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Athlete Leadership and Communication: Descriptive Research in Professional Teams with Social Network Analysis

Sporcu Liderliği ve İletişim: Sosyal Ağ Analizi ile Profesyonel Takımlarda Tanımlayıcı Araştırma

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ABSTRACT Objective: The purpose of this study was to investigate the characteristics of athlete leadership at the team level and how communication among athletes is affected by these leadership roles. **Material and Methods:** A total of 65 athletes and team captains, 30 female and 35 male athletes from various sports teams in Türkiye, constituted the sample of the study. Data were collected through surveys and analyzed using social network and correlation analyses. **Results:** A moderate positive relationship was found between athlete leadership and communication skills. This relationship was stronger in women's sports teams than in men's teams, indicating gender differences in how leadership and communication are linked. In addition, team captains were found to score lower on communication than informal leaders. Social Network Analysis revealed that extrinsic and task leadership significantly predicted communication in women's teams, while social leadership was the strongest predictor in men's teams. **Conclusion:** The findings highlight the dominant role of informal leaders compared to team captains in leadership and communication in professional sports teams. Captains, despite their formal status, are rarely central to leadership networks. Positive correlations were found between 4 leadership traits and communication in women's teams. No correlation was found between 4 leadership traits and communication in men's teams. Four leadership styles were found to be significant predictors of communication in women's teams, while task and social leadership were found to be significant predictors of communication in men's teams. Overall, the study suggests that effective leadership is shaped more by peer perception and communication than by formal roles.

Keywords: Athlete leadership; leadership; social network analysis; team captain

ÖZET Amaç: Bu çalışma, takım düzeyinde sporcu liderliğinin özelliklerini ve sporcular arasındaki iletişimin liderlik rollerinden nasıl etkilendiğini, sosyal ağ analizi kullanarak araştırmayı amaçlamıştır. Araştırma, görev lideri, dış lider, sosyal lider ve motivasyonel lider gibi belirli liderlik özelliklerine odaklanmış ve bunların iletişim becerileri ile ilişkisini incelemiştir. **Gereç ve Yöntemler:** Örneklem, Türkiye'deki çeşitli spor takımlarından, erkek futbol, kadın voleybol, kadın hentbol, erkek basketbol ve kadın basketbol takımlarından, 30 kadın ve 35 erkek olmak üzere toplam 65 sporcudan oluşmaktadır. Veriler, anketler aracılığıyla toplanmış ve sosyal ağ ve korelasyon analizleri kullanılarak analiz edilmiştir. **Bulgular:** Sporcu liderliği ile iletişim becerileri arasında orta düzeyde pozitif bir ilişki olduğunu ortaya koymuştur. İlginç bir şekilde bu ilişki, kadın spor takımlarında erkek takımlarına kıyasla daha güçlüdür ve liderlik ve iletişimin nasıl bağlantılı olduğu konusunda cinsiyet farklılıklarına işaret etmektedir. Ayrıca çalışma takım kaptanlarının takım arkadaşları tarafından her zaman görev, motivasyon, sosyal veya dış lider olarak görülmediğini ortaya koymuştur. Çoğu durumda, bu liderlik rolleri takım içindeki diğer oyuncular tarafından üstlenilmiştir. Bu da liderliğin takım genelinde dağıldığını ve sadece kaptana bağlı olmadığını göstermektedir. **Sonuç:** Genel olarak bu çalışma, sporcu liderliğinin karmaşık ve dinamik doğasını vurgulamakta, etkili liderlik ve takım uyumunun geliştirilmesinde iletişimin önemini vurgulamaktadır.

Anahtar Kelimeler: Sporcu liderliği; liderlik; sosyal ağ analizi; takım kaptanı

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In the dynamic fabric of sports teams, leadership is not just a title it's a shared phenomenon embedded in daily interactions. Leadership can be understood in various ways, such as a trait, behavior, information processing, or relationship, and is a complex, multi-dimensional process. Definitions of leadership vary depending on the perspective of the individual defining it. Northouse identifies key components in many definitions, describing leadership as a process involving influence, group dynamics, and shared goals. [1] His definition is "Leadership is a process in which an individual influences a group of individuals to achieve a common goal". Yukl defines it as "The process of influencing others to understand and accept what needs to be done and how to do it, and facilitating efforts to achieve common goals".[2] In sports, leadership is described as "a dynamic process aimed at achieving goals within a team."[3,4]

A leader is essential for team success and individual performance development, referred to as an "athlete leader". Athlete leadership is defined as a person who takes on a formal or informal role within the team, influences members to achieve a common goal, and fosters team cohesion, satisfaction, and trust.[5,6] Athlete leadership impacts both team performance and psychological well-being, offering benefits such as driving the team, ensuring discipline, enhancing communication, building team spirit, and supporting personal development.

Most studies on team leadership have focused on formal leaders, such as team captains and managers.[7,8] However, Cope et al. emphasize the importance of informal leaders.[9] Hardy et al. found that while team captains are official leaders, other players are also recognized as leaders by their teammates.[5] In another study, Loughead and Hardy noted that players beyond team captains take on leadership roles.[10] Fransen et al. found that only 29.5% of participants identified team captains as leaders, while 70.5% viewed other team members (informal leaders) as leaders.[6] These findings highlight the significance of recognizing athlete leadership within the team.

Fransen et al. categorized athlete leadership into 4 types: (1) Task leader, who contributes to tactical decisions, explains team strategies, and provides tactical advice when needed.[6] (2) Motivational leader, who inspires and encourages teammates to enhance performance. (3) Social leader, who maintains good relationships, listens during conflicts, and fosters a positive atmosphere. (4) External leaders, who connect the team with management. Several studies have examined the impact of leadership in sports. Loughead et al. used social network analysis to study the relationship between leadership qualities and team cohesion, finding that both general leadership quality and specific leadership types (task, motivational, social, and external) positively correlated with task and social cohesion.[11] Fransen et al., in a study of 135 individuals from 3 professional football teams, found a positive relationship between athlete leadership quality and team effectiveness.[12]

Communication is the process of receiving, interpreting, and transmitting messages through various sensory channels. Team harmony and communication are vital for success. Yukelson defined sports communication as building positive relationships among team members, both on and off the field.[13] Effective communication enables athletes to express themselves and understand each other, improving team performance.[14] Research shows that winning teams communicate more than losing teams and that effective communication enhances team cohesion.[14,15] McLean et al. found more communication links in winning football matches, while Sullivan and Feltz reported a positive relationship between communication and team cohesion. Recent studies suggest that social network analysis (SNA) is an effective method for quantifying these relationships within a team.[14-17]

Despite the global relevance of this topic, there is a notable lack of research focusing on Turkish professional teams, where leadership structures may differ culturally. This is a problem (and a great research opportunity) because leadership styles and effective communication allow team members to express their thoughts, feelings and needs in a productive way, increasing their ability to understand each other and thus leading to the achievement of their individual and collective goals.[13-15]

SOCIAL NETWORK ANALYSIS, ATHLETE LEADERSHIP AND COMMUNICATION

SNA is a graphical method that uses nodes and edges to represent social relationships and structures within a network.[18] In the past decade, network theory has been applied across various fields, including social media, politics, education, and organizational networks.[19] The focus of social network theory is on relationships between actors within a system, rather than individual characteristics.[20] It posits that an individual's position within a network is linked to performance outcomes, and analyzing these connections can help interpret social behaviors.[21]

SNA is particularly useful for understanding group dynamics, as it quantifies individual connections, identifies leadership distribution, and explores emerging relationships.[22] Nodes represent individuals, and ties represent interactions.[23,24] The size of each node reflects centrality, indicating an individual's position within the network.[25] This study used degree centrality to measure direct connections between individuals.[26] Sports teams, as well-defined groups, are ideal for SNA research, as noted by Lusher et al., given their interconnected nature.[17]

SNA can analyze the relationship between athlete leadership and communication by showing how leadership roles are distributed among players and how various team dynamics relate to leadership, communication, trust, and cohesion.[27] Despite its widespread use in sociology, economics, and other disciplines, SNA's application in sports is limited.[23] While there have been some studies on athlete leadership and communication, most focus on specific athletes or the entire team, with few examining the relationships between leadership and communication.[11,12,28] Most of these studies have been conducted in Western countries, with limited research in Türkiye.[6,11,29] Therefore, this study aims to examine the relationship between athlete leadership and communication using SNA in Turkish professional sports teams.

The hypotheses were developed based on previous research highlighting the relationship between perceived leadership characteristics and communication effectiveness in sport teams and the central role of informal leadership in team dynamics. For this purpose, answers will be sought to the following hypotheses:

H1: the average leadership quality of the team captain is lower than the perceived quality of the best athlete leader in the team

H2: There is a moderate positive relationship between a leader's perceived task, motivational, social and external leadership qualities

H3: There is a moderate positive relationship between a leader's perceived leadership quality (task, motivational, social and external leadership) and communication quality

H4: Does task leader perception predict athletes' communication quality?

H5: Does motivational leader perception predict athletes' communication quality?

H6: Does perception of external leader predict athletes' communication quality?

H7: Does social leader perception predict athletes' communication quality?

MATERIAL AND METHODS

PROCEDURE

This study aims to examine the relationship between leadership styles exhibited by athlete leaders in professional sports teams and team communication using SNA. A cross-sectional research design was used. Data were collected from a total of 65 professional athletes who actively competed in 2023, during their rest hours after regular training sessions. Participants were selected by convenience sampling method based on availability and voluntariness. The study was conducted in accordance with the ethical principles stated in the Declaration of Helsinki. Ethical approval was received from the Non-Interventional Clinical Research Ethics Committee of Çukurova University Faculty of Medicine, with the decision numbered 128 dated December 2, 2022.

DATA COLLECTION

The study collected data from 65 athletes and team captains from five professional sports teams in the 2nd

league in 2023: Men's soccer (n=22), women's volleyball (n=10), women's handball (n=10), men's basketball (n=13) and women's basketball (n=10). The number of athletes included in the study was determined based on the availability and accessibility of entire team **rosters** from 5 professional sports teams actively competing in their respective leagues during the 2023 season. Meetings were held with the club management and coaches of each team beforehand. Necessary permissions were obtained and the athletes were informed about the purpose of the study before the questionnaires were distributed. Informed consent forms were collected from all participants by the researchers and confidentiality was ensured. Demographic information of the participating athletes is presented in Table 1.

MEASUREMENTS

For data collection in the research, demographic information of athletes was used along with a leadership questionnaire.[6,12,30] This questionnaire was designed to assess each team member's athlete leadership quality in terms of task, motivational, social, and external leadership. Additionally, statements describing the frequency of communication with athletes were also utilized as part of the data collection tool.

To measure athlete leadership quality and communication frequency, athletes were asked to rate each team member on task, motivational, social, and external leadership qualities. All athletes' names were listed to facilitate this assessment.[17] A 5-point Likert scale, ranging from 0 (very poor leader) to 4 (excellent leader), was used to rate each team member's overall leadership qualities (task, motivational, social, and external leadership).[27,31] Similarly, the frequency of communication with each team member was assessed on a scale from 0 (none) to 4 (very frequent). For example, in a football team of 22, a player would make a total of 105 markings (21x5) to assess 21 teammates across 4 leadership qualities and communication. This process enabled all team members to evaluate each other, resulting in nxn asymmetrical matrices (n: number of athletes), where rows and columns represent athletes. For instance, the score in the 2nd row and 3rd column represents the relationship between those 2 individuals.[25]

DATA ANALYSIS

UCINET-6 software was used to analyze the research data. Transition values of the matrices (e.g., a score of 4 was coded as 1, and other scores as 0) were calculated for SNA. This threshold was chosen to emphasize the strongest and most significant leadership and communication relationships within the team. It is methodologically preferred for identifying key leadership structures and central players in teams.[5,27] The Quadratic Assignment Procedure correlation technique in UCINET-6 was used to examine the relationship between athlete leadership and communication. Additionally, Multiple Regression Quadratic Assignment Procedures were applied to model the communication frequency network (dependent variable) using independent variables (connections in different leadership quality networks). This analysis aimed to identify which leadership qualities predicted communication ties. Athlete confidentiality was ensured by coding names with numbers prior to analysis.

RESULTS

Table 1 presents the demographic characteristics of the athletes participating in the study. According to the results; the average age of the male soccer team is

TABLE 1: Demographic characteristics of athletes

	Men football n=22 (X̄±SD)	Men basketball n=13 (X̄±SD)	Women basketball n=10 (X̄±SD)	Women volleyball n=10 (X̄±SD)	Women handball n=10 (X̄±SD)
Age (year)	26±4.83	26.38±5.04	23.9±3.81	16.8±0.42	17.6±0.49
Sports age (year)	7.77±4.20	14±4.91	13.1±4.28	5.60±1.77	13.60±4.62
Time in the team	1.18±0.39	1.61±1.66	1.50±1.26	4.50±2.36	3.50±2.23

SD: Standard deviation

TABLE 2: Average degree centrism scores of all players, team captain, and informal leader

	All players	Team captain	Informal leader
Task leader	2.69±0.85	2.93±0.92	3.27±0.71
Motivational leader	2.87±0.79	3.19±0.82	3.38±0.74
Social leader	2.93±0.75	3.14±0.82	3.31±0.72
External leadership	2.55±1.00	2.88±0.96	3.01±1.13
Communication	3.12±0.79	3.37±0.72	3.48±0.56

(26±4.83); the male basketball team (26.38±5.04); the female basketball team (23.9±3.81); the female soccer team (16.8±0.42); and the female handball team (17.6±0.49). When the age of sports participation was examined, it was found that the male soccer team (7.77±4.20); the male basketball team (14±4.91); the female basketball team (13.1±4.28); the female soccer team (5.60±1.77); and the female handball team (13.60±4.62). The duration spent by the athletes in their respective teams is; male soccer team (1.18±0.39); male basketball team (1.61±1.66); female basketball team (1.50±1.26); female soccer team (4.50±2.36); and female handball team (3.50±2.23).

In Table 2, the node size and centrality position of the players are based on their degree centrality, as shown in Figure 1. Table 3 examines the average degree centrality scores for team captains and players. It was found that team captains scored lower in task leadership (2.93±0.92), motivational leadership (3.19±0.82), social leadership (3.14±0.82), and external leadership (2.88±0.96) qualities compared to informal leaders in these respective roles.

In Table 3, the relationship between different leadership networks and communication within each team was calculated using Quadratic Assignment Procedure-correlations. The results showed that in the men's football team, the strongest correlation was between task and motivational leadership (r=0.51), suggesting that team members who perceive a player as a good task leader are also likely to perceive them as a good motivational leader. The strongest correlation between task and motivational leadership was observed was seen in the men's basketball team (r=0.47). For women's volleyball, basketball, and handball teams, high correlations were found between all four leadership qualities. These results suggest that in women's teams, irrespective of the sport, players who are perceived as good task leaders are also likely to be perceived as effective motivational, social, and external leaders. When examining the correlations between leadership networks and communication for each team, high positive correlations were found in women's teams between all 4 leadership qualities and communication (women's basketball: task r=0.87, motivational r=0.94, social r=0.92, external r=0.82; women's handball: task r=0.68, motivational r=0.77, social r=0.74, external r=0.72; women's volleyball: task r=0.53, motivational r=0.49, social r=0.46, external r=0.55).

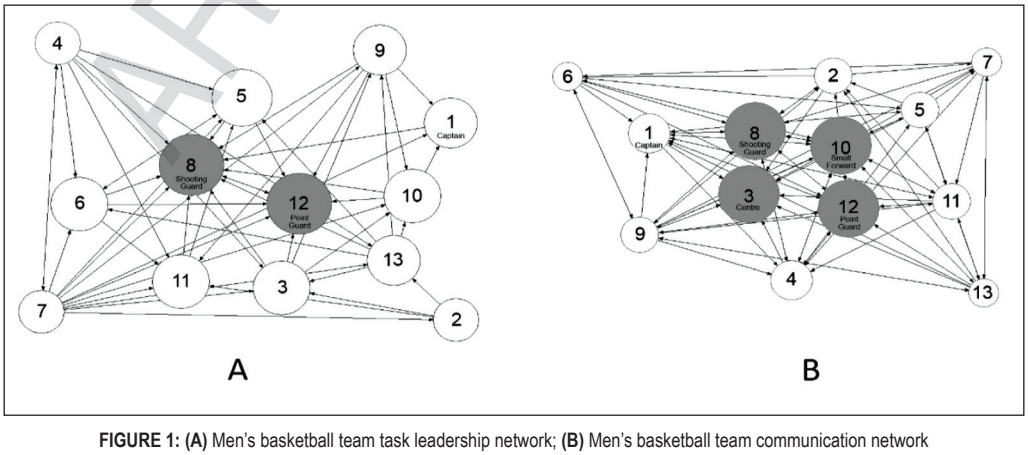

FIGURE 1: (A) Men's basketball team task leadership network; **(B)** Men's basketball team communication network

TABLE 3: Conclusion between athlete products and communication (Quadratic Assignment Procedure)

Men football (n=22)	X̄±SD	1	2	3	4	5
1- TS	2.39±0.93					
2- ML	2.32±1.03	0.51**				
3- SL	2.37±0.86	0.35**	0.47**			
4- EL	1.40±1.39	-0.07	0.03	0.23*		
5- COM	2.26±0.92	0.21	0.18	0.15	-0.17	
Men basketball (n=13)	**X̄±SD**	**1**	**2**	**3**	**4**	**5**
1- TS	2.81±0.96					
2- ML	2.92±0.77	0.26*				
3- SL	3.24±1.04	0.13	0.30**			
4- EL	2.94±1.04	0.47**	0.28*	0.35**		
5- COM	3.40±0.70	-0.11	0.06	-0.06	-0.08	
Women basketball (n=10)	**X̄±SD**	**1**	**2**	**3**	**4**	**5**
1- TS	2.84±0.88					
2- ML	3.26±0.63	0.93**				
3- SL	3.31±0.76	0.87**	0.92**			
4- EL	2.62±1.14	0.84**	0.81**	0.79**		
5- COM	3.28±0.68	0.87**	0.94**	0.92**	0.82**	
Women handball (n=10)	**X̄±SD**	**1**	**2**	**3**	**4**	**5**
1- TS	2.03±0.85					
2- ML	2.31±0.91	0.54*				
3- SL	2.27±0.95	0.67**	0.61*			
4- EL	2.42±0.89	0.61**	0.74**	0.62**		
5- COM	3.14±0.86	0.68**	0.77**	0.74**	0.72**	
Women volleyball (n=9)	**X̄±SD**	**1**	**2**	**3**	**4**	**5**
1- TS	3.38±0.63					
2- ML	3.54±0.61	0.64**				
3- SL	3.47±0.59	0.67**	0.65**			
4- EL	3.37±0.56	0.59**	0.51*	0.68**		
5- COM	3.52±0.79	0.53**	0.49*	0.46*	0.55**	
General leadership (n=64)	**X̄±SD**	**1**	**2**	**3**	**4**	**5**
1- TS	2.69±0.85					
2- ML	2.87±0.79	0.57				
3- SL	2.93±0.75	0.54	0.59			
4- EL	2.55±1.00	0.49	0.47	0.53		
5- COM	3.12±0.79	0.44	0.49	0.44	0.37	

*p<0.01; **p<0.001; SD: Standard deviation; TS: Task leader; MT: Motivational leader; SL: Social leader; EL: External leadership; COM: Communication

In Table 4, regression analysis was conducted to test whether athletes' perceptions of leadership in each team could predict their communication with leader athletes. The results indicated significant statistical effects for certain leadership qualities in predicting communication within teams: In the women's volleyball team, perceptions of social leadership (β=0.47376; p<0.01) and external leadership (β=0.19836; p<0.01) were significant predictors. In the women's basketball team, task leadership (β=0.62545; p<0.01) and external leadership (β=0.42589; p<0.01) were significant. In the women's handball team, task leadership (β=0.20109; p<0.01), external leadership (β=0.17330; p<0.01), and motivational leadership (β=-0.44111; p<0.01) were significant. In the men's football team, social leadership (β=0.48659; p<0.01) was a significant predictor. In the men's basketball team, task leadership (β=0.40771; p<0.01) and social leadership (β=0.47295; p<0.01) were significant. These vari-

TABLE 4: Regression analysis of teams

Dependent variable: Communication perception							
Variable name	**Coefficient (Beta)**	**Standard error**	**t value**	**p value (2-tail)**	**p value (1-tail)**	**Lower 95%**	**Above 95%**
Volleyball women							
TS	0.18	0.13	0.13	0.13	0.86	0.25	0.00
EL	0.19	0.26	0.00	0.00	0.99	0.01	0.00
ML	-0.01	-0.01	0.46	0.53	0.46	0.89	-0.00
SL	0.47	0.48	0.00	0.00	0.99	0.00	0.00
Intercept	0.98	0.00	0.00	0.00	0.00	0.00	0.00
Basketball women							
TS	0.62	0.61	0.00	0.00	1.00	0.00	-0.00
EL	0.42	0.45	0.00	0.00	0.99	0.00	0.00
ML	-0.23	-0.24	0.08	0.91	0.08	0.18	0.00
SL	0.06	0.06	0.32	0.32	0.67	0.64	-0.00
Intercept	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Handball women							
TS	0.20	0.17	0.00	0.00	0.99	0.012	0.00
EL	0.17	0.21	0.01	0.01	0.98	0.024	0.00
ML	0.44	0.42	0.00	0.00	1.00	0.00	-0.00
SL	0.08	0.07	0.16	0.16	0.83	0.32	0.00
Intercept	0.17	0.00	0.00	0.00	0.00	0.00	0.00
Football men							
TS	-0.20	-0.14	0.03	0.96	0.03	0.06	0.00
EL	-0.28	-0.19	0.01	0.98	0.01	0.01	-0.00
ML	-0.00	-0.00	0.48	0.51	0.48	0.95	-0.00
SL	0.48	0.31	0.00	0.00	1.00	0.00	-0.00
Intercept	1.41	0.00	0.00	0.00	0.00	0.00	0.00
Basketball men							
TS	0.40	0.41	0.00	0.00	1.00	0.00	0.00
EL	-0.03	-0.02	0.40	0.59	0.40	0.79	-0.00
ML	0.12	0.09	0.12	0.12	0.87	0.26	-0.00
SL	0.47	0.26	0.00	0.00	0.99	0.00	-0.00
Intercept	0.00	0.00	0.00	0.00	0.00	0.00	0.00

*p<0.01; **p<0.001; TS: Task leader; EL: External leadership;MT: Motivational leader; SL: Social leader

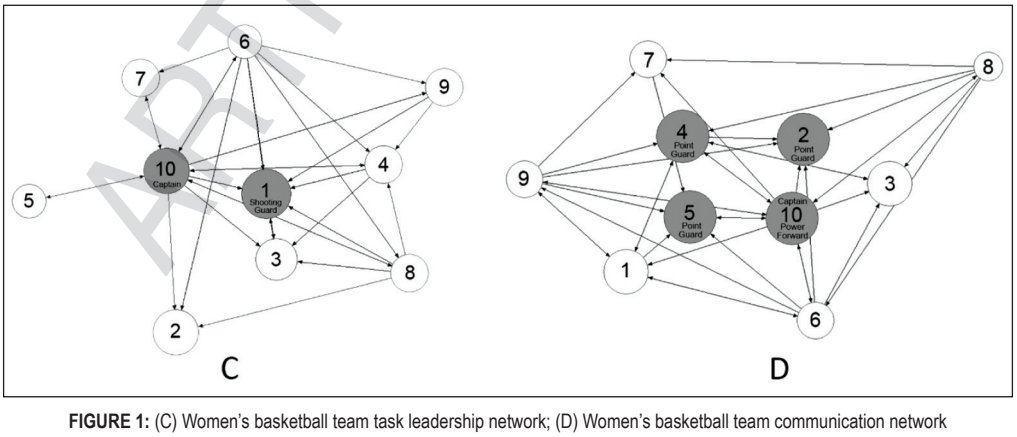

FIGURE 1: (C) Women's basketball team task leadership network; (D) Women's basketball team communication network

ables had a statistically significant impact on the model, as indicated by p values less than 0.05.

Figure 1 shows the task leadership and communication networks of the men's basketball team. In

the task leadership network, players 8 and 12 were perceived as the best task leaders by their teammates, as indicated by the larger node sizes (Figure 1A). In the communication network, players 3, 8, 10 and 12 were identified as the best communicators by their teammates (Figure 1B). The team captain (player 1), who is the official leader, has relatively smaller nodes in both images. This suggests that a player who is highly rated in one network (e.g., player 8 rated highly in task leadership) may be rated lower in another network (e.g., rated by fewer players in the communication network). In the women's basketball team, players 10 (team captain) and 1 (team captain) were perceived as the best task leaders by their teammates (Figure 1C). In the communication network, players 2, 4, 5 and 10 (captain) were perceived as the best communicators by their teammates (Figure 1D).

DISCUSSION

Social network theory is a management theory that examines strengthening and improving interpersonal relationships. This theoretical framework helps compare the perceived leadership qualities of coaches, team captains, and informal athlete leaders within a team. The purpose of this study was to examine how leadership roles among athletes are associated with intra-team communication using SNA.

The research found that team captains, who are official leaders, generally had lower average scores in task, motivational, external, and social leadership roles and communication compared to informal leaders within the team (H1). Being a captain was not found to be a significant predictor for the perceived quality of task, motivational, and external leaders (consistent with H1).

The study found that informal leaders in teams assume the roles of leadership and communication frequency (Table 2). Although team captains are official leaders and represent the team in formal settings like meetings and press conferences, they often scored lower in external leadership qualities compared to informal leaders. This finding supports research by Fransen et al. which also identified informal leaders as key in team leadership roles.[31] Additionally, similar results were found in studies by Fransen et al. and Hardy et al., highlighting the significant role of informal leaders in sports teams.[5,6]

In men's sports teams, correlations between various leadership qualities were generally moderate, while in women's teams, they were high (Table 2). This suggests that team members in women's teams perceive one another as both effective task and motivational leaders. This finding is consistent with Fransen et al., which reported moderate correlations between different leadership qualities.[6,31] A notable distinction in our study is the high correlations found within the leadership networks of women's teams. Additionally, the highest correlation across all teams was between social and motivational leadership (r=0.59), indicating that players with strong social leadership qualities are likely to exhibit motivational leadership qualities as well. This is believed to result from both types contributing to a positive team environment. Fransen et al. also found the highest correlation between task and motivational leadership, suggesting that tactical advice on the field enhances both task leadership and motivation.[31] Their 2nd-highest correlation was between social and motivational leadership, which partially aligns with our findings, as the 2nd-highest correlation in our study was between task and motivational leadership (r=0.57). These results support hypothesis H2.

Considering the role of communication in sports teams, Riggio et al. noted that players with better communication skills tend to be more effective leaders.[32] Yukelson emphasized that open and honest communication among team members enhances team effectiveness and helps in achieving goals, thereby developing leadership qualities.[33] Takamatsu and Yamakita found moderate correlations between communication and each leadership quality in three women's sports teams.[28] These results, highlighting the importance of communication in teams, support our findings, especially in women's sports teams. Smith et al. pointed out the significance of communication in highlighting a team captain's leadership and team cohesion.[34] However, this contrasts with our findings, where informal leaders generally took on both on-field and off-field leadership roles. For instance, our study showed that player number 8 (an informal leader) had a more central position compared

to player number 1 (an official leader) as seen in Figure 1A.

SNA, which identifies the leadership qualities and frequency of communication among all players in a team, can determine if a player who scores high in one leadership quality scores lower in another. The SNA conducted in our study established the leadership qualities and communication levels of both official (team captains) and informal players. Separate networks were created for 4 leadership qualities and communication. In these networks, only the strongest (excellent score of 4) leadership and communication scores were visualized. A larger node size in a network implies that a player occupies a central position in that network and is perceived by teammates as a good leader and communicator.

For example, Figure 1 shows the task leadership and communication networks of the men's basketball team. In the task leadership network, players numbered 8 and 12 were perceived by their teammates as the best task leaders, as indicated by their larger node sizes (Figure 1A). In the communication network, players 3, 8, 10, and 12 were identified by teammates as having the best communication (Figure 1B). The official leader, team captain (player number 1), had comparatively smaller nodes in both visuals. This indicates that a player scoring high in one network (e.g., player number 8 scoring high in task leadership) can score lower in another network (e.g., receiving scores from fewer players in the communication network).

The research investigated which of the 4 leadership roles in the leadership quality network explained the most variance in the communication network, with different results for men's and women's teams. For example, in women's basketball, volleyball, and handball teams, perceptions of external (basketball: $\beta=0.42$; $p<0.00$; volleyball: $\beta=0.19$; $p<0.00$; handball: $\beta=0.17$; $p<0.00$), task (basketball: $\beta=0.62$; $p<0.00$; handball: $\beta=0.20$; $p<0.00$), and social leadership qualities (volleyball: $\beta=0.47$; $p<0.00$) emerged as significant predictors of communication. In the men's football team, social leadership ($\beta=0.48$; $p<0.00$), and in the men's basketball team, task leadership ($\beta=0.40$; $p<0.00$) and social leadership ($\beta=0.47$; $p<0.00$) were predictors of communication.

Thus, in women's teams, athlete leaders displaying external (H6) and task leadership (H4) roles were seen as having very good communication. Bu sonuçlar çalışmamız sonuçlarıyla örtüşmektedir. In men's teams, the perception of communication was an important factor when evaluating a player leader's social leadership quality (H7). For both women's and men's teams, motivational leadership was not a significant predictor in evaluating communication quality (H5). Although motivational leadership is effective in increasing the performance and commitment of team members, it is not decisive in evaluating a multidimensional phenomenon such as communication quality. This is because communication quality is shaped by elements such as openness, feedback, empathy and information sharing, and these elements are more influenced by communication-oriented leadership styles. Coker et al, Takamatsu and Yamakita, Özbey and Yılmaz yaptıkları çalışmalarında her bir sporcu liderlik türü ile iletişim arasında orta düzeyde ilişki olduğunu tespit etmişlerdir. Elde edilen bulgular, literatürdeki mevcut araştırmalarla karşılaştırıldığında bazı benzerlikler göstermektedir.[28,35,36] The lack of predictive power for motivational leadership may suggest that motivation is perceived as a team-wide phenomenon rather than an individual leader attribute. In conclusion, most teams have high-quality social leaders in the most central positions in the communication network, followed by task, external, and motivational leadership. It may also reflect cultural preferences in leadership distribution, where informal peer influence may outweigh hierarchical authority.

CONCLUSION

In conclusion, our study found a moderate correlation between athlete leadership and communication. Additionally, the relationship between athlete leadership and communication was found to be stronger in women's sports teams compared to men's teams. It was also observed that team captains, who serve as official leaders, were not perceived as task, motivational, social, or external leaders by their teammates. Instead, these leadership roles were more often assumed by other players (informal leaders) within the team. The highest correlation was found between so-

cial and motivational leadership, and the 2nd-highest was between task and motivational leadership.

Our findings suggest that communication plays a key role in athletes' perceptions of leadership. Athletes may hold central positions in some networks but different roles in others. Given the influence of leadership quality and communication on team performance, coaches should foster environments that promote both leadership and effective communication. Team captains, as official leaders, should take responsibility for creating a positive team atmosphere, communicating inclusively, and gaining teammates' trust. Improved communication and team harmony can enhance overall performance. It also depends on the athletes' age, athletic abilities, playing experience, team status, etc. It can be included in social network research because of how individual characteristics can be structured by the team's missing social relationships.

The fact that the study was limited to only five teams and the 2nd league may limit the generalizability of the findings. The inclusion of more teams and different league categories in future studies will allow for more robust and reliable testing of the results.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

All authors contributed equally while this study preparing.

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