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AN INVESTIGATION OF THE RELATIONSHIP BETWEEN THE REACTION TIMES AND THE STATE AND TRAIT ANXIETY LEVELS OF THE ATHLETES

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Abstract:
Besides supposing that the anxiety levels of the athletes have an impact on their performance it is also important to know the level of this impact. In this study it was aimed to investigate the relationship between the anxiety level and the sporting performance especially the reaction time which is the determinant of the speed requiring sudden movements. The study included 60 university students who participated voluntarily, were actively engaged in sports and were living in Esenyurt district of Istanbul. The average age of the participants was 20,68±2,33, their average height was 179,05±6,43cm, their average body weight was 75,55±9,32 kg and their average sport age was 6,31±3,23years. The State and Trait Anxiety Inventory (STAI) was used in the study in order to determinate and measure the state and trait anxiety levels of participants. The State and Trait Anxiety Inventory (STAI) was developed by Spielberger and his colleagues in 1970 and its reliability and validity study was carried out by Öner and La Compte by translating it into Turkish in 1983. The analyses of the obtained data were carried out with the SPSS Statistic 17.0 package program. The measurement results were given as mean (x) and as standard deviation (SD). Correlation and regression analysis were applied for the statistical evaluation of the

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data. In the conducted study the state anxiety level of the athletes was detected to be 29,62±4,46 points, their trait anxiety level was 32,12±6,39 while their double hand reaction time was found to be 0,23±0,02 sec. A positive low level relationship was detected between the trait anxiety levels and the double hand reaction times of the athletes (r=,279,p<,05) while a positive and moderate level relationship was observed between the state anxiety level and the state anxiety level (r=,311, p<,016). Due to the fact that this research is a preliminary study done in the field of sport science, this study is considered to contribute to other studies planned to be done in the future. As a result, it was detected that with the increase in the anxiety level the response time given to an effect from any external factors lengthened. The fact that there was a low level positive relationship with the trait anxiety level revealed the conclusion that with the increase in the trait anxiety level, the reaction time also increases.

Keywords: sport, state anxiety, traıt anxıety, reaction time

1. Introduction

Today, sport has entered the process of globalization and professionalization by going beyond the amateur spirit and the phenomenon of winning and losing as it was during the emergence process. As a result, the rules of the game, the expectations of the fans, the club organizations and the popularity of the branch and the athlete must be at the highest level. This forces the athlete to be always at the highest level in terms of performance.

The excellence of physical capacity seems not to be enough alone to bring the sporting performance to the maximum level. It can be said that the psychological capacity of the athlete is as important as the physical performance. It can be explained with the reason that some of the athletes who feel emotional differences cannot reach the intended success despite the fact that their physical conditions are sufficient (Tavacıoğlu, 1999, Erkan, 1998, Akarçeşme, 2004).

Since it works in this way, sport brought some burdens to the athletes psychologically and it has become a necessity to consider the athletes as psycho-social entities from a scientific point of view (Gümüş, 2002).

Sport scientists are in an intense effort to improve the sporting performance. The search for how to lead the athlete to high performance is continuing by investigating the new training principles. The psychological preparation of the athletes is an important factor for the success. The psychological state and the exhibited performance

of the athletes are closely related to their level of anxiety (Akarçeşme C, 2004, Karabulute et al. 2013).

The athlete knows that when he loses a competition he will lose in terms of his economical state and reputation. As a result, the athlete is forced to exhibit his performance by experiencing anxiety and stress every time when he participates at a competition (Akarçeşme C., 2004).

When considering that besides the physical and physiological capacities, many of the top athletes have excellent capabilities in terms of psychological capacities such as staying motivated, managing the anxiety, coping with competition stress, concentrating and determining the goals, it is revealed that the psychological dimension should not be neglected in order to increase the sporting performance (Koç H, 2004).

State anxiety affects the motivation, concentration, coordination, decision making ability, self-confidence, conditional and coordinative skills that may be determinative in terms of the athlete's performance. Physical changes such as sweating, yellowing, flushing and shaking that emerge as a result of a physiological arousal in the autonomic nervous system are the signs of tension and anxiety of the individual. When the stress is intense there is an increase in the level of state anxiety which reduces when the stress is eliminated (Başaran MH. 2008, Öner N. 1994). Trait anxiety can be defined as perceiving the stressor as dangerous or threatening, increasing the frequency and intensity of the state emotional reactions against these threats and gaining continuity (Özgüven, 1994). State anxiety which has a neuromuscular organization such as the reaction time and the heart rate which is increasing or decreasing due to the stress and anxiety situations included during the sportive performance and due to the hormonal changes which emerge due to the loading has an important place in many sport branches (Kolayiş and Mimaroğlu, 2008).

Reaction time which is one of the determinants of modern sporting performance is related to the athlete's ability to make quick decisions under the pressure of space, time and competition (Konter, 1997). The reaction time is defined as the time between the start of the stimulus and the time at which the reaction begins (Gucstein 1972, Tamer 2000). In other words, reaction time can be explained as the time spent on the afferent nerve pathways after the stimulus, the time of perception and reaction decision and the realization of the motor reaction (Schmidt 1991, Schmidt 1998).

In sport, it is stated that the level of anxiety has an impact on the performance of the athlete. In this study, it was aimed to investigate the relationship in the sporting performance between the anxiety level and the reaction time which is a determinant of the speed requiring sudden movements.

2. Material and Methods

The study included 60 university students who participated voluntarily, were actively engaged in sports and were living in Esenyurt district of Istanbul. The average age of the participants was 20,68±2,33, their average height was 179,05±6,43cm, their weight was 75,55±9,32 kg and their average sport age was 6,31±3,23years. The ages of the participants were determined by taking their identity information into account. The height of the participants was measured with a Height Gauge (F. Bosch FB-200) in cm while their body weights (T-shirt, short) were measured with an electronic scale (Sinbo) and were recorded in kg. The Nelson Reaction Scale was used to measure the reaction time of the participants.

State and Trait Anxiety Inventory (STAI) developed by Spielberger et al (1970) was used to determine the state and trait anxiety levels of the students participating in the study. The scale's translation to Turkish and its reliability and validity studies were carried out by Öner and Le Compte (1983). The State Anxiety Scale included ten reversed expressions. These were the item 1, 2, 5, 8, 10, 11, 15, 16, 19 and 20. The Trait Anxiety Scale included 7 reversed expressions (item 21, 26, 27, 30, 33, 36 and 39). The total score of the direct and reversed expressions was calculated. The total point obtained from the reversed expressions was subtracted from the total point of the direct expressions. A predetermined stationary value was added to this number. This value was determined as 50 for the State Anxiety Inventory and as 35 for the Trait Anxiety Inventory. The finally obtained value was the anxiety score of the individual (Civan et al., 2012).

The Nelson Moving Speed Test (NMST) and the double –hand reaction time (DHRT) were measured after the state and trait anxiety levels of the participants were determined. For the Nelson Moving Speed Test, the participant was sitting on a chair while his fingers were resting on the edge of the table. The little fingers were placed on the table 30 cm apart from each other while the palms were facing each other. A ruler was held by the test manager in the middle of the two hands and it was released after the concentration of the participant was ensured. The participant caught the ruler between his hands at the highest possible speed. Five measurements were taken, the best and worst values were excluded and the average of three measurements was recorded as the falling distance of the ruler.

The reaction times of the participants were determined by calculating the value obtained from the ruler with the form given below.

Reaction Time = √ 2 x the falling distance of the ruler / Acceleration due to gravity
Reaction Time = √ 2 x Distance in cm / 980 m sec (Koç et al., 2011).

The analysis of the data was carried out with the SPSS Statistic 17.0 package program. The measurement results were given as mean (X) and standard deviation (SD). Correlation and regression analysis were applied for the statistical evaluation of the data.

4. Results

Table 1: Demographic Characteristic of the Participants

	N	Min	Max	X± Sd
Age(year)	60	17,00	28,00	20,68±2,33
Height(cm)	60	166,00	193,00	179,05±6,43
Body Weight(kg)	60	60,00	110,00	75,55±9,32
Sport Age(year)	60	2,00	15,00	6,31±3,23

When examining Table 1 it can be seen that the age of the athletes participating in the study was detected as 20,68±2,33 years, their heights were detected as 179,05±6,43 cm, their body weights as 75,55±9,32 kg while their sport ages were detected as 6,31±3,23 years.

Table 2: The State and Trait Anxiety Levels of the Participants and the Averages of the Double Hand Reaction Time

	N	Min	Max	X± Sd
State Anxiety Levels	60	20,00	40,00	29,62±4,46
Trait Anxiety Levels	60	22,00	51,00	32,12±6,39
Double Hand Reaction Time (sec)	60	,19	,27	0,23±0,02

When examining Table 2, it can be seen that the state anxiety level of the athletes was observed as 29,62±4,46 points, their trait anxiety level was detected as 32,12±6,39 points while the double hand reaction time was observed as 0,23±0,02 sec.

When examining Table 3, it can be seen that a positive low level relationship was detected between the trait anxiety levels and the double hand reaction times of the athletes (r=, 279, p<,05) while a positive moderate level relationship was observed between the trait anxiety level and the state anxiety level (r=, 311,p<,016).

Table 3: The Relationship among the Trait Anxiety, State Anxiety and Double Hand Reaction Time

		1	2	3
Trait Anxiety Level	r	1		
	p	-		
State Anxiety Level	r	,311*	1	
	p	,016	-	
Double Hand Reaction Time	r	,279*	,169	1
	p	,031	,197	-

Table 4: Regression Analysis for the Prediction of the Double Hand Reaction Time

	β	t	P	R	R^2	F	p
Constant				,175	,0306	2,651	,014
Trait Anxiety Level	-,091	-,685	,006				
State Anxiety Level	-,250	-1,876	,027				

When examining Table 4, it can be seen that there was a significant relationship among the state anxiety, trait anxiety and the double hand reaction time. It can be seen that the trait anxiety level and the state anxiety level were the predictor of the double hand reaction time and explained 30% of the total variance.

5. Discussion

The performance of the athletes is affected by the physical competence as well as by the psychological level. The duration of the reaction given especially to sudden movement or to speed requiring situation is very important.

In situations when stress is intense, an increase can be observed in the level of state anxiety while when this stress is eliminated the state anxiety level seems to decrease (Öner, 1994). This leads to the conclusion that the higher level of anxiety may restrict the focus therefore it can create a negative impact on the performance.

The state anxiety affects the motivation, concentration, coordination, decision making ability, self –confidence, conditioning and coordination skills that can be determinative on the performance which will be put forth by the athlete (Başaran, 2008). The anxiety felt as a result of supposing that the self-values are threatened or as a result of interpreting the situation in which the individual is in as a stressor can be expressed as trait anxiety (Özbaydar, 1983).

In this study which intended to investigate the relationship between the anxiety level and the reaction time which is a determinant of the speed requiring sudden movement, the state anxiety score was detected as 29,62±4,46 while the trait anxiety

score was 32,12±6,39. A positive low level relationship was detected between the trait anxiety level and the double hand reaction time of the athletes (r=,279, p<,05) while a positive moderate level relationship was detected between the state anxiety level and the trait anxiety level (r=,311, p<,016). In addition, there was also a meaningful relationship among the state anxiety, trait anxiety and the double hand reaction time. It is seen that the trait anxiety level and the state anxiety level were the predictor of the double hand reaction time and explained 30% of the total variance. During the literature review no other studies were found that intended to find a relationship among the trait anxiety level, state anxiety level and the reaction time. Although this fact increases the importance of our study, it also limits the discussion section.

In a research conducted by Civan et al. in 2010 in which the state anxiety and the trait anxiety levels of 131 athletes playing individual and team sports were measured before and after competition, the average state anxiety scores were found to be 37.732± 0.890 in the individual sports group, 36.136±0.868 in the racket sports group while in the team sports (soccer, basketball and handball) it was found to be 33.092±0.735. The trait anxiety scores were detected as 35.096±0.789, 36.844±0.770 and 37.382±0.652 respectively in the individual, racket and team sports groups. In another study conducted by Başaran et al.in 2009 on 192 male athletes which aimed to examine the state and trait anxiety levels of the athletes according to some variables, the state anxiety score was detected as 39,80±5,74 while the trait anxiety score was found to be 37,06±8,00. When these results are examined, it can be seen that the participants' anxiety scores were higher compared to the results which were obtained from our study. This difference can be expressed as the result of the measured athletes' social situation and as a result of the pressure generated by the difference among their levels of proficiency.

In the conducted study, the double hand reaction time of the athletes was found to be 0,23±0,02. When we have a look at the literature, it can be seen that in a study conducted by Menevşe in 2011 which intended to examine the effect of massage on the reaction times of 34 handball players, the double hand reaction time before the massage was detected to be 0,25±0,021 sec while the same double hand reaction time was found to be 0,226±0,027 sec after the massage. These results are parallel to our study. In another study conducted by Koç et al. on 30 people which aimed to examine the effect of massage on the reaction time, the double hand reaction time before the massage was found to be 0,32±0,03 sec while after the massage it was detected as 0,30±0,04. The results of this study seem to be at a lower level compared to our study. This difference is thought to be due to the differences in the proficiency levels of the athletes.

6. Conclusion

A positive low level relationship was detected between the trait anxiety level and the double hand reaction time of the athletes (r=,279, p<,05) while a positive moderate level relationship was detected between the state anxiety level and the trait anxiety level (r=,311, p<,016). In addition, there was also a meaningful relationship among the state anxiety, trait anxiety and the double hand reaction time. It is seen that the trait anxiety level and the state anxiety level were the predictor of the double hand reaction time and explained 30% of the total variance. It is thought, that the level of sporting performance depends not only on the physical characteristics but also on the level of motivation. It can be said that focusing which is one of the basic criteria of motivation is also affected by the state and trait anxiety. In the conducted study, the positive, moderate level relationship among the state and trait anxiety and the reaction time confirms the effect of the state and trait anxiety levels on the reaction time. As the level of anxiety increases, the duration of the given reaction also increases due to the effect caused by the anxiety. The positive low level relationship with the trait anxiety level which was detected in our study reveals the conclusion that with the increase in the trait anxiety level, the reaction time also increases.

Due to the fact that this research is a preliminary study done in this field, it is believed that it can contribute to other studies planned to be done in the future. The future studies which will intend to find a relationship among the state and trait anxiety levels and the reaction times in different branches and the investigation of the found relationships will contribute to the science.

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