

Performance indicators of Team Sports Performance in China

Shanshan Yang¹, Yangfan Wang^{2*}

Abstract

The objective of this study is to examine the role of initial workout, training and leadership in team sports performance. The moderating role of teamwork was also examined in this study. Therefore, the relationship between initial workout, training, leadership, teamwork and team sports performance was examined. To address this unique relationship, this study focused on the Chinese sports players. Data was collected from the sports players in China through quantitative research technique in which a survey was carried out. To complete a survey, this study used a questionnaire. Therefore, total 600 questionnaires were used in data collection and 250 responses were received. The analysis of the data was carried out by using a statistical software. Results of the study shows that; initial workout has positive effect on team sports performance. Training also has positive effect on team sports performance. Similarly, leadership has positive effect on team sports performance. In this direction, teamwork also play an important role to enhance the relationship between training and team sports performance. Thus, the current study has important contribution to the literature having major practical implications for the practitioners.

Keywords: Initial workout, training, leadership, teamwork, team sports performance.

1. Introduction

China is one of the rich country in terms of sports [Wen \(2020\)](#); [Ying \(2018\)](#) having major importance worldwide. Various players from China take part in national and international sports competition. China take part in number of sports activities at international level. The contribution of Chinses players in the sports industry cannot be neglected as the Chinese players are famous worldwide. Chinses players in various games won several Gold Medals. Therefore, the performance of Chinses sports industry is at high level along with the other sports rich countries. However, players performance is most important in competitions. High performance of the player is required to compete in an international competition.

Most importantly, team performance is more important as compared to a single player in a team. Team performance has the better probability to win the matches as compared to a single player in a team. Therefore, the current study considered team sports performance as one of the key focus points. Team sports performance is also based on the performance of the players which is always required to win competitions. As it is highlighted in the previous studies that team sports performance has major importance in any type of sports [Häggglund et al. \(2013\)](#); [Takemura et al. \(2017\)](#) which is the basic requirement to win matches. Therefore, the current study is one of the attempts to promote team sports performance. This study is highlighting various factors effecting the team sports performance.

According to the current study, team sports performance can be promoted with the help of different unique factors. For instance, initial workout is one of the most important elements for the players to increase the performance. As team is made up of players, therefore, increase in the performance of each players can increase the team sports performance. Initial workout is one of the important elements which has major influence on the performance of the players as well as the performance of a team. Therefore, initial workout cannot be neglected before to start a sports match which may lead to the team performance. As team sports performance is most important [Hoffman et al. \(2020\)](#); [Thomas et al. \(2019\)](#), that is the reason, the focus on initial workout is most important. Another important factor is training which has significant effect on the team sports performance. Generally, better training lead to the higher team performance. The third important factor is leadership which is influence on the players performance. Leadership may be from the coaches' point of view or caption point of view; however, both are most effective for the team sports performance. As highlighted in several previous studies that leadership has important role in performance ([Hafiz & Sary, 2020](#)).

Therefore, the relationship between initial workout, training, leadership, teamwork and team sports performance was examined. The objective of this study is to examine the role of initial workout, training and leadership in team sports performance. Furthermore, this study also examined the role of teamwork. To improve the

¹ College of Education and Sports Sciences, Yangtze University, Jingzhou, 434000, China

² College of Education and Sports Sciences, Yangtze University, Jingzhou, 434000, China

* Corresponding email: yss070328@163.com (Yangfan Wang)

team performance, teamwork is most important. During the competition, teamwork has central role to get success in competition. This study used teamwork as moderating variable. Several studies are available in the literature showing the role of team sports performance [Crombie et al. \(2009\)](#); [Salinero et al. \(2019\)](#), however, these studies have not examine the role of initial workout. These studies also have not examined the major role of leadership in team sports performance. Finally, this is also unique study because this is the first study using the moderating role of teamwork. The moderating effect of teamwork is not examined in the previous studies. Thus, the current study has important contribution to the literature as well as practice.

2. Literature Review

Figure 1 shows the relationship between initial workout, training, leadership, teamwork and team sports performance. According to the theoretical framework of the study, initial workout has effect on the team sports performance. Training and leadership also have effect on team sports performance. Finally, it shows that; teamwork playing the role of moderating variable between initial workout and team sports performance. It is also a moderating variable between training and team sports performance. Finally, teamwork playing the role of moderating variable between leadership and team sports performance.

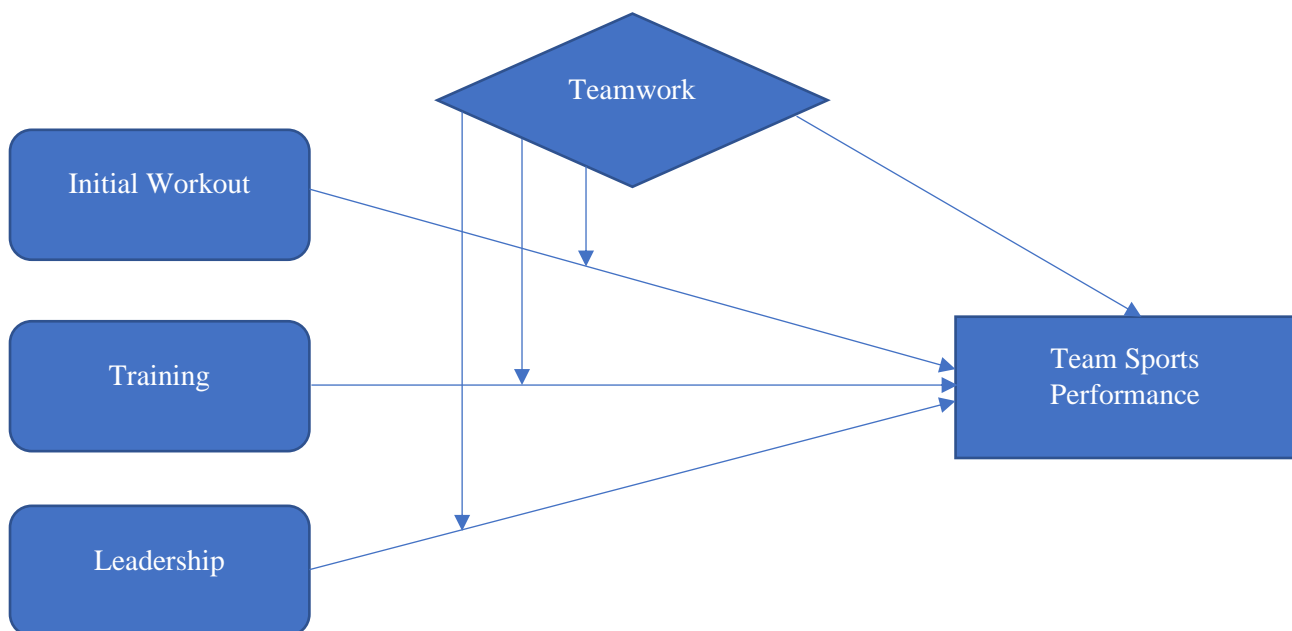


Figure 1. Theoretical framework of the study showing the relationship between initial workout, training, leadership, teamwork and team sports performance

2.1 Initial Workout and Team Sports Performance

Initial workout means the exercise and practice before the start of competition. It is important to warm-up the body which may lead to the better outcomes. Simply start the workout with some aerobic exercises like arm swings, leg kicks, as well as walking lunges. Alternatively, it can warm up by doing easy movements of the exercise which a person planning to do. Initial workout in relation to the team sports is based on two elements; exercise before the competition and practice before the competition. Both the practice and exercise have key importance to perform better in a competition. According to [You Li et al. \(2018\)](#) workout has an important role to decrease the level of physiological stress among the athletes. To decrease the level of stress is also most important among the players to perform better. Higher level of stress can decrease the performance of player in a team during competition. As it

is also given in previous studies that workout has important role in sports [Shriver et al. \(2013\)](#). Therefore, the importance of workout cannot be neglected as it has major importance for the sports team performance in higher level competition.

Hypothesis 1. Initial workout has positive effect on team sports performance.

2.2 Training and Team Sports Performance

In any sports activity, training has major importance which may influence on the sports performance. A person cannot be a good player until he or she is not involved in training activity. Training is the process of teaching various skills related to the sports in practical exercise. Without proper training to the players, it is not possible to achieve higher performance in match. It is not only influencing on the individual performance of player; it also has major influence on the overall team performance. As highlighted by various

previous studies that training has pivotal role in sports activities [Yuming Li \(2017\)](#); [Parks et al. \(2018\)](#). Therefore, to achieve high performance in a competition, players should involve in various training activities.

Hypothesis 2. Training has positive effect on team sports performance.

2.3 Leadership and Team Sports Performance

Leadership is both a research area, and a practical skill surrounding the capability of an individual, group as well as organization to "lead", influence or guide other individuals, teams, or entire organizations. In the sports organizations, leadership is also based on the guide to players. Leadership is also most important during the competition. Generally, there are two important leaders which include coach of the team and captain of the team. If the coach and captain have important leadership skills, they can influence the performance of the team. Leadership in sports has major importance which has influence on the team sports performance. As several previous studies highlighted that leadership in sports has major importance [Abd Karim and Ismail \(2019\)](#); [Fransen et al. \(2017\)](#). The success of team in any sports competition has majorly influenced by the leadership skills. Therefore, both the coach of the team and captain of the team must have high quality leadership skills to influence the performance of the players.

Hypothesis 3. Leadership has positive effect on team sports performance.

2.4 Teamwork and Team Sports Performance

Teamwork is the collective struggle of a group to attain a common goal or to compete whole task in the most effective as well as efficient way. This idea is seen within the better framework of a team, which is a group of interdependent individuals who work together towards a common goal. Simply, teamwork denotes to the collection efforts of two or more persons to achieve a single goal. Collective effort work as a synergy which lead to the higher performance. Similarly, teamwork is most important in sports competition. Among the sports competition, teamwork can play a central role which has major influence on the performance of overall team. Therefore, teamwork has central importance in the sports competitions [Clutterbuck et al. \(2020\)](#); [Van Puyenbroeck et al. \(2018\)](#). Consequently, teamwork has direct influence on the team sports performance. In the current study, teamwork is considered as moderating variables which may strengthen or weaken the relationship between two variables.

Hypothesis 4. Teamwork has positive effect on team sports performance.

Hypothesis 5. Teamwork moderates the relationship between initial workout and team sports performance.

Hypothesis 6. Teamwork moderates the relationship between training and team sports performance.

Hypothesis 7. Teamwork moderates the relationship between leadership and team sports performance.

3. Research Methodology

This study adapted measures from previous studies to measure initial workout, training, leadership, teamwork and team sports performance. A self-administrated scale was used to measure all these variables by collecting data from respondents. Figure 2 shows the scale items of each variable. Therefore, the current study used questionnaire for data collection [Bowling et al. \(1999\)](#); [Zhang et al. \(2017\)](#) which is most suitable in the current study. Thus, to examine a relationship between initial workout, training, leadership, teamwork and team sports performance, the current study used a survey questionnaire for data collection. While collecting data with the help of questionnaires, Likert scale was used which is most reliable to collect opinion and views of respondents ([Lubke & Muthén, 2004](#); [Van Laerhoven et al., 2004](#)).

Data were collected from the sports players in China. For data collection, the current study distributed 650 questionnaires among the players of various game. Remainders were sent to the respondents for data collection. Finally, total 245 responses were received. Among these responses, five were not suitable because these were missing with the reasonable part of the questionnaires. Thus, these five questionnaires were dropped and total 240 responses were used for data collection. While data collection, it was found that; 40% of the respondents have age between 20 to 25. 50% respondents have age between 26 to 30. However, only 10% respondents have age above 30. 73% of the respondents were unmarried and 27% of the respondents were married. 65% of the respondents were male and 35% of the respondents were female.

Furthermore, the collected data from the respondents were analyzed to fix the errors in the data. The errors include; missing value, outlier and normality of the data. Missing value is important to remove from the data [Aydin and Şenoğlu \(2018\)](#). Table 1 shows that data has no missing value. Furthermore, this study also examined the outlier in the data. In the current study, outlier is any value above five and below one. Five is the maximum value and one is the minimum value in the current study. However, data shows that it has no outlier. Additionally, normality of the data is also given in Table 1, however, it is not required while using Partial Least Square (PLS).

Table 1

Data Statistics

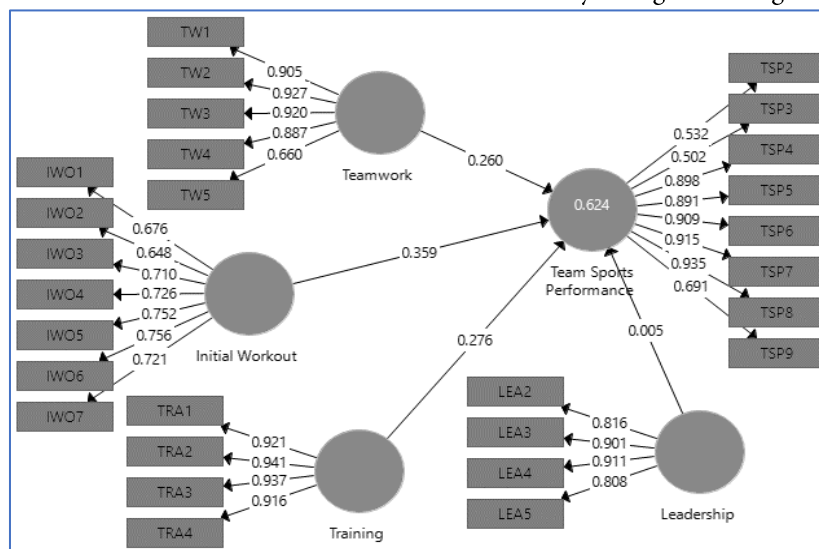
	No.	Missing	Mean	Median	Min	Max	SD	Kurtosis	Skewness
IWO1	1	0	3.074	4	1	5	1.032	0.739	-0.982
IWO2	2	0	3.015	4	1	5	1.018	1.044	-1.881
IWO3	3	0	3.881	4	1	5	1.089	0.058	-0.84
IWO4	4	0	4.2	4	2	5	0.806	-0.141	-0.726
IWO5	5	0	4.244	4	2	5	0.725	-0.521	-0.531
IWO6	6	0	4.089	4	2	5	0.89	-0.176	-0.75
IWO7	7	0	4.104	4	1	5	1.006	0.204	-0.962
TRA1	8	0	3.926	4	1	5	1.065	-0.183	-0.78
TRA2	9	0	3.993	4	1	5	1.065	-0.164	-0.805
TRA3	10	0	4.007	4	1	5	1.071	-0.11	-0.855
TRA4	11	0	3.956	4	1	5	1.06	0.043	-0.816
LEA1	12	0	4.111	4	2	5	0.757	0.481	-0.708
LEA2	13	0	3.941	4	1	5	0.995	-0.738	-0.474
LEA3	14	0	4.074	4	1	5	0.932	-0.488	-0.593
LEA4	15	0	4.037	4	2	5	0.89	-0.803	-0.456
LEA5	16	0	4.141	4	2	5	0.818	-0.411	-0.596
TW1	17	0	3.874	4	1	5	0.946	0.238	-0.752
TW2	18	0	3.993	4	1	5	0.923	0.409	-0.9
TW3	19	0	4	4	2	5	0.974	-0.434	-0.73
TW4	20	0	3.978	4	1	5	1.078	-0.003	-0.924
TW5	21	0	4	4	1	5	1.026	0.921	-1.083
TSP1	22	0	3.852	4	1	5	1.029	-0.756	-0.481
TSP2	23	0	3.874	4	2	5	0.914	-0.988	-0.217
TSP3	24	0	3.919	4	1	5	0.87	-0.274	-0.387
TSP4	25	0	4.133	5	1	5	1.108	-0.214	-0.996
TSP5	26	0	4.126	5	1	5	1.105	-0.296	-0.952
TSP6	27	0	4.193	5	1	5	1.043	0.782	-1.186
TSP7	28	0	4.148	5	1	5	1.119	-0.335	-0.971
TSP8	29	0	4.163	5	1	5	1.156	0.05	-1.109
TSP9	30	0	3.526	4	1	5	1.252	-0.946	-0.369

Note: IWO = Initial Workout; TRA = Training; LEA = Leadership; TW = Teamwork; TSP = Team Sports Performance

4. Findings

Findings of the study are approached with the help of data analysis by using statistical tool. Partial Least Square (PLS) as a statistical tool was used in this study.

Popularity of PLS is also addressed by the several previous studies in the literature J. Hair et al. (2017); Joseph F. Hair et al. (2010); Joseph F. Hair et al. (2012); Hair Jr et al. (2016); Hameed et al. (2018). The first part of data analysis is given in Figure 2.



Note: IWO = Initial Workout; TRA = Training; LEA = Leadership; TW = Teamwork; TSP = Team Sports Performance

Figure 2. Measurement Model

The first part of data analysis is performed to examine the reliability and validity of the data with the help of measurement model of PLS. It is given in Figure 2 which shows that initial workout is measured with the help of seven scale items, training is measured with the help of four scale items, leadership is measured with the help of five scale items, however, one item was deleted due to the low factor loading. Teamwork is measured by using five scale items. Finally, team sports performance is measured by using nine scale items and one was deleted due to factor loadings below 0.5. Therefore, all the items having factor loadings above

0.5 was retained and considered to approach the final results. Figure 2 shows that all the scale items have factor loadings above 0.5.

In addition to this, the current study examined composite reliability (CR) which should be above 0.7 [F. Hair Jr et al. \(2014\)](#); [Joseph F Hair et al. \(2013\)](#). Table 2 shows that; CR for initial workout, training, leadership, teamwork and team sports performance is above 0.7. Additionally, this study examined average variance extracted (AVE) which must be above 0.5. It is given in Table 2, all the constructs; initial workout, training, leadership, teamwork and team sports performance have AVE above 0.5.

Table 2*Reliability and Convergent Validity*

	Cronbach's Alpha	rho_A	Composite Reliability	(AVE)
Initial Workout	0.841	0.852	0.879	0.509
Leadership	0.884	0.931	0.919	0.74
Team Sports Performance	0.914	0.939	0.933	0.644
Teamwork	0.912	0.924	0.936	0.749
Training	0.947	0.951	0.962	0.863

After the assessment of factor loadings, CR and AVE, this study also examined discriminant validity [Henseler et al. \(2015\)](#). There are several methods to examine the discriminant validity such as, AVE square

root, HTMT and cross-loadings. The current study used cross-loadings as given in Table 3. The cross-loadings in Table 3 shows that discriminant validity is achieved.

Table 4*Cross-Loadings*

	Initial Workout	Leadership	Team Sports Performance	Teamwork	Training
IWO1	0.676	0.366	0.429	0.622	0.348
IWO2	0.648	0.336	0.435	0.546	0.392
IWO3	0.71	0.375	0.707	0.579	0.836
IWO4	0.726	0.696	0.444	0.419	0.405
IWO5	0.762	0.759	0.485	0.403	0.34
IWO6	0.756	0.65	0.533	0.393	0.384
IWO7	0.721	0.53	0.469	0.42	0.44
LEA2	0.492	0.816	0.324	0.171	0.275
LEA3	0.607	0.901	0.337	0.254	0.28
LEA4	0.73	0.911	0.527	0.431	0.38
LEA5	0.655	0.808	0.362	0.336	0.337
TRA1	0.649	0.392	0.671	0.57	0.621
TRA2	0.601	0.352	0.654	0.58	0.541
TRA3	0.617	0.35	0.685	0.541	0.537
TRA4	0.607	0.3	0.68	0.562	0.516
TSP2	0.41	0.324	0.532	0.851	0.325
TSP3	0.36	0.412	0.502	0.815	0.327
TSP4	0.686	0.476	0.898	0.964	0.599
TSP5	0.656	0.398	0.891	0.922	0.604
TSP6	0.616	0.391	0.909	0.925	0.548
TSP7	0.658	0.398	0.515	0.894	0.647
TSP8	0.643	0.379	0.335	0.682	0.605
TSP9	0.519	0.255	0.691	0.861	0.576
TW1	0.559	0.246	0.641	0.505	0.845
TW2	0.546	0.282	0.611	0.627	0.843
TW3	0.567	0.325	0.622	0.492	0.757
TW4	0.645	0.377	0.537	0.587	0.824
TW5	0.66	0.379	0.484	0.66	0.843

Note: IWO = Initial Workout; TRA = Training; LEA = Leadership; TW = Teamwork; TSP = Team Sports Performance

Measurement model of the study addressed the reliability and validity, now the current study used structural model to examine the relationship between variables. Therefore, to examine the relationship between initial workout, training, leadership, teamwork and team sports performance, this study used PLS structural model [Gadzo et al. \(2019\)](#); [Henseler et al. \(2014\)](#). While assessment of PLS structural model, the direct effect of initial workout was examined on team sports performance. The direct effect of training was

also examined on team sports performance. The direct effect of leadership was also examined. Results are given in Table 5 which shows that initial work out has significant relationship with team sports performance with t-value 2.61. The relationship between training and team sports performance is also significant with t-value 2.758. Teamwork also significant effect on the team sports performance with t-value 3.086. However, the relationship between leadership and sports performance is not significant.

Table 4

Direct Effect Results

	(O)	(M)	SD	T Statistics	P Values
Initial Workout -> Team Sports Performance	0.359	0.386	0.138	2.61	0.009
Leadership -> Team Sports Performance	0.005	-0.009	0.094	0.05	0.961
Teamwork -> Team Sports Performance	0.26	0.25	0.084	3.086	0.002
Training -> Team Sports Performance	0.276	0.269	0.1	2.758	0.006

This study also examined the moderation effect [Baron and Kenny \(1986\)](#). The moderation effect of teamwork was examined. First, the moderation effect of teamwork was examined between initial workout and team sports performance. Second, the moderation effect of teamwork was examined between training and team sports performance. Third, the moderation effect of teamwork was examined between leadership and team sports performance. Moderation effect in Table 4 shows that; first, the moderation effect of teamwork between initial

workout and team sports performance is not significant. Second, the moderation effect of teamwork between training and team sports performance is significant with t-value 3.313. Third, the moderation effect of teamwork between leadership and team sports performance is not significant. The moderation effect between training and sports performance of team is positive. Therefore, teamwork as a moderating variable strengthen the relationship between training and team sports performance.

Table 6

Moderation Effect

	(O)	(M)	SD	T Statistics	P Values
Initial Workout -> Team Sports Performance	0.439	0.448	0.129	3.4	0.001
Leadership -> Team Sports Performance	0.007	0.005	0.102	0.066	0.948
Moderating Effect 1 -> Team Sports Performance	0.142	0.134	0.084	1.691	0.091
Moderating Effect 2 -> Team Sports Performance	0.212	0.2	0.064	3.313	0.001
Moderating Effect 3 -> Team Sports Performance	-0.092	-0.088	0.072	1.274	0.203
Teamwork -> Team Sports Performance	0.161	0.161	0.082	1.966	0.05
Training -> Team Sports Performance	0.21	0.21	0.087	2.406	0.017

Finally, this study also examined the variance explained. The variance explained was examined with the help of r-square value. Figure 2 shows that; r-square value is 0.624. It shows that; all the variables; initial workout, training, leadership and teamwork are expected to bring 62.4% change in team sports performance. According to [Womack et al. \(1991\)](#), this is moderate variance explained by initial workout, training and leadership, teamwork.

5. Conclusion

The objective of this study was to examine the role of initial workout, training and leadership in team sports performance. The relationship between initial workout, training, leadership, teamwork and team sports performance was examined. To address, this unique relationship, this study focused on the Chinese sports

players. Moreover, the moderating role of teamwork was also examined in this study. After collecting data by using survey questionnaire, it was analyzed by using statistical software. Results of the study indicated that initial workout is important for the team performance. According to the results, initial workout has positive effect on team sports performance which shows that increase in initial workout increases the team sports performance. Furthermore, training also has important role in performance of the team. Increase in the training of players increases the team performance. Therefore, maximum training activities should be carried out to enhance the performance of players which ultimately effect positively on sports team performance. In addition to this, it also has effect on team sports performance. Team sport performance is affected through two way, first, teamwork has direct effect, second, teamwork has moderating effect on the relationship of training and team sports performance. First of all, teamwork has positive effect on performance of the team which shows that increase in teamwork activities increases the team sports performance. Second, teamwork as moderating variables strengthen the relationship between training and team sports performance.

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6. Implications of the Study

The current study has several implications for the literature. First, this study examined the relationship between initial workout, training, leadership, teamwork and team sports performance which is not examined in the previous studies. The objective of this study was to examine the role of initial workout, training and leadership in team sports performance which is not considered by the previous studies. Second, the current study examined the moderating role of teamwork. Three moderation effect was examined. The first moderating effect was examined between initial work out and team sports performance. Second first moderating effect was examined between training and team sports performance. Third moderating effect was examined between leadership and team sports performance. These moderating variables are not examined in the previous studies. Practically, this study is also beneficial for the various sports clubs to enhance the team sports performance. This study suggested that management of players should promote initial workout, training and teamwork to enhance the team sports performance.

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