

A Systematic Evaluation of the Game Profile and Performance Data of Turkish Table Tennis Leagues

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Abstract

The aim of this present study was to examine the data on all active Turkish professional table tennis league athletes – their playing styles, the blades and types of rubber they use and their social, demographic and anthropomorphic particulars – and relate these measured parameters to the athletes' ranking points earned during a season. For the study, a data collection method based on measured parameters was designed in order to determine the relationship between the game profile and performance. The study group consisted of athletes of different nationalities in the 96 clubs in the 2014-2015 Turkish table tennis super, premier and minor leagues, 97% of whom participated in the study (n:294). In this study, significant differences in the measured parameters were determined among the leagues and correlations with the ranking data were found for some variables ($P < 0.05$). No significant correlation was observed between the ranking data and the age, height or weight of the players or the types of sports equipment they used, and no significant difference was detected among the leagues ($p > 0.05$). In reference to gender, the results showed that differences were present between the women's and men's leagues. The evaluation profile of all Turkish table tennis leagues in terms of quantity and quality revealed that some of the parameters measured in this work were associated with the ranking score. Determination of the factors that are effective or can be effective in increasing or decreasing this score can be considered useful for the improvement of performance.

Keywords: Turkish Table Tennis, Game Profile, Performance Analysis

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1. Introduction

In order to successfully achieve the necessary tasks to be done, a sports performance can be described as putting forth the whole effort. In a sense, the relatively short time during the competition or match along with factors affecting the outcome of the performance must be seen as a whole and must be evaluated (Bayraktar and Kurtoğlu, 2009). In order to find the effective factors that contribute to the success of a sports performance, the selection and combination of appropriate auxiliary variables is necessary (Castellano et al., 2012). In a number of branches of sport, the performance is influenced to a considerable degree by the equipment used. Table tennis is one of those sports whose effective performance lies in the use of superior quality sports equipment. This equipment is basically a racket consisting of a rubber covering on various types of wooden blades (McAfee, 2009). In table tennis, the rubber covering, as one of the important components of the equipment, is generally divided into four categories: short pimples out, long pimples out, anti-spin and pimples in (inverted or reverse) (Heaton, 2009). The blade generally has a mat appearance with a black rubber covering on one side and red rubber covering on the other. These different types of rubber coverings make it possible to accommodate the different styles of play in table tennis (McAfee, 2009). One of the top table tennis players in the world Timo Boll, has stated that this sport can be difficult to understand for someone who is unaware of the effect of the rubber on the racket face or who has just enough skill to hit the balls (Geske and Mueller, 2010). In table tennis, it has been determined that, in addition to the equipment, the style of gripping the racket can be an important factor in improving performance (Lees, 2003; Pfeiffer et al., 2010; Huang et al., 2010). Two different grips widely used throughout the world are the shake-hands and pen-hold grip styles (Seemiller and Holowchack, 1997). Former Swedish national coach Glenn Östh has reported that the grip style may have a significant impact on a player's technical potentiality (Geske and Mueller, 2010).

In accordance with this information, the aim of this present study was to examine the data on all active Turkish professional table tennis league athletes – their playing styles, the blades and types of rubber they use and their social, demographic and anthropomorphic particulars – and relate these measured parameters to the athletes' ranking points earned during a season. The analysis of sports performance is a perfect way to develop table tennis skills. In order to make changes in the training regime and improve the competition results, coaches and performance analysts have shown a preference for this method in order to develop their own understanding as well as to raise the success level of their teams (Malagoli et al., 2011). In Turkey, analyses of championships and matches are focused mainly on the sport of football (Göral and Saygın, 2012; Sönmeymenmakas, 2008; Alvrdu, 2013; Cerrah and Gürol, 2011). In the literature, no other study covering all the professional leagues of any country has examined the relationship between player profiles and the levels of success achieved.

2. Methods

For the study, a data collection method based on measured parameters was designed in order to determine the relationship between the game profile and performance.

After the necessary permission was obtained, the collection of data from the Federation, from coaches and from athletes was carried out in five different stages throughout the 2014-2015 competition season and was completed by one-on-one interviews with the players during the course of the year.

Study Group: The study group consisted of athletes of different nationalities in the 96 clubs in the 2014-2015 Turkish table tennis super, premier and minor leagues, 97% of whom participated in the study ($n : 294$).

The playing style, grip techniques, rubber and blade types used by the players in the study as well as their social and demographic particulars were determined and the height and weight of the players were recorded. These measured parameters were analyzed together with the total number of matches won and matches lost and the current ranking data taken from the Turkish Table Tennis Federation at the end of the season.

Statistical comparisons were made using the IBM SPSS 19.0 statistical software (SPSS, Inc., Chicago, IL, USA). A descriptive analysis was first carried out. The homogeneity of variances was examined by means of the Shapiro-Wilk Test and an analysis of variance (ANOVA) was then used to determine which variables revealed differences between the three leagues (super, premium and minor). Pearson correlations and chi-square tests were carried out to find out the relationships and correlations between the parameters. Alpha level for significance was $P < 0.05$.

3. Results

In the present study, of all the players in the Turkish leagues during the 2014-2015 season, 98.6% used the shake-hands grip and 95.2% chose rubber with pimples in (reverse) and employed an attack game style and blade (Table 1). Among the leagues, the super leagues most often received salaries, and their incomes were the highest (Table 2). In leagues other than the super leagues, salaries were chiefly associated with the ranking scores (Fig. 1).

No statistical relationship was determined between the ranking score and the parameters of age, height or weight of the players or the rubber and blade types they used; no significant difference was observed among the leagues ($p > 0.05$) (Table 3, ANOVA). Among the male super-league players, a correlation was found between the playing style and the ranking values ($p < 0.05$) (Table 3, Fig. 1). In the men's super league, a correlation was found between the ranking points and the parameter of 'having an occupation other than sports' (Table 3, $p < 0.05$).

Foreign-national players were effective in increasing the ranking scores of the women's super league (Table 3). The number of foreign-national players in the women's and men's leagues was found to be significantly different in the super league (Table 4). In the present study, no widespread effect between player experience and ranking was observed in the leagues (Fig. 1).

Table 1. Professional league player gaming profile with frequency values of relevant parameters

Gender	League	n	Number of Matches	Type of Grip		Forehand Rubber Type		Backhand Rubber Type		Blade Style			Game Style		
				Shake-hands	Pen-hold	Pimple in	Pimple out	Pimple in	Pimple out	Attack	Block	Defense	Attack	Block	Defense
Men	Super	51	1025	49	2	51	0	47	4	49	1	1	47	1	3
	Premier	52	1557	52	0	52	0	47	5	46	4	2	37	8	7
	Minor	44	1305	43	1	43	1	38	6	40	2	2	28	9	7
Women	Super	51	782	51	0	45	6	29	22	40	6	5	45	3	3
	Premier	50	1616	50	0	49	1	37	13	45	2	3	38	6	6
	Minor	46	1459	45	1	40	6	28	18	36	4	6	35	7	4

Table 1 shows the players' number of matches, grip style, dominant gaming style, blade type and rubber used forehand and backhand with relevant frequency values. The majority of players in all Turkish table tennis leagues were seen to prefer the shake-hands grip, reverse rubber (pimples in), and the offensive or attack blade type and game style.

Table 2. Socio-demographic details of the players and related frequency values

League	Nationality	Age (\pm /Year)	Height (\pm /cm)	Weight (\pm /kg)	Experience (\pm /Year)	Other		Receipt of Salary			
						Job		Yes No			
						TR	Other	Yes	No		
Men	Super	39	12	28	177	76	18	24	27	46	5
	Premier	50	2	29	176	75	17	30	22	28	24
	Minor	41	3	28	175	72	17	27	17	25	19
Women	Super	40	11	24	165	57	14	15	36	36	15
	Premier	50	0	21	163	54	11	11	39	24	26
	Minor	46	0	24	163	54	12	20	26	11	35

The nationality, age, height, weight and experience of the players and whether or not they had a source of income other than sports along with the frequency values related to the status of income from sports can be seen in Table 2.

The results revealed that, of the super-league players, 90.1% of the men and 70.1% of the women received a salary; however, players in the premier and minor leagues receiving direct salaries were fewer. Players of different nationalities were concentrated in the super league. Additionally, the average body measurement values of the players were close to one another.

Table 3. Results showing correlation of ranking values with measured parameters of the player profiles

		<i>Pearson Correlation Results (r and p values)</i>							<i>Chi-square Results (p values)</i>						
	Leagues	Number of Matches	Matches Won	Matches Lost	Age	Height	Weight	Experience	Nationality	Salary	Other Job	Forehand Rubber	Backhand Rubber	Blade Style	Game Style
	Women's Leagues	Super	.489	.928	-.631	-	.048	.205	-.064	0.004	.082	.286	.584	.737	.841
		.000	.000	.000	.316	.736	.150	.655							
Premier		.585	.928	-.348	.046	.127	.092	.103	0.726						
		.000	.000	.013	.752	.378	.525	.478							
	Minor	.624	.939	-.266	-	.287	.166	.286	0.895	.001	.624	.332	.679	.999	.394
		.000	.000	.073	.490	.053	.269	.050							
Men's Leagues	Super	.612	.926	-.437	-	.120	-.086	-.095	0.16	.635	.026	.535	.485	.855	.050
		.000	.000	.001	.413	.400	.547	.506							
	Premier	.710	.942	-.181	-	.230	.203	.138							
		.000	.000	.200	.696	.101	.149	.330							
	Minor	.779	.927	-.113	.057	-.132	-.176	.170	0.993	.068	.609	.465	.633	.310	.631
		.000	.000	.465	.715	.393	.254	.269							

Correlations and relationships among ranking values and identified data for all Turkish table tennis leagues can be seen in Table 3. On the left side, the first value is 'r' and the second value below it is 'p'. Chi-square results are given on the right side of the table. Statistically significant correlations and relationships are highlighted.

Table 4. Statistically significant differences in player profile parameters of men's and women's leagues

Parameters	Gender	League	F	P
Ranking Score	Women	Super ^a	8.030	.000
		Premier ^b		
		Minor ^{ab}		
	Men	Super ^a	4.568	.012
		Premier ^b		
		Minor ^b		
Nationality	Women	Super ^a	12.931	.000
		Premier ^b		
		Minor ^b		
	Men	Super ^a	5.902	.003
		Premier ^b		
		Minor ^b		
Player Experience	Women	Super ^a	4.803	.000
		Premier ^b		
		Minor ^c		
	Men	Super ^a	4.483	.000
		Premier ^a		
		Minor ^b		
Receipt of Salary	Women	Super ^a	12.069	.000
		Premier ^a		
		Minor ^b		
	Men	Super ^a	10.453	.000
		Premier ^a		
		Minor ^b		
Game style	Women	Super	3.968	.216
		Premier		
		Minor		
	Men	Super ^a	1.547	.002
		Premier ^b		
		Minor ^b		

In order to determine the differences among the leagues, one-way analysis of variance (ANOVA) was applied (Table 4) and statistically significant differences were found in the parameters of 'ranking score', 'nationality', 'experience' and 'receipt of salary' ($p < 0.05$). A difference from the other leagues was noted for the men in the super league in the 'game style' parameter ($p < 0.05$). Furthermore, a significant difference was found between the women's and men's leagues for the parameters of 'type of grip', 'blade style' and 'backhand' and 'forehand' rubber types ($p > 0.05$).

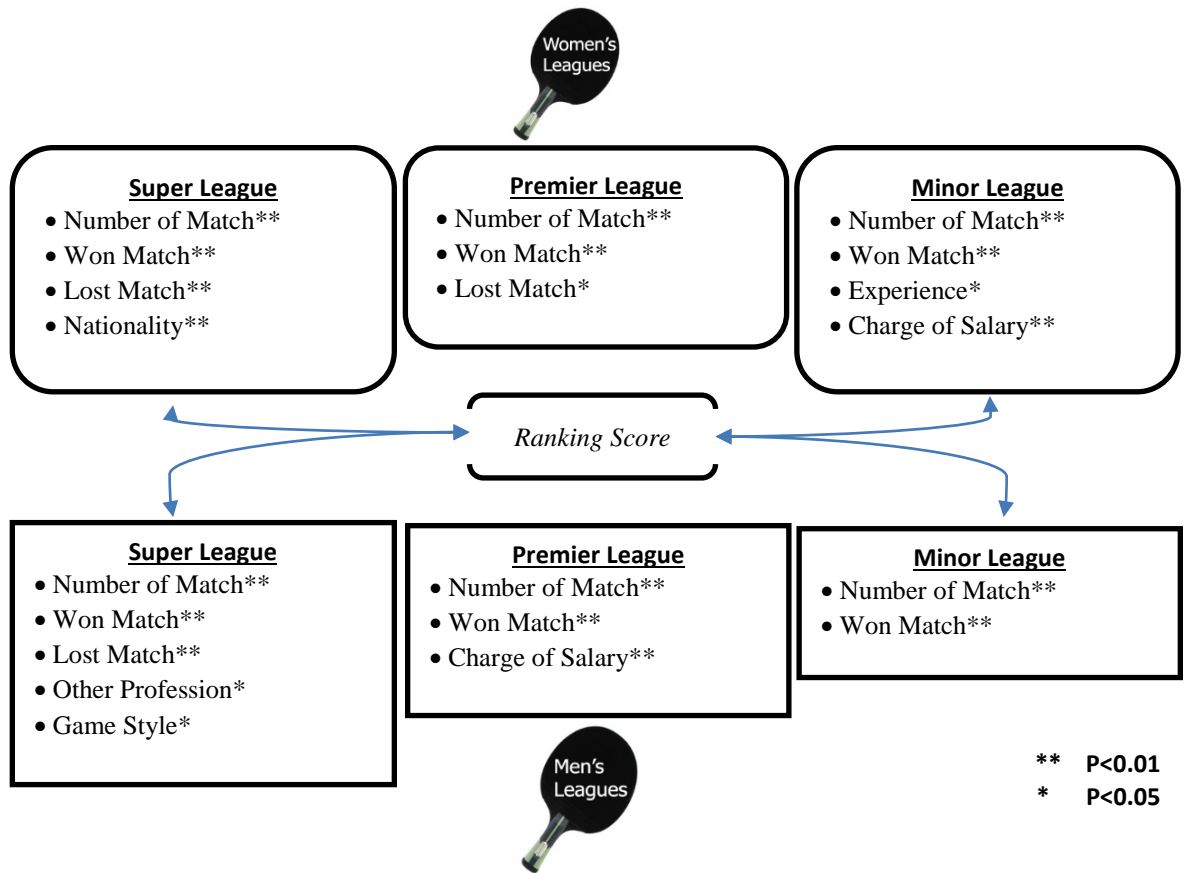


Figure 1: Player ranking data according to leagues and gender in relation to identified variables

The end-of-season total ranking scores of the women's and men's leagues in relation to the accepted parameters are shown in Figure 1. The parameters of 'experience' and 'salary' in particular were seen to be effective for men in the minor league, whereas for women they were effective in the premier league. For men in the super league, a relationship was found between their ranking and the parameters of 'gaming style' and 'having an occupation other than sports' ($p < 0.05$). A correlation was seen between the foreign transfer players in the women's super league and the league ranking score ($p < 0.01$). However, a statistically significant level of influence was observed in the ranking data of experienced players in the women's minor league.

4. Discussion

In this section, the game profiles of the competing players in the Turkish table tennis leagues and the findings between the measured parameters and the end-of-season ranking data as indicators of their achieved success are discussed under separate headings.

The statistically significant differences in parameters among the leagues as determined by one-way ANOVA (Table 4) were seen to be concentrated between the super league and the other leagues. In table tennis, as in any other branch of sport, the top-level talent and the players with technical ability are to be found in the super league. The socio-economic factors and higher concentration of all kinds of sports circuits in this league are considered to have an effective significance.

In the findings of the 'game style' parameters (Table 4), the attack style in high levels of use by the men's super league was thought to be effective. The numeric data for 'game style' (Table 1) indicated that 92.1% of the players in the men's super league used the attack style. Furthermore, the fact that the types of rubber and blades used were materials intended for the offensive gaming style is consistent with the 'game style' parameters.

4.1. Non-significant parameters

In the study, no significant statistical correlation was found between ranking score and the age, height or weight of the players or the type of rubber and blade they used ($p > 0.05$). The one-way ANOVA showed no significant difference in the women's and men's leagues in the parameters of 'type of grip', 'blade style' or 'backhand' and 'forehand' rubber types ($p > 0.05$). When examined according to gender, the average age, weight and height values of the players of all the leagues were very close to one another (Table 3). Regardless of the differences in the leagues, the similarity of the body profiles of the players competing in the table tennis leagues in Turkey can be noted. Regular, intense and prolonged performance of physical activity and asymmetrical muscle work can direct the body to a specific postural build (Kayacan et al., 2014). In table tennis players, muscle ratios and postural build are affected by frequent use and intense training on one side (Barczyk-Pawelec et al., 2012). The similarity of training methods, technical-tactical work and physical activity loads employed in all the leagues and the comparable physiological and anatomical profiles of the players can explain the absence of a significant correlation between body composition and the relevant parameters in this study.

4.2. Competition' Parameter

In order to determine the degree of linear relationship of the parameter variables according to gender, the Pearson correlation was applied. A positive correlation was found in all the leagues between the end-of-season ranking score and the total number of matches and the number of wins. A negative correlation was found in the 'matches lost' parameter for the men in the super league and for the women in the premier and minor leagues. These findings, especially for the number of 'matches lost' ranking points, were shown to have a significant impact on the Turkish leagues.

In the findings, there was no significance in the 'matches lost' parameter in the men's premier or the women's premier and minor leagues and the 'matches won' and 'matches lost' counts were close to one another. This showed the level of competition to be higher than other rates in the leagues.

4.3. Nationality' parameter

The intercontinental and international migration of highly-skilled people is not a new phenomenon (Lanfranchi and Taylor, 2001), and elite labor migration has become an important feature and component in today's global sports (Maguire and Pearton, 2000). The number of foreign nationals that participate in table tennis activities in Turkey and take their place in the squads under exceptional circumstances is determined by the Instructions and Management Principles prepared in line with the decisions of the of the Federation Board of Directors. Alternately, clubs making a place for themselves in the Turkish leagues are trying to achieve their goal by transferring foreign players. One of the chief reasons for this situation is the lack of highly-qualified coaches to train players sufficiently (Doğan et al., 2010).

Upon examination of Table 2, it can be observed that the majority of players transferred from abroad were competing in the super leagues (women: 100%, men: 70.5%). In the women's super league, there appeared to be an effective correlation between the ranking scores and the 'nationality' parameter from the aspect of the technical-tactical skills and performance of the high-quality players transferred from abroad. It is possible to state that the technical capacity, skill and performance level of national players is lower than that of the players transferred from abroad. Because there were no foreign-national players in the other women's leagues, no correlation could be identified (Table 2, Fig. 1). In Turkey, in the women's leagues in particular, the success of foreign players can have an impact on the motivation and performance of national players. This indicates the need to reexamine these factors. No statistical significance was found in the 'nationality' parameter of the men's super league and the sporting abilities and skills of the competing national and foreign players were shown to be similar.

4.4. Receipt of salary' parameter

In the literature, a number of studies have reported that a salary is an indication of the professionalism of athletes and teams and that it is associated with performance (Forrest and Simmons, 2002; Lewis, 2014; Basnier, 2014). In the present study, according to the amount and number, the highest pay rates in the Turkish table tennis leagues were observed in the super leagues (90% in men's; 70.5% in women's). Outside the super league, the salaried competing players in the premier and minor leagues were relatively high-level athletes in their own classes of game experience and technique. As an indicator of the success of the players, this situation led to their higher ranking scores. This effect was thought to play a role in the positive correlation between the ranking score and the salary received by the players in the women's minor league and the men's premier league.

4.5. 'Game style' parameter

Table tennis, with its great variety of different styles promoted among the players, has a unique status in racket sports. Improvement of the players' technical capacity allows weak styles to be eliminated quickly. Although there are many different game styles, the dominance of the attack style was observed on the international level in the 2008 Olympic Games (Hua Hsu, 2010). In a recent study of the game styles of world-ranking top-level table tennis players, the attack gaming style was reported as having an important effect on athletes' match win rates (Munivrrana et al., 2015). China, a country accepted as being at the top of this sport world-wide, exhibits its own different game strategies. For example, China's traditional 'close to the table, fast driving-and-blocking' game style has been a powerful weapon against European players (Gang, 2013).

In the present study, a relationship was found between the game style and ranking data in the men's super league ($p < 0.05$). In the ANOVA findings according to gender, significance in game styles was found only in the men's leagues (Table 4). In the Turkish men's super league, the players using the attack or offensive-oriented game style were more numerous than in the other leagues and this was considered the main reason for the statistical difference. These findings showed that the offensive-based game style was effective in the men's leagues. In light of this, despite the effectiveness of the attack game style in the successes of the 2014-2015 competition season in Turkey, a certain style of play will not always ensure victory. Diverse game styles can be effective when applied in championship games or adopted according to the different game styles of opponents,

4.6. Occupation other than sports (Other job)' parameter

The results showed that 65% of the players in the super and premier leagues received incomes from positions held outside of sports (Table 2). In the men's super league, a significant correlation was found between players who received incomes from sources outside of professional sports and their ranking scores ($p < 0.05$). Establishing satisfactory economic relations with the players of clubs or federations is accepted as a factor that increases performance (Bayraktar and Kurtoğlu, 2009). On the other hand, a source of income outside of sports is a factor that adversely affects a player's performance because when the ranking points are examined, these players were found to have lower scores compared to the other players in the same league. For players with occupations other than professional sports or those having an outside income, either their planned period for training was inadequate or it seems they were trying to use their sports experience to cover their insufficient condition and lack of training. In this case, the players' technical-tactical skills and performance levels were associated with a significant decrease.

5. Conclusion

These days, the terms "professional" and "amateur" are associated with significant differences in earnings. However, in order to satisfy an athlete's needs, performance for reasons other than a healthy lifestyle or recreational purposes requires an outlet that pays. Otherwise, athletes will turn to different financial resources.

The findings in this study have shown that in Turkey, especially in leagues outside the super leagues, the motivation of salaries paid to athletes can have a significant impact. The evaluation profile of all Turkish table tennis leagues in terms of quantity and quality revealed that some of the parameters measured in this work were associated with the ranking score. Determination of the factors that are effective or can be effective in increasing or decreasing this score can be considered useful for the improvement of performance. The parameters analyzed in this study, together with sufficient sleep, appropriate diet, adequate rest intervals, a balanced sex life, enhanced flexibility, good warm-up sessions, physical and mental training programs and individual technical and tactical work will help move the performance of the sport to the highest level.

It is anticipated that the present study will be useful for table tennis players, clubs, coaches and table tennis equipment manufacturers alike.

Acknowledgments

We are grateful to Turkish Table Tennis Federation staff, clubs and athletes for helping us to the sharing of data procedures and due to participate in the study.

Declaration of Conflicting Interests

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics Approval Statement

The study protocol as legally was approved by the Turkish Table Tennis Federation (2015/09).

Funding

The author received no financial support for the research, authorship, and/or publication of this article.

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