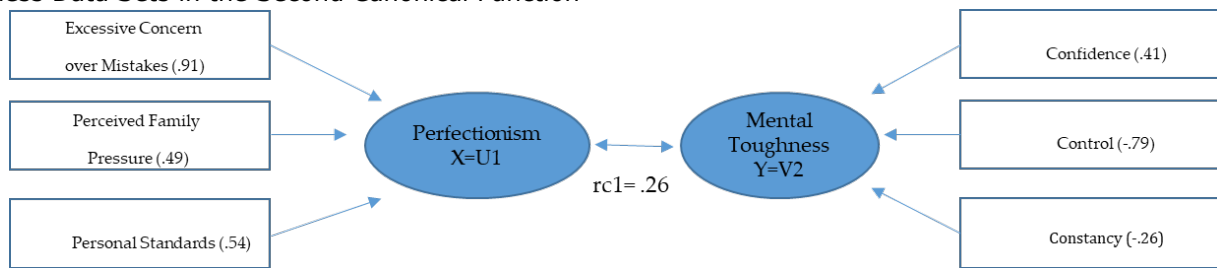
Figure 1. Canonical Variable Pairs Derived from the Relationships Between Perfectionism and Mental Toughness Data Sets in the First Canonical Function



The structural coefficients related to the second canonical function and the canonical correlation coefficients between the perfectionism and mental

toughness data sets related to this function are presented in Figure 2.

Figure 2. Canonical Variable Pairs Derived from the Relationships Between Perfectionism and Mental Toughness Data Sets in the Second Canonical Function



As shown in Figure 1, in the first canonical function, the relationship between perfectionism and mental toughness (as represented by r_{c1}) was .52, with the personal standards variable contributing the most to perfectionism (.82) and constancy the most to mental toughness (.92). According to the results presented in Figure 2, in the second canonical function, the relationship between perfectionism and mental toughness (again represented by r_{c1}) was .26 and the main contributing factor to perfectionism was excessive concern over mistakes (.91), while the influential dimension in mental toughness was control (-.79), although the effect was negative.

DISCUSSION AND CONCLUSION

The main objective of this study was to examine the relationship between perfectionism and mental toughness in athletes. As a secondary objective, we aimed to determine whether the participating athletes’ perfectionism and mental toughness scores differed according to gender and national status.

The results of the t-test, conducted with a view to the secondary objective, revealed that perfectionism scores did not significantly differ in terms of gender (see Table 3). The female and male athletes exhibited similar levels of perfectionism, set similarly high performance goals, and were similarly self-critical regarding their performance, enabling them

to strike a balance in having high but achievable expectations. In fact, it is very beneficial for athletes, whether female or male, to set high personal standards for their performance and individual development. However, in the event that they do not achieve these standards, they may engage in harsh and ruthless self-criticism. Such negative self-criticism compromises athletic performance and impedes the ability to focus (Flett & Hewitt, 2005). The male and female athletes participating in this study were observed to maintain high personal standards, but their scores for excessive concern over mistakes and perceived family pressure, both of which reflect negative perfectionism tendencies, were low. This finding can be interpreted as a beneficial use of perfectionism on the part of the male and female athletes in our study.

The similar levels of perfectionism exhibited by the female and male athletes in the present study are consistent with some previous findings reported in the literature while contradicting others. Çepikkurt and Yazgan (2012) found that males scored higher than females in the perfectionism subscales of excessive concern with mistakes and perceived family pressure, interpreting this result as indicating that males would show more perfectionist tendencies in sports. In a study by Gözmen and Aşçı (2016) examining the role of perfectionism and personality traits in predicting optimal performance, no significant difference in the perfectionism levels of female and male athletes was observed. Similar

perfectionism scores were reported for male and female athletes by Gotwals, Dunn, and Wayment (2003), who evaluated college athletes, and by Mouratidis and Michou (2011) in their study with young athletes. Anshel et al. (2009) emphasized that women and men engaged in similar levels of self-criticism.

The present study also found that mental toughness scores did not differ with respect to gender and that both female and male athletes show similar characteristics when faced with challenges. Both male and female athletes who have reached a certain level have similarly focused thinking in coping with unexpected environmental conditions and physical and/or psychological fatigue. In situations where failure occurs, they also employ similar coping methods and mental strategies, share similar training and competition conditions, and exhibit comparable levels of mental toughness. Hammer (2012) explained the lack of any significant difference between the mental toughness scores of male and female athletes by their sharing similar athletic experiences. In studies by Crust (2009), Maraşlı (2018), and Dede (2019), no statistically significant difference was found in the mental toughness subscales in terms of gender. However, there have been studies reporting significant differences in mental toughness with regard to gender. For example, studies conducted by Masum (2014), Akilveren (2017), Orhan (2018), and Juan and Lopez (2015) all found that mental toughness scores differed according to gender, with the male athletes scoring higher. Conversely, Harmancı (2019), in his study on cyclists, reported that although no significant difference in terms of gender was observed for the confidence and constancy subscales of mental toughness, there was a significant difference in the control subscale in favor of men.

In this study, the perfectionism and mental endurance scores of the athletes were also compared on the basis of national status, i.e., whether one competed at the international level as a member of the Turkish national team or not. Among the participants' mean scores on the perfectionism subscales, there was a significant difference in personal standards with respect to national status, with athletes on the national team scoring higher (see Table 4). According to these findings, even when they achieve success, athletes at this level continue to strive and maintain high standards in order to be the best. Eravşar (2019) reported that the personal standards of athletes on the national team were higher than those of professional and amateur athletes.

Another finding obtained in the study was a statistically significant difference in favor of athletes on the national team (who compete at the international level) in the control subscale of mental toughness in sports (see Table 4). Based on this result, high-level athletes who have attained success at the international level are able to maintain their calm in the face of failure or unexpected problems and can achieve greater emotional and behavioral

control. This finding suggests that in order to protect the position they have attained and create a positive image, national athletes will approach sporting events in a more controlled manner, are more likely to perceive results as being under their control, and are able to maintain their mental toughness due to increased expectations and responsibilities. A review of the relevant literature revealed numerous studies whose results aligned with our findings. Akilveren (2017) found a significant difference in the constancy and confidence subscales of mental toughness with respect to national status but reported no significant difference in the control subscale. In a study by Wieser and Thiel (2014), the mental toughness levels of non-national athletes were lower than those of athletes on the national team. The studies of Golby and Sheard (2004), comparing rugby players competing at the international level to those competing at the national level, and Bhardwaj, Singh, and Rathee (2014), comparing elite wrestlers to non-elite wrestlers, revealed that in both cases the former were mentally tougher than the latter.

The primary objective of this study was to determine the relationship between perfectionism and mental toughness in athletes. The results of the Pearson correlation analysis and canonical correlation analysis performed for this purpose revealed a significant relationship between perfectionism and mental toughness (see Tables 8, 9, and 10). Consistent with the literature, a negative significant relationship was found between the perfectionism subscale of excessive concern over mistakes and the control and constancy subscales of mental toughness, as well as between perceived family pressure and control, subscales of perfectionism and mental toughness, respectively. In addition, there was a positive significant relationship between the personal standards subscale of perfectionism and confidence and constancy subscales of mental toughness. These findings indicate that the negative aspects of perfectionism (i.e., excessive concern over mistakes and perceived family pressure) negatively affect mental toughness, whereas positive perfectionist tendencies (i.e., personal standards) enhance mental toughness. Cowden et al. (2019) investigated the mediating role of mental toughness in the relationship between perfectionism and motivation in sports, concluding that in competitive sports, mental toughness is a psychological structure associated with success, and that athletes with high personal standards of perfectionism can maintain their motivation by improving their mental toughness. Madigan and Nicholls (2017) found that mental toughness correlated negatively with burnout and that mentally tough athletes were less likely to experience a decreased sense of accomplishment and emotional exhaustion. Kurtulgel et al. (2018) reported similar results, finding that the control and constancy subscales of mental toughness showed a significant negative relationship with burnout and that athletes with high levels of mental toughness experienced less emotional exhaustion and a less diminished sense of accomplishment. In a study by Cadenas et al. (2016), a strong positive relationship was observed between striving for perfection and

mental toughness, while a negative relationship was found between perfectionist anxieties and mental toughness. Fawver et al. (2020) in their study conducted with alpine skiers found that those who strove for perfection (i.e., skiers with high personal standards) devoted more time to individual work, resulting in better performance, whereas those who experienced intense family pressure exhibited low levels of mental toughness.

In this study, athletes who were observed to exhibit excessive concern over their mistakes could not maintain their coolness under pressure and when faced with the unexpected (reflected in low control scores), nor were they able to continue striving to attain the goals they had set (reflected in low continuity scores). Furthermore, athletes who perceived intense pressure from their families exhibited the same tendencies, losing control under pressure and failing to maintain their composure in the face of unexpected situations. However, athletes with high personal standards were similarly found to have high levels of self-confidence, believing in their ability to achieve their individual goals and thus able

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