



Investigation the Relationship between Athletes' Performances Levels with the Personality Features and the Status of Lateralization

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ABSTRACT The aim of this research was to investigate the relationship between athletes' performance levels with the personality features and the status of lateralization. A total of 492 athletes participated voluntarily in the research. Hand and foot preference of the athletes was assessed by the Oldfield's questionnaire. Also, the personality features of the individuals and the team athletes were determined by the Temperament and Character Inventory. The results showed that left-handers comprised about 13.8 percent of the athletes, while right-handers comprised about 83.5 percent of the athletes. Statistically significant differences were found in harm avoidance subscale of temperament, self-transcendence subscale of characters, harm avoidance subscale of temperament and cooperativeness subscale of character. It was also determined that the success ratio of the athletes statistically depends on the lateralization and branches of the athletes. Also, the successful male athletes had significantly lower scores for harm avoidance subscale while the female athletes had significantly higher scores for cooperativeness subscale.

INTRODUCTION

Personality is physical, intellectual and the emotional features manifesting themselves in different environments, distinguishing humans from each other, including him and his surroundings perspectives, and also including the relationship levels and responses established with them. In other words, personality has to do with individual differences among the people in behavior patterns, cognition and emotion (Mischel et al. 2004). There are many components such as temperament, character etc. that determine the personality. Temperament, stable a lifetime, is defined as individual differences in pre-conceptual emotional reactions (Jaksic et al. 2015), assessed in terms of characteristic patterns and/or averages of the states of pleasure, arousal, and dominance across the representative life situations (Mehrabian 1996). Character is a value given to people's physical, emotional, and mental activity by the environment (Koknel 1997).

There are many researches which investigated that sport plays an important role in the per-

sonality development and socializing of individuals (Tasmektepligil and Imamoglu 1996; Carlstedt 2001; Pehlivan and Ada 2011; Tazegul 2014; Weinberg and Gould 2014). In this process, individual chooses a sport branch that is appropriate to his personality traits. And then, personality is reformed according to the dynamics of the sport branch. On the other hand, changing the values or today's lifestyle closely affects his sporting behavior. In particular, factors such as independence and personal development increase the individualization trend in sports (Tasmektepligil and Bostanci 2000). For this reason, it can be said strongly that there is a relationship between sports and personality. According to the hypotheses of "socialization" and "selectivity" of Bierhoff-Alfermann (1986), it can be claimed that personality affects the success in sports as well as selecting the sport branch. Success can be simply defined as overcoming difficulties, the desire for progress and development and to achieve the desired results.

In this context, everyone tends to refrain from a disturbing situation himself, while he tends to a satisfying and soothing situation himself (Soyer et al. 2010). Success is also defined as a performance in each expected impact (Ratinho and Henriques 2010). Achievement motivation is one of the most important factors that bring the success. Achievement motivation is expressed as

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striving to achieve the task, proceeding against failure and one's orientation for pride about the success (Gill 1986). Individuals who are low on their success needs prefer easier tasks while they who have high success needs prefer moderately challenging tasks (Wann 1997). As the name suggests, success is a very important factor in the sustainable life of sports.

Laterality is defined as a behavioral manifestation of dominance resulting in a preferential use and superior functioning of either the left or the right side (Puterman et al. 2010). The relationship between the levels of athletes' performance and their lateralization has been a topic worth investigating at the present time.

To the knowledge of the researcher, it is found that there are very few researches determining the relationship among the success, the personality and the status of the lateralization of the athletes (Carlstedt 2001).

Purpose of the Study

The objectives of this study were threefold: firstly, to determine the status of the lateralization of the athletes, secondly, to determine the differences among the personality features for gender, branch, success and the status of the lateralization of the athletes, thirdly to determine the relationship between the success and the status of the lateralization of the athletes.

METHODOLOGY

Participants

A total of 492 randomly selected athletes (351 male and 141 female) from three different departments (Departments of Sport Management, Physical Education and Sports, Coach Training) at the Yasar Dogu Sports Sciences Faculty of Ondokuz Mayıs University, who regularly sport at least for the last five years, participated voluntarily.

Data Collection Tools

In this study, two measurement tools (Oldfield's Questionnaire and Cloninger's Temperament and Character Inventory) were used. The hand and foot preference of the athletes was assessed by the Oldfield's questionnaire including the original items proposed by Oldfield (1971) and modified by Geschwind and Behan (1982).

The questions in the questionnaire pertained to which hand was used by the subject for writing, throwing, scissors, toothbrush, knife (without fork), spoon, holding the handle of a shovel, striking a match, and twisting off the lid of a jar. The columns "always right," "usually right," "either hand," "usually left," and "always left" were scored as +10, +5, -5, and -10, respectively. Following the suggestion of Geschwind (personal communication), the laterality score was taken as the sum of all scores, and no quotient was calculated. In the memory of Norman Geschwind, this laterality score was called as Geschwind score. A score (Geschwind score: GS) of -100 indicated that the subject responded "always left." And a score of +100 indicated "always right" on all the items. Hand preference was arbitrarily divided into four subclasses for convenience in the data analysis: strong right-handers (GSs from 80 to 100), weak right-handers (GSs from 20 to 75), mixed handers (GSs from -15 to +15), weak left-handers (GSs from -20 to -75), and strong left-handers (GSs from -80 to -100). Temperament and Character Inventory (TCI) developed by Cloninger et al. (1994) consists of 7 main scales (novelty seeking (NS); harm avoidance (HA); reward dependence (RD); persistence (P), self-directedness (SD); cooperativeness (C), self-transcendence (ST)) and 25 subscales. NS consisting of the four subscales: Exploratory excitability, impulsiveness, extravagance and disorderliness is a personality trait associated with the exploratory activity in response to the novel stimulation, impulsive decision making, extravagance in approach to reward cues, and quick loss of temper and avoidance of frustration (Cloninger et al. 1993). HA consisting of the four subscales: Anticipatory worry, fear of uncertainty, shyness with strangers, fatigability and asthenia is a personality trait characterized by excessive worrying; pessimism; shyness; and being fearful, doubtful, and easily fatigued (Gardini et al. 2009). RD consisting of the three subscales: Sentimentality, attachment and dependence on approval by others is characterized as a tendency to respond markedly to signals of reward, particularly to the verbal signals of social approval, social support, and sentiment (Millon et al. 2003), and learning to maintain and pursue behaviors which were previously associated with such rewards (Richter and Neumann 2011). Persistence refers to perseverance in spite of the fatigue or the frustration (Cloninger et al. 1993). SD is the main pre-

dictive element of the presence of personality disorder. SD is a multifaceted, higher order character trait consisting of the following five lower order traits: Responsibility, purposefulness, resourcefulness, self-acceptance, congruent second nature. Cooperativeness is a multifaceted higher order character trait that consists of the following five aspects or the lower order traits: Social acceptance, empathy, helpfulness, compassion, integrated conscience. ST is a multifaceted higher order trait with following aspects or the lower order traits: Creative self-forgetfulness, transpersonal identification, spiritual acceptance (Kose 2003). TCI is a self-evaluation questionnaire by which subjects are asked to answer by “true” or “false” to 240 statements depending on their own interests, emotional reactions, attitudes, aim and values. “True” answers were coded as 0; “false” answers as 1. The Turkish-TCI has been validated by Kose et al. (2004). After establishing semantic equivalence of the TCI items, the content equivalence of all the items was examined; and no items were excluded as being irrelevant to the Turkish culture. The final version of the Turkish TCI was verified and approved by Cloninger (Con et al. 2013).

Applications

The data were obtained at the Ondokuz Mayıs University, Yasar Dogu Faculty of Sports Sciences.

Statistical Analysis

The data were firstly analyzed using Levene’s test and the Shapiro-Wilk test for equality of variance and for normality assumption, respectively ($p > 0.05$). According to this test results, data based on the personality features (including temperament and characters features) of the athletes were expressed as a sample size, mean with standard deviation, minimum and maximum values. Secondly the differences between the answers to the questions in terms of the gender, branch and success of the athletes were analyzed by using Student t-test. The differences between the answers to the questions in terms of the status of the lateralization were analyzed by using one-way ANOVA and the Tukey test. Finally, chi-square analysis was applied to analyze whether or not the success of the athletes statistically depends on the gender, branch and status of the lateralization of the athletes. If

the p-value is under 0.05, results are considered statistically significant. All the statistical calculations were made with SPSS 11.0 V. statistical package program (SPSS 2002).

Ethical Considerations

Before the study, the required ethics committee approval by Ondokuz Mayıs University (2015/456) and a written permission by Yasar Dogu Faculty of Sports Sciences were obtained. The aim of this study was explained to the students during the data collection phase.

RESULTS

The distributions of the social-demographic characteristics of the athletes were given as a sample size (n) and a percentage in Table 1. It was seen that left-handers (weak and strong) comprised about 13.8 percent of the athletes, while right-handers (weak and strong) comprised about 83.5 percent of the athletes. The proportion of the mixed handers athletes’ (2.6%) was very low compared with others.

Table 1: Social-demographic characteristics of the athletes

<i>Traits</i>	<i>n</i>	<i>%</i>
<i>Gender</i>		
Male	351	71.3
Female	141	28.7
<i>Branch</i>		
Team	303	61.6
Individual	189	38.4
<i>Lateralization</i>		
Strong right-handers (SRH)	158	32.1
Weak right-handers (WRH)	253	51.4
Mixed-handers (MH)	13	2.6
Weak left-handers (WLH)	23	4.7
Strong left-handers (SLH)	45	9.1

Differences among the personality features (temperament and characters) according to the lateralization of athletes were given in Table 2. In this research, statistically significant difference for harm avoidance subscale of temperament among the lateralization of athletes was found.

Differences among the personality features (temperament and characters) according to the branches of the athletes were given in Table 3. In this research, statistically significant difference for self-transcendence (ST) subscale of characters between the branches of athletes was found.

Table 2: Personality features (temperament and characters) for the lateralization of athletes

<i>Personality features</i>	<i>Lateralization</i>	<i>n</i>	<i>Mean</i>	<i>Std. deviation</i>	<i>Minimum</i>	<i>Maximum</i>	<i>P-values</i>
NS	SRH	158	18.85	4.48	7.00	30.00	0.653
	WRH	253	19.49	4.65	8.00	34.00	
	MH	13	19.08	3.20	14.00	22.00	
	WLH	23	18.74	4.20	13.00	29.00	
	SLH	45	18.84	4.94	9.00	32.00	
	Total	492	19.18	4.57	7.00	34.00	
HA	SRH	158	15.42a	5.35	2.00	30.00	0.050
	WRH	253	14.41ab	5.74	3.00	30.00	
	MH	13	12.23b	5.61	3.00	23.00	
	WLH	23	13.09ab	5.13	4.00	23.00	
	SLH	45	15.71a	4.57	7.00	26.00	
	Total	492	14.73	5.52	2.00	30.00	
RD	SRH	158	13.95	3.08	4.00	21.00	0.451
	WRH	253	13.87	3.16	3.00	21.00	
	MH	13	12.69	3.64	8.00	19.00	
	WLH	23	14.35	2.57	10.00	18.00	
	SLH	45	14.38	2.14	10.00	20.00	
	Total	492	13.93	3.04	3.00	21.00	
P	SRH	158	5.52	1.75	1.00	8.00	0.192
	WRH	253	5.62	1.83	0.00	8.00	
	MH	13	5.62	2.06	2.00	8.00	
	WLH	23	6.22	1.76	2.00	8.00	
	SLH	45	6.11	1.70	2.00	8.00	
	Total	492	5.66	1.80	0.00	8.00	
SD	SRH	158	26.44	6.09	9.00	40.00	0.555
	WRH	253	26.88	5.66	13.00	42.00	
	MH	13	26.92	6.56	16.00	34.00	
	WLH	23	28.70	6.34	16.00	42.00	
	SLH	45	26.58	6.63	14.00	38.00	
	Total	492	26.80	5.94	9.00	42.00	
C	SRH	158	27.69	5.85	12.00	38.00	0.726
	WRH	252	28.08	5.93	11.00	41.00	
	MH	13	27.77	6.78	14.00	37.00	
	WLH	23	29.30	5.31	19.00	37.00	
	SLH	45	27.44	4.92	20.00	37.00	
	Total	491	27.95	5.80	11.00	41.00	
ST	SRH	158	21.58	4.75	6.00	32.00	0.472
	WRH	253	21.83	4.86	9.00	31.00	
	MH	13	23.08	4.84	16.00	31.00	
	WLH	23	22.13	4.27	15.00	30.00	
	SLH	45	22.87	3.99	15.00	30.00	
	Total	492	21.89	4.72	6.00	32.00	

NS: Novelty Seeking; HA: Harm Avoidance; RD: Reward Dependence; P: Persistence, SD: Self-Directedness; C: Cooperativeness, ST: Self-Transcendence, SRH: Strong right-handers; WRH: Weak right-handers; MH: Mixed-handers; WLH: Weak left-handers; SLH: Strong left-handers;^{a,b}Different letters within the column indicate significantly different means at $P < 0.05$.

Differences among the personality features (temperament and characters) according to the gender of athletes were given in Table 4. In this research, statistically significant difference for both harm avoidance (HA) subscale of temperament and cooperativeness (C) subscale of character between the genders of athletes was found.

Differences among the personality features (temperament and characters) according to the

success of athletes were given in Table 5. In this research, it was only found statistically significant difference for the harm avoidance (HA) subscale of temperament between the athletes' success was found.

The results of the Chi-square analyses showed that the success ratio of the athletes statistically depends on the lateralization and the branches of the athletes (Tables 6 and 7). Suc-

Table 3: Personality features (temperament and characters) for the team or individual athletes

<i>Personality features</i>	<i>Lateralization</i>	<i>n</i>	<i>Mean</i>	<i>Std. deviation</i>	<i>Minimum</i>	<i>Maximum</i>	<i>P-values</i>
NS	Team	303	19.24	4.62	8.00	30.00	0.707
	Individual	189	19.08	4.49	7.00	34.00	
	Total	492	19.18	4.57	7.00	34.00	
HA	Team	303	14.89	5.48	2.00	30.00	0.418
	Individual	189	14.48	5.58	3.00	28.00	
	Total	492	14.73	5.52	2.00	30.00	
RD	Team	303	14.01	3.16	3.00	21.00	0.485
	Individual	189	13.81	2.84	6.00	21.00	
	Total	492	13.93	3.04	3.00	21.00	
P	Team	303	5.56	1.88	0.00	8.00	0.102
	Individual	189	5.83	1.66	1.00	8.00	
	Total	492	5.66	1.80	0.00	8.00	
SD	Team	303	27.05	6.08	9.00	42.00	0.243
	Individual	189	26.40	5.70	13.00	40.00	
	Total	492	26.80	5.94	9.00	42.00	
C	Team	302	27.78	6.05	11.00	41.00	0.415
	Individual	189	28.22	5.39	14.00	38.00	
	Total	491	27.95	5.80	11.00	41.00	
ST	Team	303	21.51	4.75	6.00	31.00	0.023
	Individual	189	22.50	4.62	9.00	32.00	
	Total	492	21.89	4.72	6.00	32.00	

NS: Novelty Seeking; HA: Harm Avoidance; RD: Reward Dependence; P: Persistence, SD: Self-directedness; C: Cooperativeness, ST: Self-transcendence

Table 4: Personality features (temperament and characters) for the gender of the athletes

<i>Personality features</i>	<i>Lateralization</i>	<i>n</i>	<i>Mean</i>	<i>Std. deviation</i>	<i>Minimum</i>	<i>Maximum</i>	<i>P-values</i>
NS	Male	351	19.13	4.60	9.00	34.00	0.691
	Female	141	19.31	4.50	7.00	30.00	
	Total	492	19.18	4.57	7.00	34.00	
HA	Male	351	14.32	5.29	2.00	30.00	0.010
	Female	141	15.74	5.94	4.00	29.00	
	Total	492	14.73	5.52	2.00	30.00	
RD	Male	351	13.88	2.99	4.00	21.00	0.539
	Female	141	14.06	3.17	3.00	21.00	
	Total	492	13.93	3.04	3.00	21.00	
P	Male	351	5.58	1.78	0.00	8.00	0.114
	Female	141	5.87	1.84	1.00	8.00	
	Total	492	5.66	1.80	0.00	8.00	
SD	Male	351	26.65	6.02	13.00	42.00	0.380
	Female	141	27.17	5.75	9.00	40.00	
	Total	492	26.80	5.94	9.00	42.00	
C	Male	350	27.61	5.72	11.00	41.00	0.042
	Female	141	28.79	5.93	12.00	38.00	
	Total	491	27.95	5.80	11.00	41.00	
ST	Male	351	21.75	4.68	6.00	32.00	0.297
	Female	141	22.24	4.83	9.00	31.00	
	Total	492	21.89	4.72	6.00	32.00	

NS: Novelty Seeking; HA: Harm Avoidance; RD: Reward Dependence; P: Persistence, SD: Self-directedness; C: Cooperativeness, ST: Self-transcendence

cess was found significantly increased in strong right-handed athletes compared to in strong left-handed athletes. In the other words, it was seen that 33.6 percent of SRH samples were success-

ful while 7.2 of SLH samples were successful (Table 6). On the other hand, success was found significantly increased in the individual athletes compared to in the team athletes (Table 7). No

Table 5: Personality features (temperament and characters) for the success of the athletes

<i>Personality features</i>	<i>Lateralization</i>	<i>n</i>	<i>Mean</i>	<i>Std. deviation</i>	<i>Minimum</i>	<i>Maximum</i>	<i>P-values</i>
NS	Yes	387	19.18	4.47	7.00	34.00	0.946
	No	105	19.21	4.92	8.00	30.00	
	Total	492	19.18	4.57	7.00	34.00	
HA	Yes	387	14.40	5.29	2.00	30.00	0.011
	No	105	15.94	6.17	3.00	30.00	
	Total	492	14.73	5.52	2.00	30.00	
RD	Yes	387	13.96	2.90	4.00	21.00	0.645
	No	105	13.81	3.51	3.00	21.00	
	Total	492	13.93	3.04	3.00	21.00	
P	Yes	387	5.74	1.76	0.00	8.00	0.062
	No	105	5.37	1.92	0.00	8.00	
	Total	492	5.66	1.80	0.00	8.00	
SD	Yes	387	26.76	5.85	13.00	42.00	0.765
	No	105	26.95	6.28	9.00	42.00	
	Total	492	26.80	5.94	9.00	42.00	
C	Yes	386	28.11	5.85	12.00	41.00	0.244
	No	105	27.36	5.62	11.00	37.00	
	Total	491	27.95	5.80	11.00	41.00	
ST	Yes	387	22.05	4.71	6.00	32.00	0.152
	No	105	21.30	4.76	10.00	31.00	
	Total	492	21.89	4.72	6.00	32.00	

NS: Novelty Seeking; HA: Harm Avoidance; RD: Reward Dependence; P: Persistence; SD: Self-Directedness; C: Cooperativeness, ST: Self-Transcendence

Table 6: The success distributions for the lateralization of the athletes

			Lateralization					
			SRH	WRH	MH	WLH	SLH	Total
Success	Yes	n(%)	130(33.6)	199(51.4)	12(3.1)	18(4.7)	28(7.2)	387(100.0)
	No	n(%)	28(26.7)	54(51.4)	1(1.0)	5(4.8)	17(16.2)	105(100.0)

SRH: Strong right-handers; WRH: Weak right-handers; MH: Mixed-handers; WLH: Weak left-handers; SLH: Strong left-handers; $P=0.042$; $\chi^2=9.920$

Table 7: The success distributions for the branch of the athletes

		<i>Success</i>		<i>Total</i>
		<i>Yes</i>	<i>No</i>	
Branch	Team	n (%)	221 (72.9)	303(100.0)
	Individual	n (%)	166 (87.8)	189(100.0)

$P<0.001$; $\chi^2=15.380$

statistical difference was found between individual and team branches with respect to the lateralization of the athletes (Table 8).

DISCUSSION

Sporting success is known to be associated with the personality. Hence, improving these personality features has a great importance in terms of enhancing the sportive performance

(Con et al. 2013). Moreover, it is thought that there might be differences among the level of the sporting success of the athletes according to laterality. In general, left-handers have a general advantage over the right-handers due to better neuropsychological predispositions (Bisiacchi et al. 1985; Holtzen 2000). Left-handers comprise about 10–13 percent of the general population (Gilbert and Wysocki 1992; Perelle and Ehrman 1994; Raymond et al. 1996). In this study, it was

Table 8: The lateralization distributions for the branches of the athletes

			<i>Lateralization</i>					<i>Total</i>
			<i>SRH</i>	<i>WRH</i>	<i>MH</i>	<i>WLH</i>	<i>SLH</i>	
Branch	Team	n(%)	91(30.0)	160(52.8)	9(3.0)	17(5.6)	26(8.6)	303(100.0)
	Individual	n(%)	67(35.4)	93 (49.2)	4(2.1)	6(3.2)	19(10.1)	189(100.0)

SRH: Strong right-handers; WRH: Weak right-handers; MH: Mixed-handers; WLH: Weak left-handers; SLH: Strong left-handers; $P = 0.488$; $\chi^2 = 3.431$

seen that the proportion of the left-handed athletes' was higher than the left-handed individuals in the population (Table 1).

The results show that the total score for the harm avoidance (HA) of the mixed handlers athletes' is very low compared with the same scores for the SRH and the SLH (Table 2). Individuals low in HA tend to be carefree, relaxed, daring, courageous, composed, and optimistic even in situations that worry most people. Their energy level tends to be high, and they impress others as being dynamic, lively, and vigorous persons (Cloninger et al. 1994; Kose 2003). One of the advantages of low HA is confidence in the face of danger and this situation helps bring success.

It was determined that the total score for the self-transcendence (ST) of the individual athletes' is higher than the same scores for the team athletes' (Table 3). The athletes with high ST score are creative and idealistic (James and Johnson 1983). Contrary to the team athletes, the individual athletes do not share the success or the failure so that the recovery in the face of their failure can be difficult compared with the team athletes'. This result is in agreement with the results presented by Con (2011).

In this research, statistically significant differences between the genders of athletes for both harm avoidance (HA) subscale of temperament and cooperativeness (C) subscale of character were found (Table 4). With regard to gender differences on the HA, the female athletes had significantly higher scores. In terms of sportive performance cycle, the male athletes with low HA score tended to take the risk more than the female athletes. This finding showed that the male athletes were more persistent than the female athletes for high performance. On the other hand, it can be said that the female athletes with high a C score were more emphatic and more cooperative.

With regard to the success differences on the HA, successful athletes had significantly

lower scores on HA (Table 5). This situation indicated that their sporty performance degree was associated with the risk-taking feature.

The actions of left-handed or left-footed players are harder to anticipate than those of the right-handed or right-footed players (example, in tennis: Hagemann 2009; soccer: McMorris and Colenso 1996). Although the idea of a strategic advantage of the lefthanders is obvious to those who engage in interactive sports, empirical evidence, derived from experiments or the analysis of a on-court performance, is limited (Loffing et al. 2009). However, it was determined that the success of athletes indicates a change in favor of the right-handed and of individual athletes in this study (Tables 6 and 7). On the other hand, the success of the mixed handlers has been remarkably high (92%). So the ability to use both the hand and/or foot of the athletes seems to be an important key to success. It was also determined that the distribution of lateralization did not change according to the branches of the athletes (Table 8).

CONCLUSION

The results of this study showed that the lateralization status of the athletes is not different in terms of their personality traits. But, the total score for the self-transcendence of the individual athletes' is significantly higher. On the other hand, the successful male athletes had significantly lower scores for harm avoidance subscale while the female athletes had significantly higher scores for the cooperativeness subscale. These results showed that the male athletes tended to take the risk while the female athletes tended to be cooperative.

RECOMMENDATIONS

In this study, two factors come to the forefront in terms of improving the sportive perfor-

mance. The first of these is more risk of the athletes in the sporting process. Secondly, the success of the mixed handers is high. For this reason, planning can be done to raise the risk taking tendency of the athletes and to improve the ability to use their mixed-hand and/or -foot in sports training.

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